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medical**

# **USMLE** **Step 1**

**Lecture Notes**

**Behavioral Science**

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# Epidemiology



Epidemiology is the study of the distribution and determinants of health-related states within a population.

- Epidemiology sees disease as distributed within a group, not as a property of an individual.
- The tools of epidemiology are numbers. Numbers in epidemiology are ratios converted into rates.
- The denominator is key: who is “at risk” for a particular event or disease state.
- Rates are generally, but not always, per 100,000 by the Centers for Disease Control and Prevention (CDC), but can be per any multiplier.
- Compare the number of actual cases with the number of potential cases to determine the rate.

$$\frac{\text{Actual cases}}{\text{Potential cases}} = \frac{\text{Numerator}}{\text{Denominator}} = \text{RATE}$$

## A. Incidence and Prevalence

1. **Incidence rate:** the rate at which **new events** occur in a population. The numerator is the number of NEW events that occur in a defined period; the denominator is the population at risk of experiencing this new event during the same period.

$$\text{Incidence rate} = \frac{\text{Number of new events in a specified period}}{\text{Number of persons "exposed to risk" during this period}} \times 10^n$$

- a. Attack rate: a type of incidence rate in which the denominator is further reduced for some known exposure
  - b. Focus on acute conditions
2. **Prevalence rate:** all persons who experience an event in a population. The numerator is ALL individuals who have an attribute or disease at a particular point in time (or during a particular period of time); the denominator is the population at risk of having the attribute or disease at this point in time or midway through the period.

$$\text{Prevalence rate} = \frac{\text{All cases of a disease at a given point/period}}{\text{Total population "at risk" at a given point or period}} \times 10^n$$

- a. Point prevalence: prevalence at a specified point in time
- b. Period prevalence: prevalence during a specified period or span of time
- c. Focus on chronic conditions

## Note

### The USMLE Requires You to Know:

- The definitions and use of rates
- Incidence and prevalence
- Standardized rates
- Use and computations for screening tests
- How to identify bias in research
- Common study designs

d. Prevalence can be **changed by simply** moving the cutoff that defines what constitutes a case of disease.

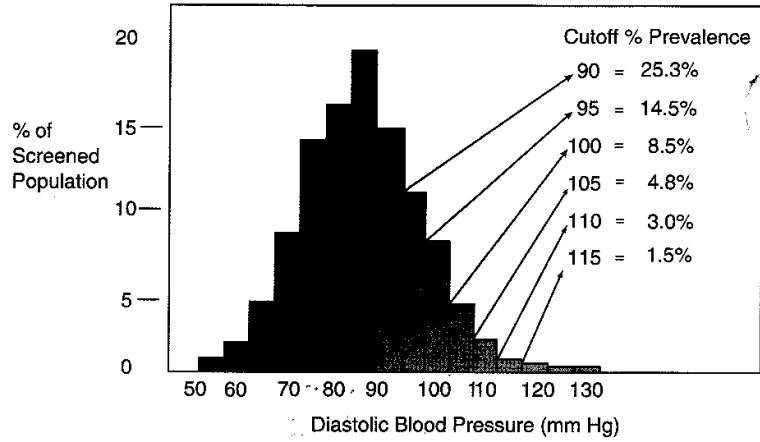


Figure 1-1. Prevalence of Hypertension

3. Understanding the relationship between incidence and prevalence

a.  $Prevalence = Incidence \times Duration$  ( $P = I \times D$ )

b. "Prevalence pot"

- i. Incident cases or new cases are monitored over time.
- ii. New cases join pre-existing cases to make up total prevalence.
- iii. Prevalent cases leave the prevalence pot in one of two ways: recovery or death.

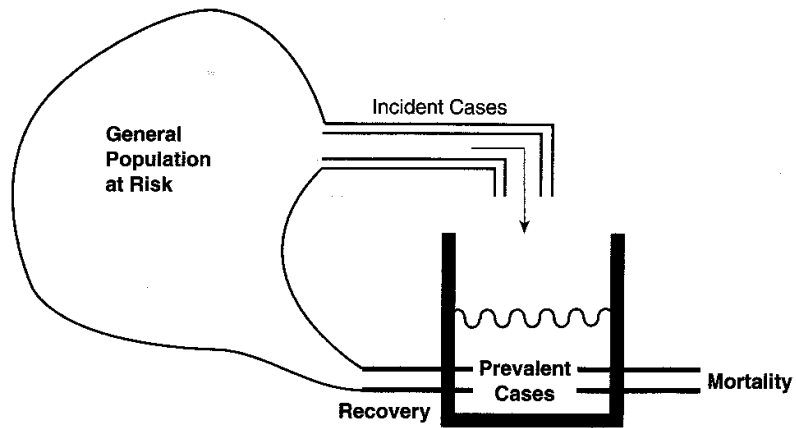


Figure 1-2. Prevalence Pot

Table 1-1. Incidence and Prevalence

What happens to incidence and prevalence if:	Incidence	Prevalence
New effective treatment is initiated?	N	↓
New effective vaccine gains widespread use?	↓	↓
Number of persons dying from the condition increases?	N	↓
Additional Federal research dollars are targeted to a specific condition?	N	N
Behavioral risk factors are reduced in the population at large?	↓	↓
Contacts between infected persons and noninfected persons are reduced: For airborne infectious disease? For noninfectious disease?	↓ N	↓ N
Recovery from the disease is more rapid than it was 1 year ago?	N	↓
Long-term survival rates for the disease are increasing?	N	↑

N = no change; ↓ = decrease; ↑ = increase

4. Morbidity rate: rate of disease in a population at risk; refers to both incident and prevalent cases
5. Mortality rate: rate of death in a population at risk; refers to incident cases only





## Practice Question

1. Why does Population A have a higher crude rate of disease compared with Population C?  
(Hint: Look at the age distribution.)

Table 1-2. Disease Rates Positively Correlated with Age

		Population A		Population B		Population C	
		Cases	Population	Cases	Population	Cases	Population
Younger	1/1,000	1	1,000	2	2,000	3	3,000
Intermediate	2/1,000	4	2,000	4	2,000	4	2,000
Older	3/1,000	9	3,000	6	2,000	3	1,000
		14	6,000	12	6,000	10	6,000
Crude Rates	Per/1,000	2.3		2.0		1.6	

Table 1-3. Types of Mortality Rates

Crude mortality rate	Deaths per population
Cause-specific mortality rate	Deaths from a specific cause per population
Case-fatality rate	Deaths from a specific cause per number of persons with the disease
Proportionate mortality rate (PMR)	Deaths from a specific cause per all deaths

Table 1-4. Screening Results in a 2 × 2 Table

		Disease				Totals
		Present		Absent		
Screening Test Results	Positive	TP	60	FP	70	TP+FP
	Negative	FN	40	TN	30	TN+FN
	Totals	TP+FN		TN+FP		TP+TN+FP+FN

TP=true positives; TN=true negatives; FP=false positives; FN=false negatives

C. Understanding Screening Tests

1. **Sensitivity:** the probability of correctly identifying a case of disease. Sensitivity is the **proportion of truly diseased persons** in the screened population who are **identified as diseased** by the screening test. This is also known as the “true positive rate.”

$$\begin{aligned} \text{Sensitivity} &= \text{TP}/(\text{TP} + \text{FN}) \\ &= \text{true positives}/(\text{true positives} + \text{false negatives}) \end{aligned}$$

- a. Measures only the distribution of persons with disease
- b. Uses data from the left column of the 2 × 2 table (Table 1-4)
- c. 1-sensitivity = false negative rate

2. **Specificity:** the probability of correctly identifying disease-free persons. Specificity is the **proportion of truly nondiseased persons** who are **identified as nondiseased** by the screening test. This is also known as the “true negative rate.”

$$\begin{aligned} \text{Specificity} &= \text{TN}/(\text{TN} + \text{FP}) \\ &= \text{true negatives}/(\text{true negatives} + \text{false positives}) \end{aligned}$$

- a. Measures only the distribution of persons who are disease-free
- b. Uses data from the right column of the 2 × 2 table
- c. 1-specificity = false positive rate

3. **Positive predictive value:** the probability of disease in a person who receives a positive test result. The probability that a **person with a positive test is a true positive**. (i.e., has the disease) is referred to as the “predictive value of a positive test.”

$$\begin{aligned} \text{Positive predictive value} &= \text{TP}/(\text{TP} + \text{FP}) \\ &= \text{true positives}/(\text{true positives} + \text{false positives}) \end{aligned}$$

- a. Measures only the distribution of persons who receive a positive test result
- b. Uses data from the top row of the 2 × 2 table

4. **Negative predictive value:** the probability of no disease in a person who receives a negative test result. The probability that a **person with a negative test is a true negative** (i.e., does not have the disease) is referred to as the “predictive value of a negative test.”

$$\begin{aligned} \text{Negative predictive value} &= \text{TN}/(\text{TN} + \text{FN}) \\ &= \text{true negatives}/(\text{true negatives} + \text{false negatives}) \end{aligned}$$

- a. Measures only the distribution of persons who receive a negative test result
- b. Uses data from the bottom row of the 2 × 2 table

5. **Accuracy:** total percentage correctly selected; the degree to which a measurement, or an estimate based on measurements, represents the true value of the attribute that is being measured.

$$\text{Accuracy} = (TP + TN)/(TP + TN + FP + FN)$$

$$= (\text{true positives} + \text{true negatives})/\text{total screened patients}$$

#### Practice Questions

1. What is the effect of increased incidence on sensitivity? On positive predictive value? (None; screening does not assess incidence.)
2. What is the effect of increased prevalence on sensitivity? On positive predictive value? (Sensitivity stays the same, positive predictive value increases.)

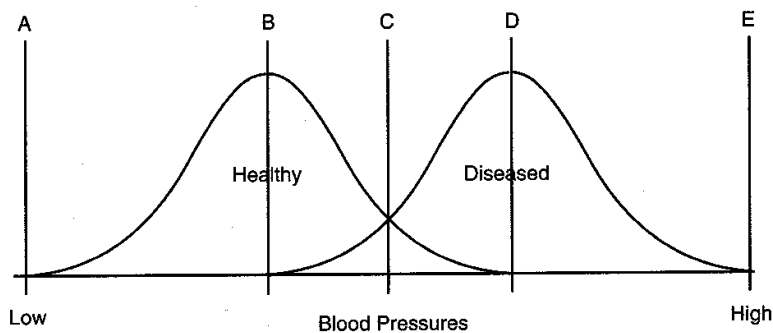


Figure 1-4. Healthy and Diseased Populations Along a Screening Dimension

1. Which cutoff point provides optimal sensitivity? (B) Specificity? (D) Accuracy? (C) Positive predictive value? (D)
2. Note: point of optimum sensitivity = point of optimum negative predictive value  
point of optimum specificity = point of optimum positive predictive value

#### D. Study Designs

1. Bias in research: deviation from the truth of inferred results
  - a. **Reliability:** ability of a test to **measure something consistently**, either across testing situations (test-retest reliability), within a test (split-half reliability), or across judges (inter-rater reliability). Think of the clustering of rifle shots at a target. **Precision**
  - b. **Validity:** degree to which a test **measures that which was intended**. Think of a marksman hitting the bulls-eye. Reliability is a necessary, but insufficient, condition for validity. **Accuracy**
2. Types of bias
  - a. **Selection bias** (sampling bias): the **sample selected is not representative** of the population. Examples:
    - i. Predicting rates of heart disease by gathering subjects from a local health club

- ii. Using only **hospital records** to estimate population prevalence (Berkson's bias)
  - iii. People included in a **study are different** than those who are not (non-responder bias)
- b. **Measurement bias**: information is **gathered in a manner that distorts the information**. Examples:
- i. Measuring patients' satisfaction with their respective physicians by using leading questions, e.g., "You don't like your doctor, do you?"
  - ii. Subjects' behavior is altered because they are being studied (Hawthorne effect). Only a factor when there is no control group in a prospective study
- c. **Experimenter expectancy** (Pygmalion effect): **experimenter's expectations inadvertently communicated** to subjects, who then produce the desired effects. Can be avoided by **double-blind design**, where neither the subject nor the investigators who have contact with them know which group receives the intervention under study and which group is the control
- d. **Lead-time bias**: gives a **false estimate of survival rates**. Example: Patients seem to live longer with the disease after it is uncovered by a screening test. Actually, there is no increased survival, but because the disease is discovered sooner, patients who are diagnosed *seem* to live longer.
- e. **Recall bias**: subjects **fail to accurately recall events** in the past. Example: "How many times last year did you kiss your mother?" Likely problem in retrospective studies
- f. **Late-look bias**: **individuals with severe disease are less likely to be uncovered** in a survey **because they die first**. Example: a recent survey found that persons with AIDS reported only mild symptoms.
- g. **Confounding bias**: **factor being examined is related to other factors** of less interest. Unanticipated factors obscure a relationship or make it seem like there is one when there is not. More than one explanation can be found for the presented results. Example: comparing the relationship between exercise and heart disease in two populations when one population is younger and the other is older. Are differences in heart disease due to exercise or to age?

Table 1-5. Type of Bias in Research and Important Associations

Type of Bias	Definition	Important Associations	Solutions
Selection	Sample not representative	Berkson's bias, nonrespondent bias	Random, independent sample
Measurement	Gathering the information distorts it	Hawthorne effect	Control group/placebo group
Experimenter expectancy	Researcher's beliefs affect outcome	Pygmalion effect	Double-blind design
Lead-time	Early detection confused with increased survival	Benefits of screening	Measure "back-end" survival
Recall	Subjects cannot remember accurately	Retrospective studies	Multiple sources to confirm information
Late-look	Severely diseased individuals are not uncovered	Early mortality	Stratify by severity
Confounding	Unanticipated factors obscure results	Hidden factors affect results	Multiple studies, good research design

3. Observational studies: nature is allowed to take its course, no intervention
- a. Case report: brief, objective report of a **clinical characteristic or outcome from a single clinical subject** or event,  $n = 1$ . E.g., 23-year-old man with treatment-resistant TB. No control group
  - b. Case series report: objective report of a **clinical characteristic or outcome from a group of clinical subjects**,  $n > 1$ . E.g., patients at local hospital with treatment-resistant TB. No control group
  - c. Cross-sectional study: the **presence or absence of disease and other variables** are determined in each member of the study population or in a representative sample **at a particular time**. The co-occurrence of a variable and the disease can be examined.
    - i. Disease prevalence rather than incidence is recorded.
    - ii. The temporal sequence of cause and effect cannot usually be determined in a cross-sectional study, e.g., who in the community now has treatment-resistant TB.
  - d. Case-control study: identifies a **group of people with the disease and compares them with a suitable comparison group without the disease**. Almost always retrospective. E.g., comparing cases of treatment-resistant TB with cases of non-resistant TB
    - i. Cannot assess incidence or prevalence of disease
    - ii. Can help determine causal relationships
    - iii. Very useful for studying conditions with very low incidence or prevalence
  - e. Cohort study: population group of those who have been **exposed to risk factor** is identified and followed over time and **compared with a group not exposed to the risk factor**. Outcome is disease incidence in each group, e.g., following a prison inmate population and marking the development of treatment-resistant TB.

**Note**

- Random error is unfortunate but OK and expected (a threat to reliability)
- Systematic error is bad and biases result (a threat to validity)

- i. Prospective; subjects tracked forward in time
- ii. Can determine incidence and causal relationships
- iii. Must follow population long enough for incidence to appear

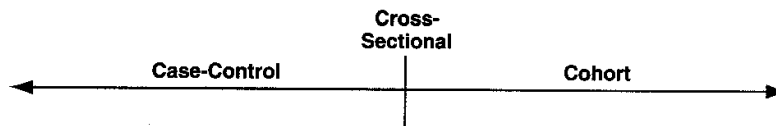


Figure 1-5. Differentiating Study Types by Time

4. Analyzing observational studies

- For cross-sectional studies: use chi-square ( $\chi^2$ )
- For cohort studies: use relative risk and/or attributable risk
- a. Relative risk (RR): comparative probability asking “How much more likely?”
  - i. Incidence rate of exposed group divided by the incidence rate of the unexposed group

How much greater chance does one group have of contracting the disease compared with the other group?

- ii. E.g., if infant mortality rate in whites is 8.9 per 1,000 live births and 18.0 in blacks per 1,000 live births, then the relative risk of blacks versus whites is 18.0 divided by 8.9 = 2.02. Compared with whites, black infants are twice as likely to die in the first year of life.
- iii. For statistical analysis, yields a p-value

b. Attributable risk (AR): comparative probability asking “How many more cases in one group?”

- i. Incidence rate of **exposed group minus** the incidence rate of the **unexposed group**
- ii. Using the same example, attributable risk is equal to 18.0 minus 8.9 = 9.1. Of every 1,000 black infants, there were 9.1 more deaths than were observed in 1,000 white infants. In this case attributable risk gives the excess mortality.
- iii. Note that both relative risk and attributable risk tell us if there are differences, but do not tell us why those differences exist.

• For case-control studies: use odds ratio (OR)

c. Odds ratio: looks at the increased odds of getting a disease with exposure to a risk factor versus nonexposure to that factor

- i. Odds of **exposure for cases** divided by odds of **exposure for controls**
- ii. The odds that a person with lung cancer was a smoker versus the odds that a person without lung cancer was a smoker

Table 1-6. Case-Control Study: Lung Cancer and Smoking

	Lung Cancer	No Lung Cancer
Smokers	659 (A)	984 (B)
Nonsmokers	25 (C)	348 (D)

iii. Odds ratio =  $\frac{A/C}{B/D} = \frac{AD}{BC}$

iv. Use OR = AD/BC as working formula

v. For the above example:

$$OR = \frac{AD}{BC} = \frac{659 \times 348}{984 \times 25} = 9.32$$

vi. The odds of having been a smoker are more than nine times greater for someone with lung cancer compared with someone without lung cancer.

#### Practice Question

How would you analyze the data from this case-control study?

Table 1-7. Case-Control Study: Colorectal Cancer and Family History Practice

	No Colorectal Cancer	Colorectal Cancer	TOTALS
Family History of Colorectal Cancer	120	60	180
No Family History of Colorectal Cancer	200	20	220
TOTALS	320	80	400
ANSWER:	$\frac{AD}{BC}$	$\frac{(60)(200)}{(120)(20)}$	OR = 5.0

vii. This means that the odds of having a family history of colorectal cancer are five times greater for those who have the disease than for those who do not.

Table 1-8. Differentiating Observational Studies

Characteristic	Cross-Sectional Studies	Case-Control Studies	Cohort Studies
Time	One time point	Retrospective	Prospective
Incidence	NO	NO	YES
Prevalence	YES	NO	NO
Causality	NO	YES	YES
Role of disease	Measure disease	Begin with disease	End with disease
Assesses	Association of risk factor and disease	Many risk factors for single disease	Single risk factor affecting many diseases
Data analysis	Chi-square to assess association	Odds ratio to estimate risk	Relative risk to estimate risk

5. Clinical trials (intervention studies): research that involves the **administration of a test regimen** to evaluate its safety and efficacy
  - a. Control group: subjects who **do not receive the intervention under study**; used as a **source of comparison** to be certain that the experiment group is being affected by the intervention and not by other factors. In clinical trials, this is most often a placebo group. Note that control group subjects must be **as similar as possible to intervention group** subjects.
  - b. For Food and Drug Administration (FDA) approval, three phases of clinical trials must be passed.
    - i. Phase One: testing **safety in healthy volunteers**
    - ii. Phase Two: testing **protocol and dose levels** in a small group of **patient volunteers**
    - iii. Phase Three: testing **efficacy and occurrence of side effects** in a larger group of **patient volunteers**. Phase III is considered the definitive test.
  - c. Randomized controlled clinical trial (RCT)
    - i. Subjects in the study are **randomly allocated** into “intervention” and “control” groups to receive or not receive an experimental preventive or therapeutic procedure or intervention.
    - ii. Generally regarded as the **most scientifically rigorous** studies available in epidemiology
    - iii. **Double-blind RCT** is the type of study **least subject to bias**, but also the **most expensive** to conduct. Double-blind means that neither subjects nor researchers who have contact with them know whether the subjects are in the treatment or comparison group.
  - d. Community trial: experiment in which the unit of allocation to receive a preventive or therapeutic regimen is an **entire community or political subdivision**. Does the treatment work in real world circumstances?



- e. Cross-over study: for ethical reasons, no group involved can remain untreated. **All subjects receive intervention**, but at different times:  
 E.g., AZT trials. Assume double-blind design. Group A receives AZT for 3 months, Group B is control. For second 3 months, Group B receives AZT and Group A is control.

### Chapter Summary

Epidemiology is the study of the rate of disease in a population.

Rate = actual/potential

Incidence = NEW cases      Prevalence = ALL cases

Prevalence = Incidence  $\times$  Duration

Screening test calculation rule: "Trues on top and divide by everything"

Sensitivity = detection of disease =  $TP/TP+FN$

Specificity = identifying the healthy =  $TN/TN+FP$

Positive predictive value = % of positives that are truly diseased =  $TP/TP+FP$

Negative predictive value = % of negatives that are truly nondiseased =  $TN/TN+FN$

Accuracy = how often the test is right overall =  $TP + TN/TP + TN + FP + FN$

Important types of bias are selection, measurement, expectancy, lead-time, recall, late-look, and confounding.

Observational Studies:

Case report	Single patient
Case series	Several patients
Cross-sectional	One point in time
Case-control	Backward in time, odds ratio
Cohort	Forward in time, relative risk and attributable risk

Intervention Studies:

Clinical trials	The ultimate test
Double-blind designs	Neither subjects nor researchers know
Community trials	Testing in "real life"
Crossover trials	No untreated participants



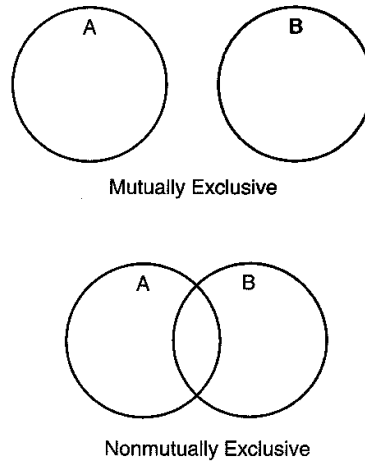
## A. Key Probability Rules

1. Independence: across multiple events
  - a. Combine probabilities for independent events by **multiplication**
    - i. Events are independent if the **occurrence of one tells you nothing about the occurrence of another**. The issue here is the intersection of two sets.
    - ii. E.g., if the chance of having blond hair is 0.3 and the chance of having a cold is 0.2, the chance of meeting a blond-haired person with a cold is:  $0.3 \times 0.2 = 0.06$  (or 6%)
  - b. If events are nonindependent
    - i. Multiply the probability of one event by the probability of the second, assuming that the first has occurred.
    - ii. E.g., if a box has five white balls and five black balls, the chance of picking two black balls is:  $(5/10) \times (4/9) = 0.5 \times 0.44 = 0.22$  (or 22%)
2. Mutually exclusive: within a single event
  - a. Combine probabilities for mutually exclusive events by **addition**
    - i. Mutually exclusive means that the **occurrence of one event precludes the occurrence of the other**. The issue here is the union of two sets.
    - ii. E.g., if a coin lands on heads, it cannot be tails; the two are mutually exclusive. If a coin is flipped, the chance that it will be either heads or tails is:  $0.5 + 0.5 = 1.0$  (or 100%)
  - b. If two events are not mutually exclusive
    - i. The combination of probabilities is accomplished by adding the two together and subtracting out the multiplied probabilities.
    - ii. E.g., if the chance of having diabetes is 10% and the chance of being obese is 30%, the chance of meeting someone who is obese or had diabetes or both is:  $0.1 + 0.3 - (0.1 \times 0.3) = 0.37$  (or 37%)

## Note

### The USMLE Requires You to Know:

- Rules governing joint probability
- Types of central tendency
- Measures of variation
- Constant percentages under the normal curve
- Computing and using confidence intervals, including standard errors and z-scores
- Types of scales
- The logic of statistics, including p-values and Type I and Type II errors
- How to choose among very basic statistical tests. You do not need to know all of statistics, but just enough to answer the presented questions



**Figure 2-1. Venn Diagram Representations of Mutually Exclusive and Nonmutually Exclusive Events**

**Practice Questions**

1. If the prevalence of diabetes is 10%, what is the chance that three people selected at random from the population will all have diabetes? ( $0.1 \times 0.1 \times 0.1 = 0.001$ )
2. Chicago has a population of 10,000,000. If 25% of the population is Latino, 30% is African American, 5% is Arab American, and 40% are of European extraction, how many people in Chicago are classified as other than of European extraction? ( $25\% + 30\% + 5\% = 60\%$ .  $60\% \times 10,000,000 = 6,000,000$ )
3. At age 65, the probability of surviving for the next 5 years is 0.8 for a white man and 0.9 for a white woman. For a married couple who are both white and age 65, the probability that the wife will be a living widow 5 years later is:  
(A) 90%  
(B) 72%  
(C) 18%  
(D) 10%  
(E) 8%

**Answer: C.** This question asks for the joint probability of independent events; therefore, the probabilities are multiplied. Chance of the wife being alive: 90%. Chance of the husband being dead:  $100\% - 80\% = 20\%$ . Therefore,  $0.9 \times 0.2 = 18\%$ .

4. If the chance of surviving for 1 year after being diagnosed with prostate cancer is 80% and the chance of surviving for 2 years is 60%, what is the chance of surviving for 2 years given that the patient is alive at the end of the first year?

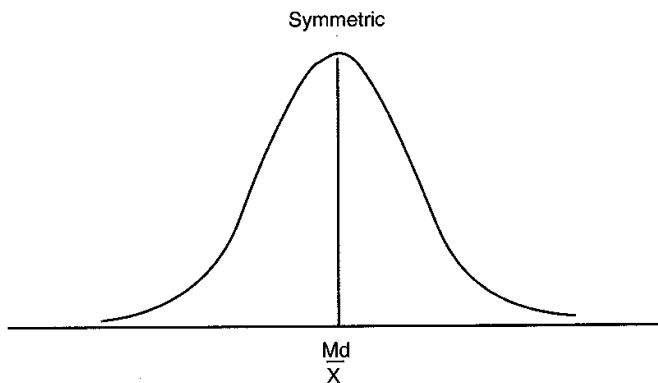
- (A) 20%
- (B) 48%
- (C) 60%
- (D) 75%
- (E) 80%

Answer: D. The question tests knowledge of “conditional probability.” Out of 100 patients, 80 are alive at the end of 1 year and 60 at the end of year two. The 60 patients alive after 2 years are a subset of those that make it to the first year. Therefore,  $60/80 = 75\%$ .

**B. Descriptive Statistics: Summarizing the Data**

1. Distributions

Statistics deals with the world as distributions. These distributions are summarized by a **central tendency and variation around that center**. The most important distribution is the **normal or Gaussian curve**. This “bell-shaped” curve is **symmetric**, with one side the mirror image of the other.



**Figure 2-2. Measures of Central Tendency**

- a. Central tendency is a general term for several characteristics of the distribution of a set of values or measurements around a value **at or near the middle of the set**.
- b. **Mean ( $\bar{X}$ ): a synonym for average**. The sum of the values of the observations divided by the numbers of observations
- c. **Median (Md)**: the simplest division of a set of measurements is into two parts — the upper and lower half. The **point on the scale that divides the group** in this way is the median. The measurement below which half the observations fall: the 50th percentile
- d. **Mode**: the **most frequently occurring value** in a set of observations

Given the distribution of numbers: 3, 6, 7, 7, 9, 10, 12, 15, 16

The mode is 7, the median is 9, the mean is 9.4

- e. Skewed curves: not all curves are normal. Sometimes the curve is skewed, either positively or negatively. A **positive skew** has the tail to the right and the **mean greater than the median**. A **negative skew** has the tail to the left and the **median greater than the mean**. For skewed distributions, the median is a better representation of central tendency than is the mean.

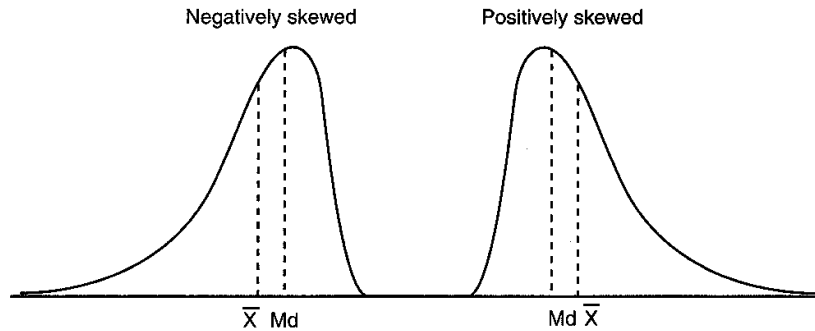


Figure 2-3. Skewed Distribution Curves

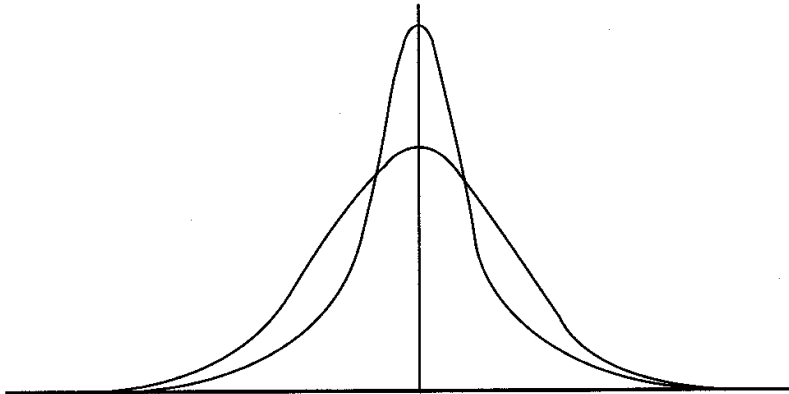
2. Measures of variability

The simplest measure of variability is the **range**, the difference between the highest and the lowest score. But the range is unstable and changes easily. A more stable and more useful measure of dispersion is the **standard deviation**.

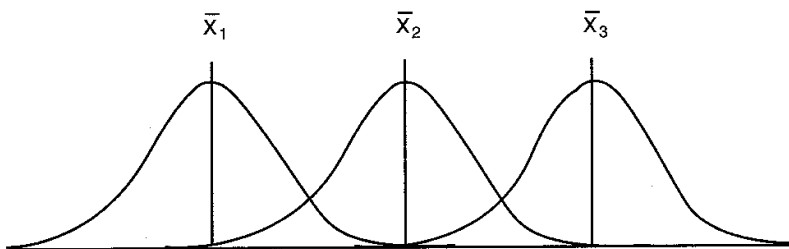
- a. To calculate the standard deviation, we first subtract the mean from each score to obtain **deviations from the mean**. This will give us both positive and negative values. But squaring the deviations, the next step, makes them all positive. The squared deviations are added together and divided by the number of cases. The square root is taken of this average, and the result is the standard deviation (S or SD).

$$s = \sqrt{\frac{\sum(X - \bar{X})^2}{n - 1}}$$

The square of the standard deviation ( $s^2$ ) equals the **variance**.



**Figure 2-4. Comparison of Two Normal Curves with the Same Means, but Different Standard Deviations**



**Figure 2-5. Comparison of Three Normal Curves with the Same Standard Deviations, but Different Means**

- b. You will not be asked to calculate a standard deviation or variance on the exam, but you do need to know what they are and how they relate to the normal curve. In ANY normal curve, a constant proportion of the cases fall within one, two, and three standard deviations of the mean.
- i. Within one standard deviation: 68%
  - ii. Within two standard deviations: 95.5%
  - iii. Within three standard deviations: 99.7%

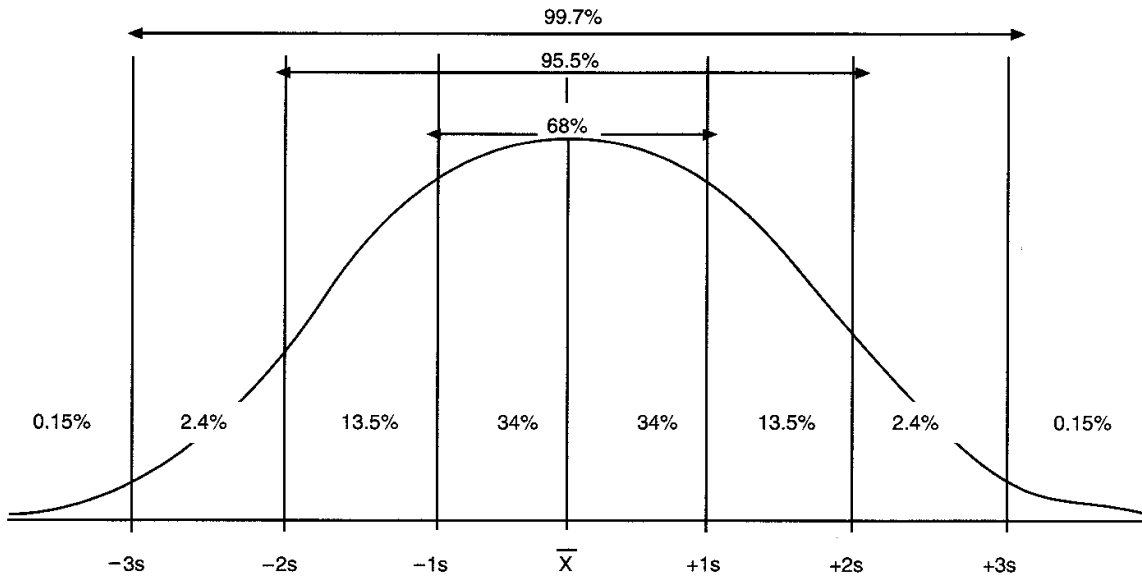


Figure 2-6. Percentage of Cases Within One, Two, and Three Standard Deviations of the Mean in a Normal Distribution

Know the constant presented in Figure 2-6 and be able to combine the given constants to answer simple questions.

**Practice Questions**

1. In a normal distribution curve, what percent of the cases are below 2s below the mean? (2.5%)
2. In a normal distribution curve, what percent of the cases are above 1s below the mean? (84%)
3. A student who scores at the 97.5 percentile falls where on the curve? (2s above the mean)
4. A student took two tests:

	<u>Score</u>	<u>Mean</u>	<u>Standard Deviation</u>
Test A	45	30	5
Test B	60	40	10

On which test did the student do better? (On Test A, she scored 3s above the mean versus only 2s above the mean for Test B.) Test A



### C. Inferential Statistics: Generalizations From a Sample to the Population as a Whole

The purpose of inferential statistics is to designate **how likely it is that a given finding is simply the result of chance**. Inferential statistics would not be necessary if investigators studied all members of a population. However, because we can rarely observe and study entire populations, we try to select samples that are representative of the entire population so that we can **generalize the results from the sample to the population**.

#### 1. Confidence intervals

Confidence intervals are a way of admitting that any measurement from a sample is only an **estimate** of the population. Although the estimate given from the sample is likely to be close, the true values for the population may be above or below the sample values. A confidence interval **specifies how far above or below a sample-based value the population value lies** within a given range, from a possible high to a possible low. The true mean, therefore, is most likely to be somewhere within the specified range.

#### 2. Confidence interval of the mean

The confidence interval contains two parts:

- a. An estimate of the quality of the sample for the estimate, known as the **standard error of the mean**;
- b. The degree of confidence provided by the interval specified, known as the standard or **Z-score**.
- c. The confidence interval of the mean can be calculated by:

$$\text{Mean} \pm \text{appropriate Z-score} \times \text{standard error of the mean} = \bar{X} \pm Z (S/\sqrt{N})$$

- d. Standard error of the mean is the **standard deviation divided by the square root of the sample size**
  - i. If the standard deviation is larger, the chance of error in the estimate is greater.
  - ii. If the sample size is larger, the chance of error in the estimate is less.
- e. Z-score or standard score is a score from a normal distribution with a mean of 0 and a standard deviation of 1. Any distribution can be converted into a Z-score distribution using the formula:

$$Z = (X - \bar{X})/S$$

- i. The Z-score distribution is easy to use for calculations because it has simple values. All points in a Z-score distribution are **represented in standard deviation units**.
- ii. Positive scores are above the mean; negative scores are below the mean. Therefore, a Z-score of +2.0 is exactly two standard deviations above the mean; a Z-score of -1.5 is exactly 1.5 standard deviations below the mean.
- f. Z-scores are used in computing confidence intervals to set the level of confidence. Recall that in a normal distribution, 95.5% of the cases are within two standard deviations (2s) of the mean. To get 95% confidence and 99% confidence, all we need to know is what symmetric Z-score to use to contain exactly 95% and 99% of the cases.
  - i. For 95% confidence = 1.96  
for calculation purposes, use Z-score of 2.0

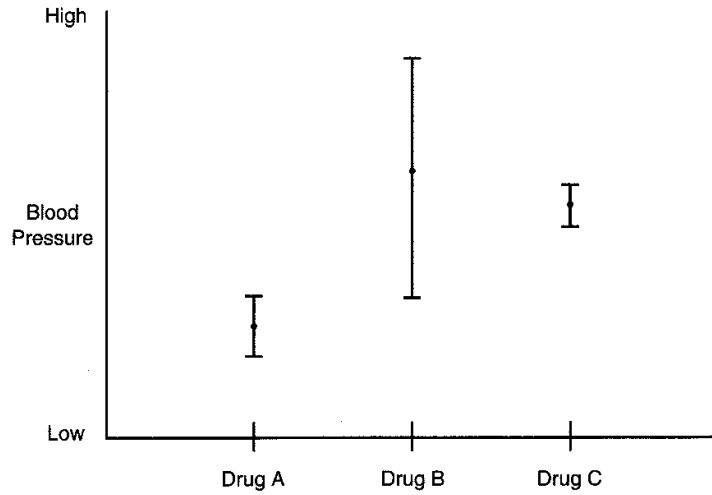
- ii. For 99% confidence = 2.58  
for calculation purposes, use Z-score of 2.5
- iii. Note that a 99% confidence interval will be wider than a 95% interval.

**Practice Questions**

1. Forty-nine women, aged 15 to 25, were selected in a random sample of a local neighborhood. Each woman was given a full physical exam, including measurement of weight. The results show the group has a mean weight of 140 lb, with a standard deviation of 3.5. Specify the 95% confidence interval for this sample.

Answer:  $140 \pm 2.0 \times (3.5/\sqrt{49}) =$  approximately 139 to 141. This tells us that we are 95% sure that the true mean (if we measured the whole population) rests between 139 and 141.

2. Assuming the graph (Figure 2-7) presents 95% confidence intervals, which groups, if any, are statistically different from each other?



**Figure 2-7. Blood Pressures at End of Clinical Trial for Three Drugs**

Answer: When comparing two groups, any overlap of confidence intervals means the groups are not significantly different. Therefore, if the graph represents 95% confidence intervals, Drugs B and C are no different in their effects; Drug B is no different from Drug A; Drug A has a better effect than Drug C.

3. Confidence intervals for relative risk and odds ratios  
If the given confidence interval contains 1.0, then there is no statistically significant effect of exposure.

Example:

<u>Relative Risk</u>	<u>Confidence Interval</u>	<u>Interpretation</u>
1.57	(1.12 – 2.25)	Statistically significant (increased risk)
1.65	(0.89 – 2.34)	NOT statistically significant (risk is the same)
0.76	(0.56 – 0.93)	Statistically significant (decreased risk)

**D. Nominal, Ordinal, Interval, and Ratio Scales**

To convert the world into numbers, we use four types of scales.

**Table 2-1. Types of Scales in Statistics**

Type of Scale	Description	Key Words	Examples
Nominal (Categorical)	Different groups	This or that or that	Gender, comparing among treatment interventions
Ordinal	Groups in sequence	Comparative quality, rank order	Olympic medals, class rank in medical school
Interval	Exact differences among groups	Quantity, mean, and standard deviation	Height, weight, blood pressure, drug dosage
Ratio	Interval + true zero point	Zero means zero	Temperature measured in degrees Kelvin

1. Nominal or categorical scale

A nominal scale puts people into boxes, without specifying the relationship between the boxes. Gender is a common example of a nominal scale with two groups, male and female. Anytime you can say, “It’s either this or that,” you are dealing with a nominal scale. Other examples: cities, drug versus control group

2. Ordinal scale

Numbers can also be used to express ordinal or rank order relations. For example, we say Ben is taller than Fred. Now we know more than just the category in which to place someone. We know something about the relationship between the categories (quality). What we do not know is how different the two categories are (quantity). Class rank in medical school and medals at the Olympics are examples of ordinal scales.

3. Interval scale

Uses a scale graded in equal increments. In the scale of length, we know that one inch is equal to any other inch. Interval scales allow us to say not only that two things are different, but by how much. If a measurement has a mean and a standard deviation, treat it as an interval scale. It is sometimes called a “numeric scale.”

4. Ratio scale

The best measure is the ratio scale. This scale orders things and contains equal intervals, like the previous two scales. But it also has one additional quality: a **true zero point**. In a ratio scale, zero is a floor, you can’t go any lower. Measuring temperature using the Kelvin scale yields ratio scale measurement.

**Note**

The scales are hierarchically arranged from least information provided (nominal) to most information provided (ratio). Any scale can be degraded to a lower scale, e.g., interval data can be treated as ordinal. For the USMLE, concentrate on identifying nominal and interval scales.

### E. Understanding Statistical Inference

The goal of science is to define reality. Think about statistics as the referee in the game of science. We have all agreed to play the game according to the judgment calls of the referee, even though we know the referee can and will be wrong sometimes.

#### 1. Basic steps of statistical inference

- a. Define the research question: what are you trying to show?
- b. Define the null hypothesis, generally the opposite of what you hope to show
  - i. Null hypothesis says that the **findings are the result of chance or random factors**. If you want to show that a drug works, the null hypothesis will be that the drug does NOT work.
  - ii. Alternative hypothesis says what is left after defining the null hypothesis. In this example, that the drug does actually work
- c. Two types of null hypotheses
  - i. One-tailed, i.e., directional or “one-sided,” such that one group is *either* greater than, or less than, the other. E.g., Group A is not < than Group B, or Group A is not > Group B
  - ii. Two-tailed, i.e., nondirectional or “two-sided,” such that two groups are not the same. E.g., Group A = Group B

#### 2. Hypothesis testing

At this point, data are collected and analyzed by the appropriate statistical test. How to run these tests is not tested on USMLE, but you may need to be able to interpret results of statistical tests with which you are presented.

- a. p-Value: to interpret output from a statistical test, focus on the p-value. The term p-value refers to two things. In its first sense, the p-value is a standard against which we compare our results. In the second sense, the p-value is a result of computation.
  - i. The **computed p-value is compared with the p-value criterion to test statistical significance**. If the computed value is less than the criterion, we have achieved statistical significance. In general, the smaller the p the better.
  - ii. The p-value criterion is traditionally set at  $p \leq 0.05$ . (Assume that these are the criteria if no other value is explicitly specified.) Using this standard:
    - If  $p \leq 0.05$ , reject the null hypothesis (reached statistical significance)
    - If  $p > 0.05$ , do not reject the null hypothesis (has not reached statistical significance).

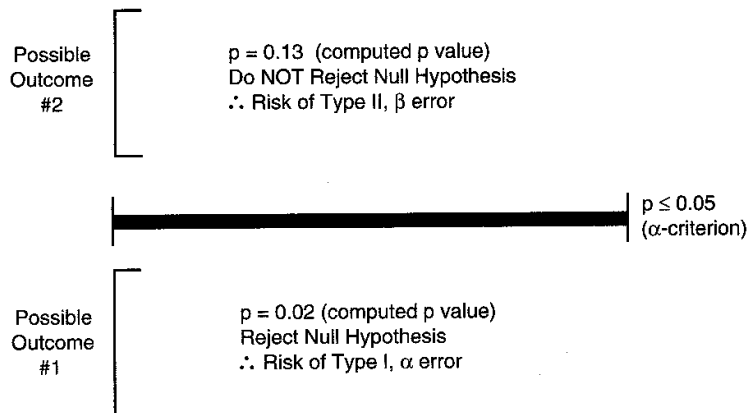


Figure 2-8. Making Decisions Using p-Values

- If  $p = 0.13$ , fail to reject the null hypothesis, i.e., decide that the drug does not work
- If  $p = 0.02$ , reject the null hypothesis, i.e., decide that the drug works

b. Types of errors

Just because we reject the null hypothesis, we are not certain that we are correct. For some reason, the results given by the sample may be inconsistent with the full population. If this is true, any decision we make on the basis of the sample could be in error. There are two possible types of errors that we could make:

- i. Type I error ( $\alpha$  error): **rejecting the null hypothesis when it is really true**, i.e., assuming a statistically significant effect on the basis of the sample when there is none in the population, e.g., asserting that the drug works when it doesn't. The chance of Type I error is given by the p-value. If  $p = 0.05$ , then the chance of a Type I error is 5 in 100, or 1 in 20.
- ii. Type II error ( $\beta$  error): **failing to reject the null hypothesis when it is really false**, i.e., declaring no significant effect on the basis of the sample when there really is one in the population, e.g., asserting the drug does not work when it really does. The chance of a Type II error cannot be directly estimated from the p-value.

c. Meaning of the p-value

- i. Provides criterion for making decisions about the null hypothesis
- ii. Quantifies the chances that a decision to reject the null hypothesis will be wrong
- iii. Tells statistical significance, not clinical significance, nor likelihood of benefit

d. Limits to the p-value: the p-value does NOT tell us

- i. The chance that an individual patient will benefit
- ii. The percentage of patients who will benefit
- iii. The degree of benefit expected for a given patient

**Note**

We never accept the null hypothesis. We either reject it or fail to reject it. Saying we do not have sufficient evidence to reject it is not the same as being able to affirm that it is true.

**Note**

- If the null hypothesis is rejected, there is no chance of a Type II error. If the null hypothesis is not rejected, there is no chance of a Type I error.
- Type I error (error of commission) is generally considered worse than Type II error (error of omission).

- e. Statistical power
  - i. In statistics, **power** is the **capacity to detect** a difference if there is one.
  - ii. Just as increasing the power of a microscope makes it easier to see what is going on in histology, **increasing statistical power** allows us to detect what is happening in the data.
  - iii. Power is directly related to Type II error:  $1 - \beta = \text{Power}$
  - iv. There are a number of ways to increase statistical power. The most common is to increase the sample size.

F. Statistical Tests

Table 2-2. Types of Scales and Basic Statistical Tests

Name of Statistical Test	Variables		Comment
	Interval	Nominal	
Pearson Correlation	2	0	Is there a linear relationship?
Chi-square	0	2	Any # of groups
<i>t</i> -test	1	1	2 groups only
One-way ANOVA	1	1	2 or more groups
Matched pairs <i>t</i> -test	1	1	2 groups, linked data pairs, before and after
Repeated measures ANOVA	1	1	More than 2 groups, linked data

**Note**

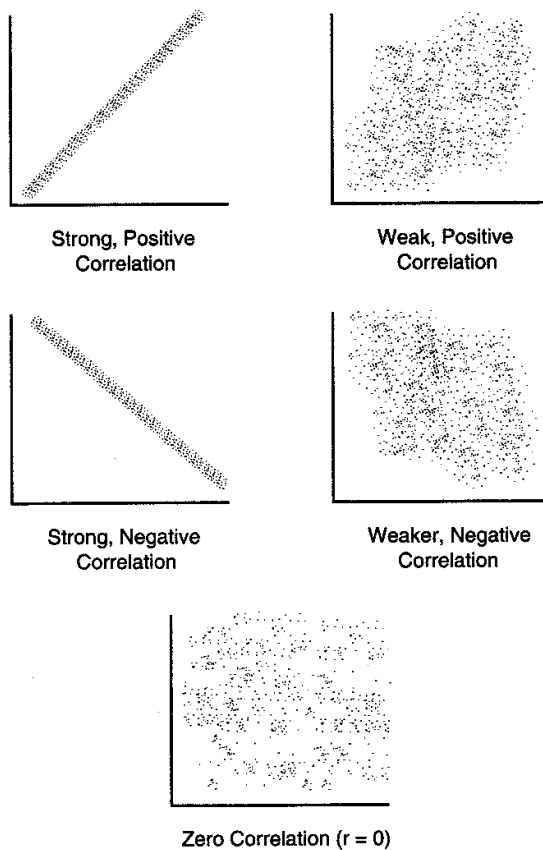
Remember, your default choices are:

- Correlation for interval data
- Chi-square for nominal data
- *t*-test for a combination of nominal and interval data

**Note**

You will not be asked to compute any of these statistical tests. Only recognize what they are and when they should be used.

1. Meta-analysis
  - a. A statistical way of **combining the results of many studies** to produce one overall conclusion
  - b. A mathematic literature review
2. Correlation analysis (*r*, ranges from -1.0 to +1.0)
  - a. A **positive value** means that **two variables go together in the same direction**, e.g., MCAT scores have a positive correlation with medical school grades.
  - b. A **negative value** means that the **presence of one variable is associated with the absence of another variable**, e.g., there is a negative correlation between age and quickness of reflexes.
  - c. The further from 0, the stronger the relationship ( $r = 0$ )
  - d. A **zero correlation** means that **two variables have no linear relation to one another**, e.g., height and success in medical school.
  - e. Graphing correlations using scatterplots
    - i. Scatterplot will show points that approximate a line
    - ii. Be able to interpret scatter plots of data: positive slope, negative slope, and which of a set of scatterplots indicates a stronger correlation.



**Figure 2-9. Scatter Plots and Correlations**

f. NOTE: Correlation, by itself, does not mean causation.  
 A correlation coefficient indicates the **degree to which two measures are related**, not why they are related. It does not mean that one variable necessarily causes the other. There are two types of correlations.

- g. Types of correlations
- i. Pearson correlation: compares two interval level variables
  - ii. Spearman correlation: compares two ordinal level variables

3. *t*-tests

- a. Output of a *t*-test is a “*t*” statistic
- b. **Comparing the means of two groups** from a single nominal variable, using means from an interval variable to see whether the groups are different
- c. Used for two groups only, i.e., compares two means. E.g., do patients with MI who are in psychotherapy have a reduced length of convalescence compared with those who are not in therapy?

- d. "Pooled *t*-test" is regular *t*-test, **assuming** the variances of the two groups are the same
- e. Matched pairs *t*-test: if each **person in one group** is matched with a person in the second. Applies to **before and after measures** and linked data

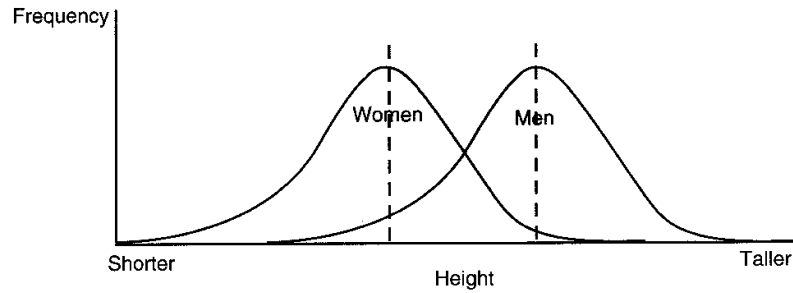


Figure 2-10. Comparison of the Distributions of Two Groups

4. Analysis of variance (ANOVA)

- a. Output from an ANOVA is one or more "F" statistics
- b. One-way: **compares means of many groups** (two or more) of a **single nominal variable** using an interval variable. Significant p-value means that at least two of the tested groups are different.
- c. Two-way: **compares means of groups generated by two nominal variables** using an interval variable. Can test effects of several variables at the same time
- d. Repeated measures ANOVA: multiple measurements of same people over time

5. Chi-square

- a. Nominal data only
- b. Any number of groups (2×2, 2×3, 3×3, etc.)
- c. Tests to see whether two nominal variables are independent, e.g., testing the efficacy of a new drug by comparing the number of recovered patients given the drug with those who are not

Table 2-3. Chi-Square Analysis for Nominal Data

	New Drug	Placebo	Totals
Recovered	45	35	80
Not Recovered	15	25	40
Totals	60	60	120



**Chapter Summary**

For independent events: multiply  
 For mutually exclusive events: add  
 For non-mutually exclusive events: add, then subtract correction factor

**Descriptive Statistics:**

Distribution: summarizing what you have  
 Central tendency: mean, median, mode  
 Variability: range, standard deviation =  $\sqrt{\frac{\sum(X - \bar{X})^2}{n - 1}}$   
 For a normal distribution: constant %ages related to standard deviation units

**Inferential Statistics:**

Confidence intervals: reaching beyond what you have  
 Confidence interval of the mean =  $\bar{X} \pm Z (S / \sqrt{N})$   
 Z-score of 1.96 = 95% confidence  
 Z-score of 2.58 = 99% confidence  
 When comparing confidence intervals, and overlap means no difference.  
 For relative risk, confidence interval = statistically significant if it *excludes* the number 1.0.  
 Statistical inference is about making decisions. Comparing p-values is how we do this.  
 The null hypothesis = the opposite of what the experimenter wants to prove  
 Most likely p-value criterion is  $p \leq 0.05$   
 If computed p-value is less than this:  
     Then, reject null hypothesis = possible Type I error  
 If computed p-value is not less than this:  
     Then, do not reject null hypothesis = possible Type II error

**Statistical Tests:**

Pearson correlation      2 interval variables  
 Chi-square                2 nominal variables  
 t-test                        1 nominal, 1 interval variable, 2 groups only

## Review Questions

### Epidemiology and Statistics

1. A recent study found a higher incidence of SIDS for children of mothers who smoke. If the rate for smoking mothers is 230/100,000 and the rate for nonsmoking mothers is 71/100,000, what is the relative risk for children of mothers who smoke?
  - (A) 159
  - (B) 32
  - (C) 230
  - (D) 3.2
  - (E) 8.4
2. A researcher wishing to demonstrate the efficacy of a new treatment for hypertension compares the effects of the new treatment versus a placebo. This study provides a test of the null hypothesis that the new treatment has no effect on hypertension. In this case, the null hypothesis should be considered as
  - (A) positive proof that the stated premise is correct
  - (B) the assertion of a statistically significant relationship
  - (C) the assumption that the study design is adequate
  - (D) the probability that the relationship being studied is the result of random factors
  - (E) the result the experimenter hopes to achieve
3. A standardized test was used to assess the level of depression in a group of patients on a cardiac care unit. The results yielded a mean of 14.60 with confidence limits of 14.55 and 14.65. This presented confidence limit is
  - (A) less precise, but has a higher confidence than 14.20 and 15.00
  - (B) more precise, but has a lower confidence than 14.20 and 15.00
  - (C) less precise, but has a lower confidence than 14.20 and 15.00
  - (D) more precise, but has a higher confidence than 14.20 and 15.00
  - (E) indeterminate, because the degree of confidence is not specified
4. A recently published report explored the relationship between height and subjects' self-reported cholesterol levels in a sample of 44- to 65-year-old males. The report included a correlation of +0.02, computed for the relationship between height and cholesterol level. One of the possible interpretations of this correlation is:
  - (A) The statistic proves that there is no definable relationship between the two specified variables.
  - (B) There is a limited causal relationship between the two specified variables.
  - (C) A real life relationship may exist, but the measurement error is too large.
  - (D) A scatter plot of the data will show a clear linear slope.
  - (E) The correlation is significant at the 0.02 level.

## Items 5 through 7

The Collaborative Depression study examined several factors impacting the detection and treatment of depression. One primary focus was to develop a biochemical test for diagnosing depression. For this research, a subpopulation of 300 persons were selected and subjected to the Dexamethasone Suppression Test (DST). The results of the study are as follows:

DST Results	Actual Depression	
	NO	YES
Depressed	87	102
Nondepressed	63	48

Using this table, the following ratios were computed:

- (A) 102:150
  - (B) 102:189
  - (C) 63:150
  - (D) 87:150
  - (E) 63:111
5. Which of these ratios measures specificity?
6. Which of these ratios measures positive predictive value?
7. Which of these ratios measures sensitivity?
8. Initial research supported a conclusion that a positive relationship exists between coffee consumption and heart disease. However, subsequent, more extensive research suggests that this initial conclusion was the result of a Type I error. In this context, a Type I error
- (A) means there is no real-life significance, but statistical significance is found
  - (B) suggests that the researcher has probably selected the wrong statistical test
  - (C) results from a nonexclusionary clause in the null hypothesis
  - (D) indicates that the study failed to detect an effect statistically, when one is present in the population
  - (E) has a probability in direct proportion to the size of the test statistic
9. A survey of a popular seaside community (population = 1,225) found the local inhabitants to have unusually elevated blood pressures. In this survey, just over 95% of the population had systolics between 110 and 190. Assuming a normal distribution for these assessed blood pressures, the standard deviation for systolic blood pressure in this seaside community is most likely
- (A) 10
  - (B) 20
  - (C) 30
  - (D) 40
  - (E) 50

10. A report of a clinical trial of a new drug for herpes simplex II versus a placebo noted that the new drug gave a higher proportion of success than the placebo. The report ended with the statement:  $\chi^2 = 4.72$ ;  $p < 0.05$ . In light of this information, we may conclude that
- (A) fewer than one in 20 will fail to benefit from the drug
  - (B) the chance that an individual patient will fail to benefit is less than 0.05
  - (C) if the drug were effective, the probability of the reported finding is less than one in 20
  - (D) if the drug were ineffective, the probability of the reported finding is less than 0.05
  - (E) the null hypothesis is false
11. A recent study was conducted to assess the intelligence of students enrolled in an alternative high school program. The results showed the IQs of the students distributed according to the normal curve, with a mean of 115 and a standard deviation of 10. Based on this information it is most reasonable to conclude that
- (A) 50% of the students will have an IQ below the standard mean of 100
  - (B) 5% of the students will have IQs below 105
  - (C) students with IQs of 125 are at the 84th percentile
  - (D) 2.5% of the students will have IQs greater than 125
  - (E) all of the students' scores fall between 85 and 135
12. A correlation of +0.56 is found between alcohol consumption and systolic blood pressure in men. This correlation is significant at the 0.001 level. From this information we may conclude that:
- (A) There is no association between alcohol consumption and systolic pressure.
  - (B) Men who consume less alcohol are at lower risk for increased systolic pressure.
  - (C) Men who consume less alcohol are at higher risk for increased systolic pressure.
  - (D) High alcohol consumption can cause increased systolic pressure in men.
  - (E) High systolic pressure can cause increased alcohol consumption in men.

## Questions 13-15

To assess the effects of air pollution on health, a random sample of 250 residents of Denver, Colorado, were given thorough check-ups every 2 years. This same procedure was followed on a matched sample of persons living in Ft. Collins, Colorado, a smaller town located about 150 miles north. Some of the results, presented as percent mortality, are displayed in the table below.

Table 1. Cumulative Mortality in Two Communities Over Ten Years

	1975	1977	1979	1981	1983	1985
Denver	4%	6%	10%	15%	22%	28%
Ft. Collins	2%	3%	7%	10%	12%	14%

13. This type of study can be best characterized as a
- (A) cross-sectional study
  - (B) clinical case trial design
  - (C) cross-over study
  - (D) cohort study
  - (E) case-control study
14. According to the data presented in the table, the cumulative relative risk for living in Denver by the year 1981 was
- (A) 0.67
  - (B) 5%
  - (C) 1.5
  - (D) 2.0
  - (E) 1.33
15. What statistical test would you run to test whether there was a difference between the cumulative mortality rate for Denver and Ft. Collins in 1985?
- (A) *t*-test
  - (B) ANOVA
  - (C) regression
  - (D) correlation coefficient
  - (E) chi-square

16. A study is conducted to examine the relationship between time spent driving when commuting to and from work, and myocardial infarctions. One hundred married males who had suffered infarcts were selected and their average commuting time ascertained from either the subject, or if the infarct had been fatal, their spouse. A comparison group of 100 married males who had not suffered infarcts was also selected and their average commuting time recorded. When examining this data for a possibly causal relationship between commuting time and the occurrence of myocardial infarcts, the most likely measure of association is
- (A) odds ratio
  - (B) relative risk
  - (C) incidence rate
  - (D) attributable risk
  - (E) correlation coefficient
17. A particular association determines membership based on members' IQ scores. Only those people who have documented IQ scores at least two standard deviations above the mean on the Wechsler Adult Intelligence Scale, Revised (WAIS-R), are eligible for admission. Out of a group of 400 people randomly selected from the population at large, how many would be eligible for membership to this society?
- (A) 2
  - (B) 4
  - (C) 6
  - (D) 8
  - (E) 10
18. A physician wishes to study whether moderate alcohol consumption is associated with heart disease. If, in reality, moderate alcohol consumption leads to a relative risk of heart disease of 0.60, the physician wants to have a 95% chance of detecting an effect this large in the planned study. This statement is an illustration of specifying
- (A) alpha error
  - (B) beta error
  - (C) a null hypothesis
  - (D) criterion odds
  - (E) statistical power
19. Public health officials were examining a suspicious outbreak of diarrhea in an inner city community child care center. Center workers identified children with diarrhea and all children at the center were studied. Officials discovered that children who drank liquids from a bottle were more likely to have diarrhea than children who drank from a glass. They concluded that drinking from unclean bottles was the cause of the outbreak. The use of bottles was subsequently banned from the center. The outbreak subsided. Which of the following is the most likely source of bias in this study?
- (A) recall bias
  - (B) lead-time bias
  - (C) measurement bias
  - (D) confounding
  - (E) random differences as to the identification of diarrhea

20. Suicides in teenagers in a small Wisconsin town had been a rare event before 11 cases were recorded in 1994. This unusual occurrence led to the initiation of an investigation to try to determine the reason for this upsurge. The researchers suspect that the suicides are linked to the increasing numbers of new families who have moved in to the town recently. The best type of study to explore this possibility would likely be
- (A) cohort study
  - (B) case-control study
  - (C) cross-over study
  - (D) cross-sectional study
  - (E) community trial study

**Items 21-30**

Which statistical test will most likely be used to analyze the data suggested by the following statements?

- (A) *t*-test
  - (B) Chi-square test
  - (C) one-way ANOVA
  - (D) two-way ANOVA
  - (E) Pearson correlation
  - (F) matched pairs *t*-test
21. Comparing the blood sugar levels of husbands and wives.
22. Comparing the number of staff who do or do not call in sick for each of three different nursing shifts.
23. Is there a relationship between time studying and test score?
24. A researcher believes that boys with same-sex siblings are more likely to have higher testosterone levels.
25. A doctor believes that drawing blood is faster with a vacutainer for someone once that person is trained, but faster with a standard syringe for someone with no training.
26. Twenty rats are coated with margarine and 20 with butter as part of a study to explore the carcinogenic effects of oleo.
27. To assess the efficacy of surgical interventions for breast cancer, the quality of life, measured on a ten-point scale, of 30 women who underwent radical mastectomies was compared with 30 women who received radiation treatments and 15 women who refused any medical intervention.
28. Comparison of passing and failure rates at each of three test sites.
29. Comparison of actual measured test scores for students at each of three test sites.
30. Assessing changes in blood pressure for a group of 30 hypertensives 1 week before and 3 months after beginning a course of antihypertensive medication.

31. In a study of chemical workers, 400 workers with respiratory disease and 150 workers without respiratory disease were selected for examination. The investigators obtained a history of exposure to a particular solvent in both groups of workers. Among workers with the respiratory disease, 250 gave a history of exposure to the solvent, compared to 50 of the workers without respiratory disease. The study design can best be described as
- (A) case-control study
  - (B) cohort study
  - (C) cross-sectional study
  - (D) community trial
  - (E) comparative clinical trial
32. The air quality test is assessed in two Midwestern cities, one in which a government program has instituted reducing the amount of carbon monoxide emissions allowed, and one without the government program. The rates of respiratory problems in both cities are recorded over a 5-year period. Given the design of this study, an appropriate one-tailed null hypothesis would be:
- (A) Air quality is related to respiratory problems in both of the cities under study.
  - (B) Air quality is related to respiratory problems in the city with the government program but not in the other city.
  - (C) No evidence will be found for differences in air quality between the two cities.
  - (D) The rate of respiratory problems in the city with the government program will not be any lower than that of the other city.
  - (E) Air quality will be inversely related to the rate of respiratory problems in both cities.



## Answers

1. **Answer: D.** Relative risk means divide, compute the ratio between the two groups.  $[230/71 = 3.2]$
2. **Answer: D.** Definition question. Null hypothesis is a statement of chance, the opposite of what the researcher hopes to find.
3. **Answer: B.** Smaller interval is more precise, but less confident. Precise means narrower interval. 95% confidence yields a smaller interval than 99% confidence.
4. **Answer: C.** One reason for a near zero correlation is that the error of measurement is so large that it obscures an underlying relationship. Shows no linear relationship. Does not mean cause. Number given is coefficient, not p-value.
5. **Answer: C.** True negatives, out of all nondiseased.  $[TN/(TN+FP)] = [63/(87+63)]$ . Note, divided by number ending in "0".
6. **Answer: B.** True positives, out of all positives.  $[TP/(TP+FP)] = [102/(102+87)]$ . Note, divided by number ending in "9".
7. **Answer: A.** True positives, out of all diseased.  $[TP/(TP+FN)] = [102/(102+48)]$ . Note, divided by number ending in "0".
8. **Answer: A.** Type I error means the researcher rejected the null hypothesis, but should not have. This means that although statistical significance is found, there is no real-world significance. By reversing the clauses in the answer, the correct answer becomes more apparent. Answer D is a good definition of a Type II error.
9. **Answer: B.** If 95% of cases fall between 110 and 190 and the distribution is symmetrical, then the mean must be 150, and the numbers given are two standard deviations above and below the mean. This means that two standard deviations must equal 40 and that one standard deviation equals 20.
10. **Answer: D.** Key here is the "p-value." Ignore the chi-square value. If less than 0.05, this gives the chance of a Type I error. Therefore, the probability of the finding if the drug was ineffective.
11. **Answer: C.** This is one standard deviation above the mean.  $[115 + 10]$ . Below this point are 84% of the cases using the normal curve.
12. **Answer: B.** The given correlation is statistically significant at the 0.001 level and can therefore be interpreted. It is a positive correlation, suggesting that high goes with high and low goes with low. Avoid answers that suggest a causal relationship.
13. **Answer: D.** People in the two communities are followed forward in time and incidence (mortality) is the outcome.
14. **Answer: C.** Key is to focus only on 1981. Relative risk means divide.  $[15\%/10\% = 1.5]$  or 1.5 times the risk.
15. **Answer: E.** Denver versus Ft. Collins is one nominal variable with two groups. Dead versus alive is the second nominal variable. Two nominal variables with  $n > 25 =$  chi-square.

16. **Answer: A.** This is a case-control study (infarcts versus no infarcts). Therefore, use an odds ratio. The data is not incidence data, so relative risk does not apply.
17. **Answer: E.** The IQ is scaled to have a mean of 100 and a standard deviation of 15. What percent of the cases are above two standard deviations above the mean? (2.5%) Therefore, what is 2.5% of 400? (10)
18. **Answer: E.** Power is the chance of detecting a difference in the study if there really is a difference in the real world. The question tells us what chance the researcher will have of finding a difference.
19. **Answer: D.** Bottle versus glass is confounded with age or maturity. The other options, while possible, are unlikely.
20. **Answer: B.** Select suicide cases and compare with nonsuicides (controls).
21. **Answer: F.** Blood sugar levels are ratio data, treated as interval data. Husbands and wives are nominal, but are nonindependent, matched pairs; therefore, matched pairs *t*-test.
22. **Answer: B.** Staff either call in sick or do not (nominal variable) over three shifts (nominal variable). Two nominal variables with a  $2 \times 3$  design, chi-square.
23. **Answer: E.** "Is there a relationship?" between two interval level variables? Pearson correlation
24. **Answer: A.** Same sex versus no same sex (nominal variable). Testosterone level is assessed as ratio and treated as interval. Therefore, simple *t*-test.
25. **Answer: D.** Vacutainer versus standard syringe (nominal), training versus no training (nominal), and time (interval). Two nominal and one interval = two-way ANOVA.
26. **Answer: B.** Margarine versus butter (nominal), cancer versus no cancer (nominal). Therefore, Chi-square.
27. **Answer: C.** Three types of treatment: surgery, radiation, and none (nominal variable, three groups), quality of life on the given scale (interval). Therefore, one-way ANOVA.
28. **Answer: B.** Passing versus failure (nominal), three sites (nominal). Therefore, chi-square.
29. **Answer: C.** Three sites (nominal) with actual test scores (interval). Therefore, one-way ANOVA.
30. **Answer: F.** Before and after (nominal, two-groups, matched pairs), and blood pressure (interval). Therefore, matched pairs *t*-test.
31. **Answer: A.** Respiratory (cases) versus nonrespiratory disease (controls), looking at history.
32. **Answer: D.** The correct statement needs to be a one directional statement of no effect. "Not any lower than" satisfies this criterion.

# Social Life in the United States

# 3

## A. Family Life

1. The divorce rate has been rising steadily over the past 40 years. In 1998: 52 divorces for every 100 marriages. Best estimate: half of all marriages today will end in divorce.
2. U.S. has the highest divorce rate among western nations. However, there is no correlation between industrialization and divorce rates.
3. This higher rate is due to change of the basis for marriage from economic to "love match," increased mobility and distance from family supports, fewer legal and religious constraints, and the lessening of economic dependence of women.
4. Marriage has a better chance of success if both partners are of similar backgrounds, race, intelligence, and education.
5. Divorce rates are higher for children of divorced parents, couples who marry young, lower SES, very high SES.
6. Divorced persons have the highest rates of hospitalization for mental disorders.
7. Divorce is hard on children: more behavior problems, delayed physical and mental development. However, staying in a hostile environment can be harder.
8. Marital satisfaction is higher for couples without children.

## B. Socioeconomic Status (SES)

1. SES: weighted combination of occupation and education. Income is not used as a direct determinant of SES.
2. In general, there is a positive correlation between SES and good things such as good mental health, life satisfaction, freedom from illness, and life expectancy. Exceptions to this are anxiety disorders and breast cancer in women, and more bipolar in either gender. High SES people marry later and have children later.
3. Lower SES is also associated with more sharply defined sex-role expectations, more rigidity in expectations of individuals, and more action-oriented language rather than conceptual language.
4. Most low SES families are single-parent families. More than 80% of single families are headed by women. More than 50% of all black children live with just one parent, usually the mother. Overall, one in five children live in single-parent families. Among families headed by women with children, more than 50% are living below the poverty level compared with less than 20% for all women with children.
5. Percentage of American households consisting of father who works outside the home, mother who does not work outside the home, and two children = 15%.
6. More than 50% of mothers with children work outside the home (even if male partner in the home).

## Note

### The USMLE Requires You to Know:

Some basic facts about life in the United States, including:

- Family life
- Suicide
- Use of healthcare
- AIDS
- Mortality patterns

(General patterns and trends are more important than specific numbers.)

C. Suicide

1. Statistics

- a. Annually, more than 30,000 commit suicide in the U.S.
- b. Annually, as many as 600,000 (2.9% of those older than 18) attempt suicide.
- c. Suicide rate for 1998 was about 11 per 100,000 (Scandinavia and Eastern Europe, 25 per 100,000)
- d. Between 10 and 20 suicide attempts for every one that succeeds
  - i. Men commit suicide four times as often as women.
  - ii. Women attempt three times as often as men
- e. Firearms are the most likely method by which either men or women *commit* suicide. Pills/poisons most likely method for women to *attempt* suicide
- f. For people aged 15 to 24, suicide is the third leading cause of death; for those aged 25 to 35, it is the second
- g. Suicides outnumber homicides in the U.S.

2. Adolescent suicide (ages 15–19)

- a. 1960 rate was 3.6 per 100,000. 1998 rate was more than 11 per 100,000; a 200% increase versus 17% increase for the general population
- b. Lifetime prevalence of suicide ideation: 54%; past 12 months: 26%; specific method: 10%
- c. 60% say they had a friend who committed suicide.
- d. For this age group only: ethnic group with the highest suicide rate is Native Americans. This age group has the highest rate for all ages of Native Americans.
- e. Psychological autopsy studies show that almost all had some prior mental illness, although most were undetected. 50% had been identified or had sought help.
  - i. Highest risk: boys aged 15 to 19 who are depressed and/or drink heavily
  - ii. Higher rates in single-parent families
  - iii. Precipitating event is some shameful or humiliating experience
- f. Educational prevention programs: increase knowledge but no demonstrated change on rates
- g. Best prevention: identify and address the underlying mental illness or substance abuse

3. Epidemiologic facts

- a. Elderly: 40 per 100,000 for men older than 65
  - i. Rates 3 to 4 times rest of the population
  - ii. Attempt suicide less often but succeed more often
  - iii. 25% of suicides are older than 65
  - iv. Native American elderly have lower suicide rates than other elderly. The rate is also lower than younger Native Americans.
- b. More than 25% of all suicides are alcohol related.
- c. Roughly 80% have given some warning.
  - i. 80% have seen a physician in the past 6 months.
  - ii. 50% have seen a physician in the past month.

- d. Rates are higher for:
  - i. Protestants versus Catholics (although how religious is more important than which religion)
  - ii. Upper or middle classes versus lower classes
  - iii. Whites versus blacks
  - iv. Separated, divorced, widowed, or unemployed (Note: singles are not at higher risk)
  - v. During harder economic times and after national crises
- e. Persons discharged from mental hospitals: 34 times more likely to commit suicide than the general population
  - i. Depression: 15%
  - ii. Alcoholism: 15%
  - iii. Schizophrenia: 10%
  - iv. Borderline personality disorder: 5%
- f. Higher concordance in monozygotic twins than in dizygotic twins
- g. Physicians have a higher suicide rate than the general population
  - i. Psychiatry is the highest subspecialty (although recent data suggest that surgeons and family practice rates are comparable)
  - ii. When SES is controlled for, physicians' rate is the same as the general population
  - iii. However, suicide rate for female physicians is four times greater than general population. Stays high even after controlling for SES
- h. Dentists have the highest suicide rate of any profession
  - i. Highest "on-the-job" mortality: taxi drivers
  - j. Suicide (especially violent suicide) is associated with lower serotonin levels.

**Table 3-1. Factors Associated With High Risk for Suicide**

Previous suicide attempt (#1 risk factor)
Males
Over age 45
White
Separated, divorced, widowed
Unemployed or retired
Living alone
Poorer health
Nervous or mental disorder
Depression, alcoholism (alcoholics have 50 times the rate of the general population)
Hanging, drowning, firearms as method
Between 6 PM and 6 AM
Between April and September (exceptions: for adolescents, between December and March; for over 65, August)

4. Clinical issues

- a. Single best predictor of suicide: previous suicide attempt
- b. Other clinical signs
  - i. Sense of hopelessness
  - ii. Having a plan
- c. Suicide threats are the clearest reason to hospitalize someone for psychiatric reasons.
- d. IMPORTANT: Suicide often occurs when a person is feeling better after coming out of a deep depressive episode (more likely just after admission to hospital for psychiatric reasons).
- e. Suicide common in patients faced with chronic, painful, or hopeless condition

D. Health Care Utilization

1. Overview

- a. Recent years have seen a rise in chronic conditions, decline in the number of patients with acute conditions
- b. Since 1960, the death rate for heart disease has declined, while the rate for cancer has increased.
- c. Physicians are not distributed evenly with the population demographics. The shortage of qualified physicians in rural areas is getting worse. Specialties that are experiencing shortages throughout the country include general psychiatry, preventive medicine, and internal medicine.
- d. People older than 65 visit the physician about twice as often as those younger than 45. This pattern is strongest for men because women see physicians for gynecologic reasons.
- e. The most common principal diagnosis resulting in an office visit to a physician
  - i. For men: essential hypertension
  - ii. For women: pregnancy
- f. The average length of hospital stay has been declining slowly but steadily since 1970. Now 5 to 6 days
- g. Average hospital occupancy rate is about 69% nationwide.
  - i. 50% is the break-even point for a hospital.
  - ii. Largest portion of hospital budget is for personnel
- h. Whites have 10 times the number of physician visits as blacks.
- i. More malpractice suits involve breast cancer than any other diagnosis.
- j. Physicians are regulated by State Medical Boards; hospitals are accredited by the Joint Commission for Accreditation of Healthcare Organizations (JCAHO); Medicare and Medicaid are run by Health Care Financing Administration (HCFA).

2. Mental illness

- a. Over the past 30 years: a *decrease* in the number of persons who occupy hospital beds for mental illness
- b. Admissions have not changed: stays are shorter; more outpatient treatment and serial admissions

- c. Reasons for shorter stays:
    - i. Development of medication, especially chlorpromazine
    - ii. Movement to deinstitutionalize people
  - d. Most psychiatric care hospitals are run by states.
  - e. One in 10 persons will be hospitalized at some time in their lives for psychiatric reasons (includes substance abuse).
3. Hospitalization
- a. Most admissions: psychiatric reasons
  - b. Most days in hospital: diseases of cardiovascular system
  - c. Most days lost from work: diseases of upper respiratory system
  - d. Ambulatory clinics: back pain 30% of cases
  - e. Most work-related disability: muscle/skeletal problems
  - f. Most common for both males and females: back pain; carpal tunnel is second for both
4. Health care payments
- a. Capitation: prospective payment system. Payments are made for number of people the provider is responsible for, not care delivered.
  - b. Medicare: federal government program that provides insurance payment for the elderly, the disabled, and dependents of the disabled.
    - i. Medicare does not generally cover routine physical exams, nursing home care, or prescription drugs.
    - ii. Medicare does cover ambulance transport, dialysis, and speech and occupational therapy.

#### E. Morbidity and Mortality

1. Mandatory reportable diseases

When mandatory reportable diseases are encountered, they must be reported to the local Public Health Department, who will inform the CDC.

**Table 3-2. Selected Mandatory Reportable Diseases**

Diagnosis	Rank Order
Chlamydia	1
Gonorrhea	2
Chicken pox	3
AIDS	4
Syphilis	5
Salmonella	6
Hepatitis A	7
Tuberculosis	8
Lyme	9
Hepatitis B	10
Pertussis	11
Hepatitis-Other	12
Legionnaires	13
Mumps	14
Rubella	15
Measles	16

**Table 3-3. Top Three Nongenetic Causes of Death in the U.S.**

	% of Total Deaths
Tobacco	19%
Diet/Activity	14%
Alcohol	5%

2. Cancer rates

- a. Female lung cancer rates are increasing:
  - i. 5.1 per 100,000 in 1965
  - ii. More than 30 per 100,000 in 2000
- b. Most common cancer for either sex
  - i. Basal cell or squamous cell cancers: 900,000 cases per year
  - ii. Melanoma: 42,000 cases per year, more than 7,000 deaths
  - iii. Incidence rate 16 times higher for whites than blacks



3. Mortality rates per 100,000

Table 3-4. Leading Sites of Cancer Incidence and Death

Types of Cancer	Incidence	Deaths
<b>Males</b>		
Prostate	1	2
Lung	2	1
Colorectal	3	3
<b>Females</b>		
Breast	1	2
Lung	2	1
Colorectal	3	3

Table 3-5. U.S. Mortality Rates per 100,000 (1998)

Cause of Death	Rate per 100,000
1) Heart disease	265.8
2) Neoplasia	201.6
3) Cerebrovascular	61.4
4) Chronic respiratory	45.5
5) Accidents	35.7 (approx. 50% vehicle)
6) Diabetes mellitus	25.1
7) Pneumonia & influenza	23.4
8) Alzheimer's	16.3
9) Nephritis	13.0
10) Septicemia	11.2

Table 3-6. Top Three Leading Causes of Death by Age Group

Rank	Less than 1	1 to 4	4 to 9	10 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 65	over 65
#1	Congenital anomalies	Unintended injuries	Unintended injuries	Unintended injuries	Unintended injuries	Unintended injuries	Neoplasia	Neoplasia	Neoplasia	Heart disease
#2	Short gestation	Congenital anomalies	Neoplasia	Neoplasia	Homicide	Suicide	Unintended injuries	Heart disease	Heart disease	Neoplasia
#3	SIDS	Neoplasia	Congenital anomalies	Suicide	Suicide	Homicide	Heart disease	Unintended injuries	Bronchitis, asthma, emphysema	Cerebrovascular

Table 3-7. Causes of Death Patterns in Minority Groups Compared to Whites

Disease/Problem	African Americans	Latinos	Native Americans	Asian/Pacific Islanders
Cancer	+	x	x	x
Cardiovascular disease	+	x	x	x
Chemical dependency	+	+	+	x
Diabetes mellitus	+	+	+	x
Infant mortality	+	x	+	x
Violence	+	+	+	x
Homicide	+	+	+	x
Suicide	x	x	+	x
Unintentional injury	+	+	+	x
AIDS/HIV	+	+	x	x

+ = higher than whites; x = not higher than whites

- a. Trauma (motor vehicle accidents, homicide, and violent cause of death) is the leading killer for black children between ages 1 and 4. Single most common cause is fire.
  - b. For children who die in a fire, the most likely cause of fire is cigarettes.
  - c. The leading cause of death for black males and females aged 15 to 24 is homicide. For white males, it is traffic accidents.
  - d. Unintentional injury is the leading cause of death for persons aged 1 to 34 years. Rates of death due to unintended injury is highest for those older than 65.
4. Infant mortality
- a. Rates per 1,000 live births (1998)
    - i. Whites: 6.0
    - ii. Blacks: 14.3
    - iii. Hispanics:
      - Puerto Ricans: 8.6
      - All other Hispanics: 6.1
    - iv. Native Americans: 8.8
    - v. Overall: 7.2
  - b. Top three reasons for death:
    - i. Birth defects: 24%
    - ii. Low birth weight (1,500 g) and respiratory distress: 18%
    - iii. Sudden infant death syndrome (SIDS): 16%
  - c. Key facts
    - i. Blacks have the highest rates of infant mortality from low birth weight and infections.
      - #1 killer of black infants is low birth weight
      - SIDS is #2 for blacks

- ii. Native Americans have the highest SIDS rate.
- iii. SIDS rates reduced sharply by:
  - Having infants sleep on their backs
  - Avoid having infants sleeping on a surface that is too soft/fluffy
  - Mother avoids smoking while pregnant
  - Avoid all smoking in the infant's household

#### E. HIV/AIDS

1. About 1,000,000 adults and 200,000 children in the U.S. are HIV positive (male 1:100, female 1:800)
2. In some inner-city areas, as many as 50% of males are HIV positive.
3. AIDS is now the *fifth* leading cause of death for all men aged 25 to 44.
  - a. Better treatments have reduced mortality.
  - b. Unintended injuries is #1, heart disease is #2, suicide is #3
4. Most dangerous sexual practice: anal intercourse
5. Recent evidence that HIV can be transmitted by oral sex
6. If the patient has AIDS today, most likely homo/bisexual man
7. If recently became HIV positive, most likely IV drug user
8. Fastest growing method of HIV transmission: heterosexual contact (especially for blacks and Hispanics)
  - a. Heterosexual transmission is easier from men to women than from women to men
  - b. Risk of acquiring for men is greater if contact occurs during menses.
  - c. Uncircumcised men are more likely to be seropositive and contract HIV during sex.
9. HIV transmission rates
  - a. Risk from single sexual encounter with man who is not a member of a risk group: 1 in 5 million
  - b. Risk from single encounter with man who is a member of a high risk group: 1 in 20 to 1 in 2
  - c. Needle-stick (with HIV-positive blood): 1 in 100 to 1 in 1,000 (average 1 in 250)
  - d. Seroconversion from blood transfusion: 2 of 3
  - e. If the mother is HIV positive, 100% of children will test positive at birth
    - i. About 20% of these remain HIV positive after 1 year
    - ii. Breast-feeding increases transmission rate
    - iii. AZT reduces risk by half (to about 10%). AZT + C-section reduces transmission rate to 5%.
    - iv. Nevepapine: given during labor to mother and to child after birth, cuts rate to 10%

### Chapter Summary

The United States has the highest divorce rate. Economic issues are a good predictor of divorce rate.

Socioeconomic status is the weighted combination of occupation and education and not directly determined by income.

Most women in the United States work outside the home.

Suicide:

Men commit suicide more often than women, women have more suicide attempts.

Suicide rate for adolescents has risen noticeably over past several decades; prevent by treating underlying cause

Review Table 3-1.

Best predictor for suicide:            previous attempt

Having a plan is a key indicator to separate mere talk from intention.

If you think patient is suicidal:        hospitalize patient

Morbidity and mortality: Review included tables

Table 3-4 lists the leading sites of cancer incidence and death for males and females.

Table 3-5 records the mortality rates for the 10 most common causes of death in the U.S.

Table 3-6 ranks the three leading causes of death among different age groups from neonates to over 65.

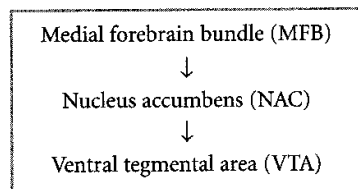
Table 3-7 indicates the relative important causes of death among African Americans, Latinos, Native Americans, and Asians/Pacific Islanders compared to whites.

# Substance Abuse

# 4

## A. Physiology of Substance Abuse

The basic addiction pathway in the brain is a dopamine pathway. Activation of this pathway accounts for the "positive reinforcement" feeling and makes us want to repeat the action that triggered that feeling.



1. When activated by environmental stimuli, this pathway helps to make behavior adaptive and goal directed.
2. Ingestion of chemicals gives the positive reinforcement without the linkage to environmental stimuli and can make behavior less and less environmentally responsive over time.
3. This addiction pathway is activated by all substances that produce psychological dependence.
4. Serotonin (5-HT) also plays a role in the addiction process owing to its regulation of impulse control

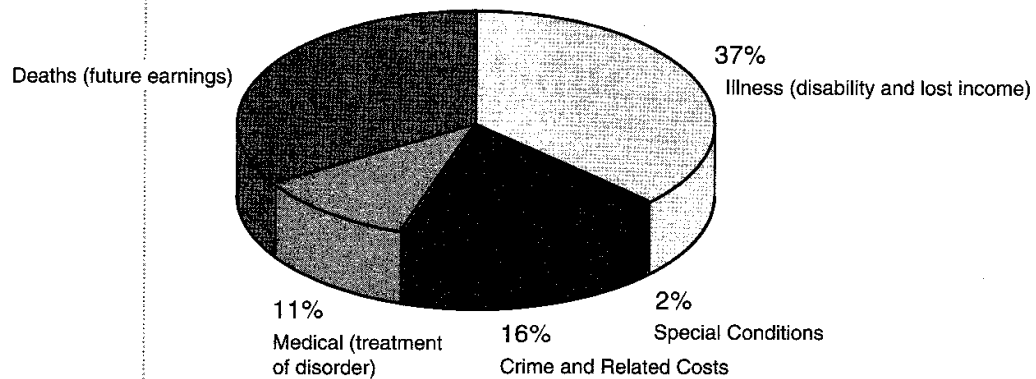
## B. Alcohol and Alcoholism

1. Costs the U.S. around \$100 billion a year; the most costly health problem. Nevertheless, tobacco accounts for more loss of life. The best way to reduce long-term mortality is to eliminate smoking.

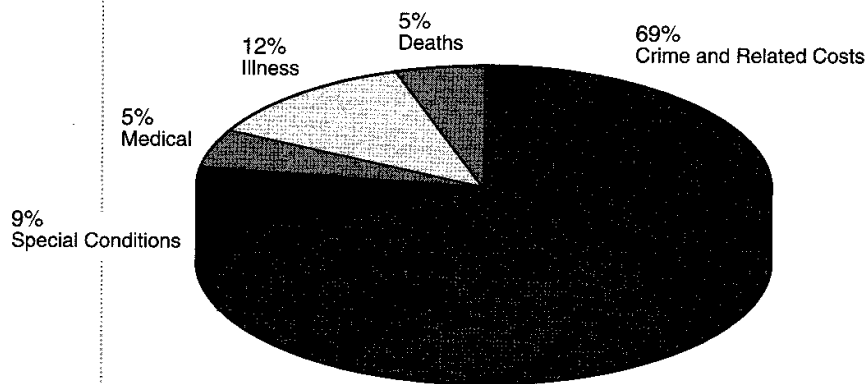
## Note

### The USMLE Requires You to Know:

- Susceptibility to alcohol problems and the most common interventions
- Presenting signs and symptoms for intoxication and withdrawal reactions for commonly abused substances
- Basic facts about substance abuse and health status



**Figure 4-1. Cost of Alcohol Abuse (1990)**  
Total Cost: \$99 Billion



**Figure 4-2. Costs of Illegal Drug Abuse (1990)**  
Total Cost: \$67 Billion

2. Alcohol is the most abused drug for all ages.
  - a. Approximately 10% of all adults (12 million people) are problem drinkers.
  - b. Male to female ratio is 4 to 3, but the gap is closing.
3. Since 1980, per capita consumption of alcohol has declined. However, the proportion of heavy drinkers younger than 20 has increased.
4. Binge drinking is becoming more common.
5. Alcoholism rates are higher for the low SES groups.
6. Low SES alcoholics recover sooner and at higher rates (if they survive).
7. Alcohol use has been implicated in 15% of all auto accidents.

8. Alcohol use implicated in 50% of all
  - a. Auto accidents not involving a pedestrian
  - b. Auto accident deaths
  - c. Homicides (killer or victim)
  - d. Hospital admissions
9. Fetal alcohol syndrome (FAS)
  - a. The leading known cause of mental retardation (Down syndrome is second)
  - b. Characterized by developmental and mental retardation, craniofacial abnormalities, limb dislocation
  - c. Consumption of large quantities of alcohol needed to produce FAS
10. Increasing evidence for genetic contribution
  - a. Concordance rates: MZ > DZ (MZ = 60%, DZ = 30%)
  - b. Marked ethnic-group differences: Asians, Jewish Americans, and Italian Americans much less likely to develop alcoholism than Americans with northern European roots
  - c. Capacity to tolerate alcohol is the key (enzyme induction, lack of tyrosine kinase)
  - d. If biologic father was an alcoholic, the incidence of alcoholism in males adopted into nonalcoholic families is equal to the incidence of alcoholism in sons raised by biologic alcoholic fathers.
  - e. Family history of alcoholism increases likelihood of unipolar (major) depression in offspring.
11. CAGE questions
  - a. Have you ever tried to Cut down on alcohol intake and not succeeded?
  - b. Have you ever been Annoyed about criticism concerning your drinking?
  - c. Have you ever felt Guilty about your drinking behavior?
  - d. Have you ever had to take a drink as an Eye-opener in the morning to relieve the anxiety and shakiness?
12. Medical complications of alcohol abuse  
Cirrhosis, alcoholic hepatitis, pancreatitis, gastric or duodenal ulcer, esophageal varices, middle-age onset of diabetes, gastrointestinal cancer, hypertension, peripheral neuropathies, myopathies, cardiomyopathy, cerebral vascular accidents, erectile dysfunction, vitamin deficiencies, pernicious anemia, and brain disorders, including Wernicke-Korsakoff syndrome (mortality rate of untreated Wernicke is 50%; treatment is with thiamine)
13. Chronic alcohol use can change genes related to myelin in the frontal cortex.

**Table 4-1. Common Laboratory Value Changes for Alcoholics**

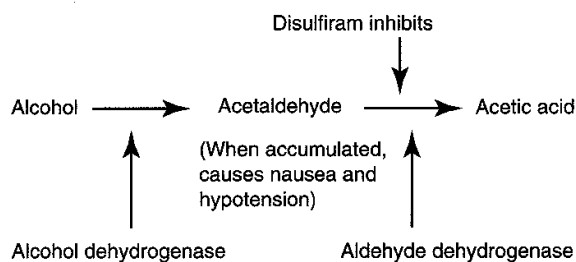
Alanine aminotransferase (ALT)	increase
Aspartate aminotransferase (AST)	increase
Amylase	increase
Uric acid	increase
Triglyceride	increase
Cholesterol	increase
Calcium	decrease
Phosphorus	decrease
White blood cell count	decrease
Platelet count	decrease
Hematocrit	decrease

14. Treatment issues

- a. Most successful way to get person into treatment: referral by employer
- b. Alcoholics Anonymous: largest source of alcohol treatment in U.S.
  - i. The original 12-step program. Grassroots movement
  - ii. Believed to be most successful treatment
  - iii. Provides substitute dependency, social support, inspiration and hope, and external reminders that drinking is aversive. Meetings and sponsors
  - iv. Least expensive treatment
  - v. Al-Anon for family and friends: deals with codependence and enabling behaviors

15. Pharmacologic treatments

- a. Disulfiram (Antabuse)
  - i. Decreases alcohol consumption
  - ii. Interaction with alcohol produces symptoms of nausea, chest pain, hyperventilation, tachycardia, vomiting
  - iii. Effective for short-term treatment only
  - iv. Must be used with psychotherapy (or 12-step program)



**Figure 4-3. Disulfiram Treatment**



- b. Acamprosate
  - i. Helps prevent relapse
  - ii. Lowers the activity of the receptors for glutamate (chronic alcohol abuse increases the number of these receptors)
  - iii. Effects persist after treatment ended
  - iv. Not widely used
- c. Benzodiazepines (e.g., lorazepam)
  - i. Helps prevent seizures
  - ii. Seizures can occur during periods of heavy drinking or during detoxification
- d. Naltrexone
  - i. Given to recovering alcoholics
  - ii. Reduces craving. Drinks don't taste good. Helps them stop after first drink
  - iii. On naltrexone, relapse=50%; if not, relapse=95%

Table 4-2. Summary of Substance Abuse

Substance	Intoxication	Withdrawal	Psychopharmacology	Treatment	Helpful Associations
Amphetamines (release DA)	Euphoria, hypervigilance, anxiety, stereotyped behavior, grandiosity, paranoia, tachycardia, pupillary dilation	Depression, fatigue, increased appetite, unpleasant dreams	Noradrenergic system, NAC pathway (dopaminergic)	Antipsychotics or benzodiazepines amantadine, desipramine	Increased use among white professionals, cardiac arrhythmias
Cocaine (prevent re-uptake of DA)	Restlessness, agitation, insomnia, diuresis, GI disturbances, excitement	Headache, fatigue, drowsiness, nausea or vomiting	Antagonist of adenosine receptors, increased cAMP in neurons that have adenosine receptors	Avoid caffeine, analgesics	Average adult consumes about 200 mg per day. A cup of coffee contains 100–150 mg of caffeine, tea has 1/3 as much
Cannabis (e.g., marijuana, hashish)	Impaired motor coordination, anxiety, slowed reaction time, impaired judgment, conjunctival infection, dry mouth, increased appetite	None	Inhibitory G protein, GABA, increased serotonin	Abstinence and support	Respiratory effects, amotivational syndrome, increased incidence of mental illness
Hallucinogens (e.g., LSD, mescaline)	Anxiety, ideas of reference, depersonalization, illusions, hallucinations, pupillary dilation, tremors, uncoordination	None	Partial agonist at postsynaptic 5-HT receptors	Supportive counseling, talking down, antipsychotics or benzodiazepines	Perceptual impairment, flashbacks, synesthesias (hearing a smell), convulsions
Inhalants (glue, paint thinner)	Belligerence, impaired judgment, nystagmus, uncoordination, lethargy, unsteady gait, crusting around nose/mouth	None	GABA, cross tolerance, cerebellum (versus basal ganglia for Parkinson's)	Education and counseling	More likely in poor (e.g., young, not drug sophisticated)
Nicotine	None in usual doses but more depression (2X), impotency, traffic accidents, and more days lost from work	Irritability, depressed mood and heart rate, increased appetite, insomnia, anxiety	Agonist at Ach receptors, activates dopaminergic pathway (positive reinforcer), speeds and intensifies flow of glutamate	Nicotine patch, education, fluoxetine; 1 trial success to quit = 9–10%, 5–8X for success	24% of population are smokers; increased use in women, blacks, teenagers and low SES
Opiates	Pupillary constriction, constipation, drowsiness, slurred speech, respiratory depression, bradycardia, coma	"Flu-like" muscle aches, nausea or vomiting, yawning, piloerection, lacrimation, rhinorrhea, fever, insomnia, pupillary dilation	Opiate receptors, locus cereuleus pathway (noradrenergic)	Naloxone (short half-life), naltrexone (longer half-life), clonidine (ease withdrawal), methadone, LAMM (Levo-ac-aretyl-methadol); substitute addictions, longer withdrawal period	Males > Females 3:1; TB, AIDS, hepatitis, pulmonary hypertension, pneumonia

(Continued)

Table 4-2. Summary of Substance Abuse (continued)

Substance	Intoxication	Withdrawal	Psychopharmacology	Treatment	Helpful Associations
Phencyclidine (PCP; angel dust)	Assaultive, combative, impulsive, agitated, nystagmus, ataxia, hypersalivation, muscle rigidity, decreased response to pain, hyperacusis, paranoia, unpredictable violence, psychosis	None	Antagonist of NMDA glutamate receptors, prevents influx of calcium ions, activates dopaminergic neurons	Nonstimulating environment, restraints, vitamin C, benzodiazepines, or antipsychotics	Men in minority groups aged 20-40 years; mixed with cannabis or opiates
Sedative hypnotics (barbiturates, benzodiazepines)	Impaired judgment, slurred speech, uncoordination, unsteady gait, stupor, or coma	Autonomic hyperactivity; tremors, hyperactivity; hallucinations, anxiety, grand mal seizures	GABA, cross-tolerance, delirium	Barbiturates; pentobarbital challenge test Benzodiazepines: slowly taper dose	Decreases in cognitive performance, overdose danger, withdraw danger, elderly prone to hip fractures

**C. Other Abused Substances**

1. Ecstasy (MDMA)
  - a. Acts as a hallucinogen combined with an amphetamine
  - b. Effects begin in 45 minutes and last 2 to 4 hours.
  - c. Use spreading beyond "rave" parties
  - d. Dehydration may be a problem
  - e. Fatigue the day after use
  - f. Long-term use effects
    - i. Evidence of destruction of serotonin receptors (increased impulsiveness)
    - ii. Destruction of connections between brain cells (memory gaps)
2. Anabolic steroids
  - a. Taken by male and female athletes to increase performance and physique
  - b. With chronic use, can cause cardiomyopathy, bone mineral loss with later osteoporosis, hypertension, diabetes, mood lability, depression, atypical psychosis
  - c. Presenting signs include skin atrophy, spontaneous bruising, acne, low serum potassium levels
    - i. For men: breast development, scrotal pain, premature baldness
    - ii. For women: disrupted menstrual cycle, deepening of voice, excessive body hair
3. Summary points
  - a. Only nicotine does not have intoxication.
  - b. Hallucinogens, inhalants, cannabis, and PCP do not have withdrawal reactions.
  - c. Schizophreniform delusional disorder: amphetamines, cocaine, hallucinogens, cannabis, and phencyclidine

**Table 4-3. Helpful Hints of Substance Abuse**

Paranoia	cocaine/amphetamine intoxication
Depression	cocaine/amphetamine withdrawal
Arrhythmias	cocaine intoxication
Violence	PCP
Vertical nystagmus	PCP
Pinpoint pupils	opiate overdose (treatment = naloxone)
Flu-like	opiate withdrawal (treatment = clonidine)
Flashbacks	LSD
Seizures	benzoid withdrawal
Death	barbiturate withdrawal

4. Epidemiology
  - a. Physicians tend to underdiagnose substance abuse problems of all types.
    - i. Detection rates: 25% for surgery and OB/GYN, 65% for psychiatry
    - ii. Women, high SES patients (including other physicians) likely to be underdiagnosed

- b. Most illicit drug users are employed full-time.
- c. About 33% of psychiatric disorders are substance abuse disorders.
  - i. Men outnumber women roughly 2.5 times.
  - ii. Prevalence of substance abuse in newly admitted psychiatric inpatients or outpatients is roughly 50%.
  - iii. These “dual diagnosis” patients are very difficult to treat and tend to continue use when on inpatient wards.
- d. Substance abuse adds to the suicide risk of any underlying psychiatric diagnosis
- e. 50% of emergency department visits are substance related.

**D. Substance-Abusing Physicians**

- 1. Psychiatrists and anesthesiologists have highest rates
- 2. Physician impairment issues are dealt with by the State Licensing Boards.
- 3. If you suspect that a colleague has a substance abuse problem:
  - a. You must report it to hospital administration.
  - b. Get the colleague to suspend patient contact.
  - c. Ideally, get the colleague into treatment.

**Chapter Summary**

The NAC dopamine pathway is the primary addiction pathway in the brain.

Alcohol and Alcoholism:

- Although alcohol abuse is the most costly health problem in the U.S., tobacco use causes more deaths.
- Alcohol is the most abused drug for all ages.
- 10% of US adults have a drinking problem.
- Fetal alcohol syndrome (FAS) is the leading known cause of mental retardation, followed by Down syndrome.
- There is increasing evidence of a strong genetic contribution to alcoholism as shown by concordance rates, ethnic differences, and adoption studies.
- Capacity to tolerate alcohol is an important predisposing factor for alcoholism.
- Most effective way to get an alcoholic to go for treatment: referral from an employer
- Most successful mode of treatment: Alcoholics Anonymous 12-step program
- Drugs used to treat alcoholism: disulfiram, acamprosate, benzodiazapines, and naltrexone

**Other Abused Substances:**

Review Table 4-2: Major substances of abuse, signs and symptoms of intoxication and withdrawal, modes of action, and helpful associations

Physicians tend to underdiagnose substance abuse, particularly among women and high SES individuals.

About a third of the psychiatric disorders and half the ER visits are due to drug abuse, most commonly by men.

Always report substance-abusing physicians.



# Human Sexuality

# 5

## A. Sexual Behavior in the United States

1. Adolescent sexual behavior
  - a. Nearly 70% of all unmarried females are nonvirgins by age 19 (80% of males).
    - i. 25% of females have had sex by age 15; almost all these encounters were forced or coerced.
    - ii. Average age of first sexual experience: 16
  - b. Adolescents in the aggregate still drift into sexual activity rather than decide to have sex.
    - i. Most adolescent sexual activity still takes place in the context of one primary relationship.
    - ii. Most adolescents are not promiscuous, but “serially monogamous.”
  - c. Recent survey: 57% of adolescents claim to have used a condom the last time they had sex.
    - i. Other research suggests that they do not do as they say.
    - ii. More than 50% of sexually active adolescents do not use birth control regularly.
2. Teenage pregnancy
  - a. About 1 million U.S. teenagers become pregnant each year.
    - i. 10% of all teenage girls
    - ii. 50% of all unwed mothers are teenagers.
  - b. 50% have the child.
    - i. 33% have elective abortions.
    - ii. The remainder are spontaneously aborted.
  - c. About 33% of girls aged 15–19 have at least one unwanted pregnancy.
  - d. Single mothers account for 70% of births to girls aged 15–19.
  - e. Consequences of teenage pregnancy
    - i. For mother:
      - Leading cause of school drop out
      - High risk for obstetric complications
    - ii. For child:
      - Neonatal deaths and prematurity are common.
      - Possible lower level of intellectual functioning
      - Problems of single-parent family (increased risk of delinquency, suicide)

## Note

### The USMLE Requires You To Know:

- Sexual behavior in the United States
- Paraphilias
- Differential diagnosis among sexual dysfunctions
- Facts about sexual practices

3. Sexually transmitted diseases

- a. One in five teenagers will have a sexually transmitted disease: rates for gonorrhea and chlamydia are higher for adolescents than for any older group.
- b. Highest incidence: most common sexually transmitted disease is human papilloma virus (HPV).
- c. Highest prevalence: one in five Americans has herpes simplex virus, type 2 (HSV-2).
  - i. Chlamydia is the most commonly reported STD in women.
  - ii. Gonorrhea is the most commonly reported STD in men.
- d. Syphilis (primary and secondary):
  - i. Cases have doubled since 1970.
  - ii. Rate now more than 20/100,000
- e. Gonorrhea:
  - i. Number of cases has declined by half since 1975.
  - ii. Since 1975, increase in resistant strains

Table 5-1. Male Sexual Response Cycle

Body Area	Excitement Phase	Orgasm Phase	Resolution Phase
Skin	Sexual flush	3–15 seconds	Disappears
Penis	Vasocongestion, penile erection	Ejaculation	Detumescence
Scrotum	Tightening and lifting	No change	Decrease to baseline size
Testes	Elevation and increase in size	No change	Decrease to baseline size, descent
Breasts	Nipple erection	No change	Return to baseline

During the excitement and orgasm phase, there is an increase in respiration, tachycardia up to 180 beats per minute, a rise in systolic blood pressure 20–100 mm Hg and diastolic blood pressure of 10–50 mm Hg.



Table 5-2. Female Sexual Response Cycle

Body Area	Excitement Phase	Orgasm Phase	Resolution Phase
Skin	Sexual flush	3–15 seconds	Disappears
Breasts	Nipple erection, areolas enlarge	May become tremulous	Return to normal
Clitoris	Enlargement, shaft retracts	No change	Detumescence, shaft returns to normal
Labia majora	Nulliparous: elevate and flatten Multiparous: congestion and edema	No change	Nulliparous: increase to normal size Multiparous: decrease to normal size
Labia minora	Increase in size, deeper in color	Contractions of proximal portion	Return to normal
Vagina	Transudate, elongation	Contractions in lower third	Congestion disappears, ejaculate forms seminal pool in upper two-thirds
Uterus	Ascends into false pelvis	Contractions	Contractions cease and uterus descends

1. Note: Plateau phase is a stage of sustained excitement.

2. Only men have a refractory period.

### B. Paraphilias

1. **Pedophilia**: sexual urges toward children. Most common sexual assault
2. **Exhibitionism**: recurrent desire to expose genitals to stranger
3. **Voyeurism**: sexual pleasure from watching others who are naked, grooming, or having sex. Begins early in childhood
4. **Sadism**: sexual pleasure derived from others' pain
5. **Masochism**: sexual pleasure derived from being abused or dominated
6. **Fetishism**: sexual focus on objects, e.g., shoes, stockings
  - a. Transvestite fetishism: fantasies or actual dressing by heterosexual men in female clothes for sexual arousal
  - b. Differentiate from transsexual and homosexual
  - c. Gender identity set by 2 to 3 years of age
  - d. Strongest determinants of gender identity are parental assignment and culture, not biology
7. **Frotteurism**: male rubbing of genitals against fully clothed woman to achieve orgasm; subways and buses
8. **Zoophilia**: animals preferred in sexual fantasies or practices
9. **Coprophilia**: combining sex and defecation
10. **Urophilia**: combining sex and urination
11. **Necrophilia**: preferred sex with cadavers
12. **Hypoxiphilia**: altered state of consciousness secondary to hypoxia while experiencing orgasm. Autoerotic asphyxiation, poppers, amyl nitrate, nitric oxide

Table 5-3. Gender Identity and Preferred Sexual Partner of a Biologic Male

Common Label	Gender Identity	Preferred Sexual Partner
Heterosexual	Male	Female
Transvestite fetishism	Male	Female
Gender identity disorder (transsexual)	Female	Male
Homosexual	Male	Male

**C. Sexual Dysfunctions**

1. Pharmacologic effects
  - a. Neuroleptics: may lead to erectile dysfunction due to dopamine blockage
  - b. Dopamine agonists: enhanced erection and libido
  - c. Trazodone (alpha-1 blocker and 5-HT): priapism (prolonged erection in the absence of sexual stimulation). Alpha-1 blockers may lead to impaired ejaculation.
  - d. Beta-blockers and tricyclics: may lead to erectile dysfunction
  - e. SSRIs: may inhibit orgasm in 15 to 20% of patients, retarded ejaculation
2. Sexual desire disorders
  - a. Hypoactive: deficiency or absence of fantasies or desires, 20% of population, more common in women. Reasons: low testosterone in men, CNS depressants, common postsurgery, depression, marital discord. Oral contraceptives depress libido.
  - b. Sexual aversion: aversion to all sexual contact
3. Sexual arousal disorders
  - a. Female sexual arousal disorder
    - i. May occur in as high as 33% of females
    - ii. May be hormonally related: many women report peak sexual desire just prior to menses
    - iii. Antihistamine and anticholinergic medications cause decrease in vaginal lubrication
  - b. Male erectile disorder (impotence)
    - i. Primary: never able to achieve erection
    - ii. Secondary: was able once to achieve erection
      - 10 to 20% lifetime prevalence, point prevalence is 3%
      - 50% of men treated for sexual disorders have this complaint
      - Incidence 8% young adult, 75% of men older than 80
      - 50% more likely in smokers
      - Be sure to check alcohol usage, diabetes
    - iii. Assessment: postage stamp test, snap gauge
    - iv. Treatment: sildenafil (Viagra) and similar drugs, mechanical devices

## 4. Orgasm disorders

- a. Anorgasmia (inhibited female orgasm)
  - i. Clitoral and vaginal orgasm are physiologically the same
  - ii. 5% of married women older than 35 have never achieved orgasm.
  - iii. Overall prevalence from all causes: 30%
  - iv. Likelihood to have orgasm increases with age
- b. Inhibited male orgasm (retarded ejaculation)
  - i. Usually restricted to inability to orgasm in the vagina
  - ii. 5% general prevalence
  - iii. Differentiate from retrograde ejaculation
- c. Premature ejaculation
  - i. Male regularly ejaculates before or immediately after entering vagina
  - ii. More common if early sexual experiences were in back seat of car or with prostitute
  - iii. Treatment: stop and go technique, squeeze technique, SSRIs

## 5. Sexual pain disorders

- a. Dyspareunia: recurrent and persistent pain before, during, or after intercourse in either man or woman
  - i. More common in women
  - ii. 30% of surgical procedures of female genital area result in temporary condition
  - iii. Chronic pelvic pain is a common complaint of women who have been raped or sexually abused
- b. Vaginismus: involuntary muscle constriction of the outer third of the vagina
  - i. Prevents penile insertion
  - ii. Treatment: relaxation, Hegar dilators

**D. Masturbation**

1. Normal activity from infancy to old age
2. Reasons
  - a. In adults: lonely, tired, bored, relieve stress, help sleep
  - b. In children: normal, feels good
3. Frequency: 3–4 times weekly for adolescents, 1–2 times weekly for adults, once a month for married people
4. Equally common in men and women
5. Abnormal only if interferes with sexual or occupational functioning
6. Can lead to premature ejaculation in males who use it primarily to reduce tension

**E. Homosexuality**

1. 4 to 10% of all males, 1 to 3% of all females
2. Issue is partner preference, not behavior
  - a. Behavioral patterns of homosexuals are as varied as those of heterosexuals.

- b. Same level and variations in sexuality as for heterosexuals
- c. Variety of ongoing relationship patterns
- 3. Male–male relationships are less stable than are female–female relationships
- 4. Over 50% of homosexuals have children
- 5. Distinguish between ego-syntonic and ego-dystonic homosexuality
  - a. Ego-syntonic: agrees with sense of self, person is comfortable
  - b. Ego-dystonic: disagrees with sense of self, makes person uncomfortable
  - c. If ego-dystonic: sexual orientation distress. NOT considered pathologic unless ego-dystonic
- 6. Increasing evidence of biologic contribution. Higher concordance rates for MZ twins (52%) than for DZ (22%)
- 7. No difference in the sexual response cycle
- 8. Preference well established by adolescence
  - a. Feelings of preference emerge 3 or more years before first encounter
  - b. Describe duration of feelings with “As long as I can remember”
- 9. Similar number of heterosexual experiences reported in childhood and adolescence
  - a. Report experiences as “ungratifying”
  - b. 30 to 40% of all people report at least one same-gender sexual experience
- 10. Very feminine (sissy) boys
  - a. Prefer playing with dolls, take female role when playing house
  - b. Much greater chance of being homosexual
  - c. Most homosexual men were not feminine boys.
- 11. Very masculine girls: only slightly greater chance of being lesbian

**F. Sexuality and Aging**

- 1. Sexual interest does not decline significantly with aging.
- 2. Continued sexual activity means sexual activity can continue (use it or lose it).
- 3. Best predictor of sexual activity in the elderly is availability of a partner
- 4. For after MI, sexual position that puts least strain on the heart: partner on top
- 5. Changes in men:
  - a. Slower erection
  - b. Longer refractory period
  - c. More stimulation needed
- 6. Changes in women:
  - a. Vaginal dryness
  - b. Vaginal thinning
  - c. Can be reduced by estrogen replacement

### Chapter Summary

#### Sexual Behavior in the United States:

The vast majority of males and females have had sex by the age of 19.

70% of teenage births are to unwed mothers. These pregnancies cause health and social problems for mother and child.

20% of teenagers have a sexually transmitted disease.

For all ages:

Highest STD incidence rate: human papilloma virus

Highest prevalence rate: herpes simplex-type 2

Most commonly reported STDs: chlamydia for females and gonorrhea for males

Paraphilias:

Definitions and associations for pedophilia, exhibitionism, voyeurism, sadism, masochism, fetishism, frotteurism, zoophilia, coprophilia, urophilia, necrophilia, and hypoxiphilia.

Review Table 5-3 distinguishing among: heterosexual, transvestite, transsexual, and homosexual.

Sexual Dysfunctions:

Review the sexually related side effects of neuroleptics, dopamine agonist, trazodone, beta-blockers, tricyclics, and SSRIs.

Review the descriptions and differential among sexual desire, sexual arousal, orgasm, and sexual pain disorders.

Masturbation is normal for all ages. Only be considered abnormal if it interferes with occupational or social activity.

Homosexuality is part of normal sexual response pattern. Facts and myths regarding homosexuality are discussed.

Sexuality and aging: interest in sex continues throughout life.

- "Use it or lose it."
- Desire remains, but arousal becomes more difficult.

### Review Questions

33. Suicide has increased incidence in a wide range of psychiatric disorders. In others, the association is closer to that of the general population. The suicide rate for which of the following disorders is most likely to be closest to that of the general population?
- (A) schizophrenia
  - (B) alcoholism
  - (C) schizoid personality disorder
  - (D) major affective disorders
  - (E) borderline personality disorder
34. A young couple comes to you for counseling soon after they are married. They say they have read that marital satisfaction changes over the course of the marriage and want to know what they should expect over the course of their own marriage. The physician tells them that, although their personal experience may be different, overall marital satisfaction tends to
- (A) increase with length of time married
  - (B) decrease with length of time married
  - (C) increase gradually, reaching a high point when children are in adolescence, then decline rapidly
  - (D) decrease gradually during the childbearing years, then increases after all children have left home
  - (E) increase during the preschool years, decreasing during grammar school, then rising again during adolescence
35. A 39-year-old divorced Hispanic woman presents with lethargy and fatigue. When questioned, she complains of diffuse physical aches, although her health appears to be generally good. She confesses that she finds herself crying "for no reason." She reports not really feeling like seeing any of her usual friends and has difficulty sleeping, especially waking up early in the morning. She is given a preliminary diagnosis of uni-polar depression. In addition to this diagnosis, the strongest risk factor for suicide in this patient would be the patient's
- (A) age
  - (B) gender
  - (C) marital status
  - (D) overall health
  - (E) visit to the physician
  - (F) fatigue
36. Your schedule indicates that you have an initial appointment with a patient who is a 50-year-old white male. Following the examination, the most likely resultant diagnosis for this man is
- (A) gastrointestinal problems
  - (B) upper respiratory distress
  - (C) essential hypertension
  - (D) obesity
  - (E) urinary problems

37. According to surveys by the Centers for Disease Control and Prevention, as of 2000, the most common health problem in the United States is
- (A) cancer
  - (B) heart disease
  - (C) substance abuse
  - (D) obesity
  - (E) dental caries
38. A 32-year-old white woman appears at your office for her annual physical exam. The physical exam shows the patient to be in good health, although she is slightly overweight and has moderately elevated blood pressure. If the patient were to die at some point in the next 10 years, the most likely cause of death would be
- (A) unintended injuries
  - (B) neoplasms
  - (C) heart disease
  - (D) homicide
  - (E) AIDS
39. Mr. Jones has been complaining of a depressed mood for several months. His wife informs you that he tried to kill himself last month when he reported hearing voices that told him to kill himself. He was hospitalized for 21 days and given a diagnosis of a major psychiatric disorder. When questioned, he reported having "given up." Upon further questioning, you learn that he has a 10-year history of alcoholism. Which of the following would pose the greatest risk for future completed suicide?
- (A) feelings of helplessness
  - (B) marital status
  - (C) affective disorders
  - (D) past suicide attempt
  - (E) schizophrenia
40. During a 1-year period, a physician practicing medicine in the United States would be most likely to encounter a patient suffering from which of the following mandatory reportable diseases?
- (A) Hepatitis A
  - (B) Lyme disease
  - (C) HIV/AIDS
  - (D) chicken pox
  - (E) syphilis

41. An earthquake recently devastated a town in Northern California. Electricity was shut off for several days, and many of the people in the area were homeless. The most likely pattern of response of the affected population would be
- (A) widespread emotional after-effects that are usually mild and transitory
  - (B) disintegration of social organization
  - (C) incidence of post-traumatic stress syndrome in close to 20% of those effected
  - (D) children adapt to the new circumstances more quickly than do adults
  - (E) increased divorce in the following six months
42. You have been appointed to provide an assessment of the general health status of your local community. You have a limited budget and must, therefore, focus on the most likely determinant of community health status. Based on this information, your assessment should focus on
- (A) hospital bed:population ratio
  - (B) infant mortality rate
  - (C) physician:patient ratio
  - (D) general mortality rate
  - (E) quality of the physical and social environment
43. Following surgery for the removal of her appendix, a female patient comes to see you complaining of a lack of interest in sexual contact with her husband. "We have been fighting so much lately," she says. "Between that and the pressure I feel at work, I just don't know what to do anymore." Medical history shows that she has been taking diazepam for the past two years and oral contraceptives for the past five years. Which of the following can be safely excluded as unlikely to result in the reported suppression of libido?
- (A) oral contraceptives
  - (B) marital discord
  - (C) postoperative recovery
  - (D) work stress
  - (E) diazepam
44. At the conclusion of her annual gynecological exam, a 34-year-old married Hispanic woman confides to her physician that her interest in sex has been "spotty" lately. Although she has sexual relations with her husband at least once a week, she reports only feeling "really passionate" in the week just prior to the onset of menses. She refrains from sexual intercourse during menses. The woman wants to know what is wrong with her. The physician's best response would be
- (A) "What medications are you taking?"
  - (B) "Is your husband sometimes abusive?"
  - (C) "This is a normal pattern of sexual arousal reported by many women."
  - (D) "You may find that an erotic movie will stimulate your sexual desire at times when you do not feel passionate."
  - (E) "How often does your husband want to have sex?"
  - (F) "I'm going to have you talk to a friend of mine who specializes in this sort of thing."
  - (G) "You might consider abstaining from sex for a while until you feel more sure that you want it."



45. A woman reports to her physician that she can only achieve orgasm when recalling a previous, abusive boyfriend. Suspecting the presence of a paraphilia, the physician should explore for further evidence of
- (A) coprophilia
  - (B) transvestitism
  - (C) sadism
  - (D) frotteurism
  - (E) voyeurism
  - (F) exhibitionism
  - (G) pedophilia
  - (H) fetishism
  - (I) masochism
  - (J) zoophilia
  - (K) necrophilia
46. The medical record of a 65-year-old white male details a long list of medical conditions, including diabetes, gastric ulcer, recurrent headaches, and peripheral neuropathies. In addition, the record indicates that the patient has a history of substance abuse, although no specifics are provided. When interviewing the patient, the physician is most likely to discover that the substance abused by the patient most likely was
- (A) alcohol
  - (B) cocaine
  - (C) caffeine
  - (D) ecstasy
  - (E) hallucinogens
  - (F) inhalants
  - (G) opiates
  - (H) sedative hypnotics
47. A 21-year-old male patient is brought to the emergency department by his parents who are concerned because he was stumbling around their house, waving his arms in the air, and would not respond verbally to their questions. When examined, the patient appears anxious, with elevated heart rate and clammy skin. A slight tremor is evident in his hands and his pupils are dilated. Over time, he becomes verbal and reports that he felt like he was floating out of his body and that words spoken to him seemed like insects that should be swatted away. He also admits to having recently taken an illegal substance. The patient's behavior and physiology are most consistent with intoxication due to
- (A) cocaine
  - (B) inhaled paint thinner
  - (C) marijuana
  - (D) mescaline
  - (E) phencyclidine
  - (F) phenobarbital

48. A 72-year-old married man who is being treated for elevated cholesterol asks his physician about normal sexual function in the elderly. At this point, the physician should inform the patient that
- (A) loss of interest in sex is a natural part of aging
  - (B) although men maintain interest in sexual activity, women lose interest as they age
  - (C) more mental and physical stimulation may be required to achieve erection
  - (D) sexual activity should be limited to once a month to reduce cardiovascular stress
  - (E) he will be provided with a prescription for an anti-impotence drug so that it is available when he needs it
49. The police bring a 22-year-old white male to the emergency department. From the outset, he is belligerent, aggressive, and violent, requiring the efforts of several officers to restrain him. When questioned, the patient is paranoid. Physical exam shows him to have muscle rigidity and pupils that move up and down rapidly. The patient had previously been treated for opiate overdose. What neurochemical mechanisms are most likely to account for the patient's current behavior?
- (A) reduction in levels of GABA
  - (B) antagonism of the glutamate receptors
  - (C) partial agonist of the postsynaptic serotonin receptors
  - (D) antagonism of the locus cerelose pathway and blocking of substance P
  - (E) increases in GABA and inhibitory G protein
50. His parents, who are concerned because their 17-year-old son is "just not himself," bring him into the emergency department. Preliminary examination shows the boy to be drowsy, with slurred speech, pupillary constriction, lethargy, and generally positive affect. Based on this initial presentation, the boy is most likely intoxicated with
- (A) caffeine
  - (B) cannabis
  - (C) cocaine
  - (D) LSD
  - (E) alcohol
  - (F) inhalants
  - (G) phencyclidine
  - (H) nicotine
  - (I) opiates
  - (J) sedative hypnotics

## Answers

33. **Answer: C.** All options presented have suicide rates higher than the general population, but schizoid personality disorder has the lowest associated rate. Alcoholism and depression=15%, schizophrenia=10%, borderlines=5 to 7%.
34. **Answer: D.** Marital satisfaction tends to be lower for couples with children, and to rise when the children leave home.
35. **Answer: C.** Being over age 45, male, in poor health and emerging from depression are all risk factors for suicide, but none of these are true for this patient. The fact that she is divorced, and the social isolation that may bring, is the strongest risk factor along side the diagnosed depression.
36. **Answer: C.** Essential hypertension is the most likely diagnosis resulting from an office visit by a male to his physicians.
37. **Answer: E.** The key here is the phrase "health problem." More people have dental cavities than anything else listed.
38. **Answer: B.** For males in the same age range, the leading cause of death is accidents.
39. **Answer: D.** Past suicide attempt is the strongest risk factor. Sense of hopelessness is second.
40. **Answer: D.** In order from most to least likely: chicken pox, HIV/AIDS, syphilis, salmonella, hepatitis A.
41. **Answer: A.** The aftermath of natural disasters finds many people suffering from distress reactions. These reactions, however, tend to be relatively mild and resolve themselves of their own accord and generally fall under the diagnosis of acute stress disorder. After natural disasters, there tends to be an increase in social organization. PTSD incidence is closer to 4% (Mt. St. Helen's). Adults adapt more quickly than children. Divorce rates tend to decline in the period just after a disaster.
42. **Answer: E.** The quality of the overall environment is the main issue. The other, technical sounding, options are all indicators of community health, but are not the most important determinant. Infant mortality is one of the strongest predictors of life expectancy, but not of overall health of the community.
43. **Answer: E.** Although the others have been shown to suppress sexual desire, diazepam has not.
44. **Answer: C.** Many women report peak sexual arousal just prior to the onset of menses. Reassure the woman that her experience is normal. She needs reassurance, not problem solving or medical intervention.
45. **Answer: I.** To qualify for masochism, the sexual act must be the result of gratification that includes receiving pain in either reality or fantasy.
46. **Answer: A.** Alcohol is the most abused drug for any age. Note that the patient's symptoms, with the exception of the headache, are all linked to long-term alcohol use.
47. **Answer: D.** The patient presents behavior and symptoms of someone high on hallucinogens. Although cocaine may also induce anxiety, the case lacks the other cocaine-related symptoms.
48. **Answer: C.** Sexual interest does not decline with age for either men or women. A prescription should not be given without an identified problem.

49. **Answer: B.** The presenting profile is most suggestive of PCP intoxication, which produces its behavioral effects by antagonism of the glutamate receptors and the activation of dopamine neurons.
50. **Answer: I.** Pupillary constriction and lethargy are the key features here.

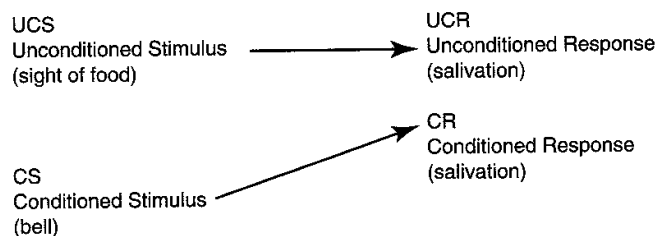
# Learning and Behavior Modification

# 6

In the behaviorist model of learning and behavior modification, internal states, subjective impressions, and unconscious processes are not relevant. All that matters is the objective data, i.e., only what can be seen, observed, and measured. The behaviorist definition of learning: a relatively permanent change in behavior, not due to fatigue, drugs, or maturation.

The two main types of learning paradigms are classic conditioning and instrumental conditioning.

## A. Classic Conditioning



**Figure 6-1. Classic (or Respondent or Pavlovian) Conditioning**

1. In classic conditioning, the conditioned response is elicited by the conditioned stimulus after repeated pairings of the UCS and CS.
  - a. The Pavlovian experiment paired the ringing of a bell with the bringing of food so that, eventually, the sound of the bell elicited the salivatory response, which previously occurred only with the sight of the food.
  - b. Or, for example, a patient receives chemotherapy (UCS), which induces nausea (UCR). Eventually, the sights and sounds of the hospital alone (CS) elicit nausea (now a CR).
2. A new stimulus elicits the same behavior. Note that the triggering stimulus (CS) occurs before the response.
3. **Stimulus generalization:** an organism's tendency to respond to a similar stimuli with the similar response. If a salivation response had been conditioned to a tone of 1,000 CPS, an 800 CPS tone will elicit a similar response. Or, in the second example, generalization will have occurred if any hospital, or even meeting a physician, comes to elicit nausea from the patient.
4. **Extinction:** after learning has occurred, removal of the pairing between the UCS and the CS results in a decreased probability that the conditioned response will be made.

## Note

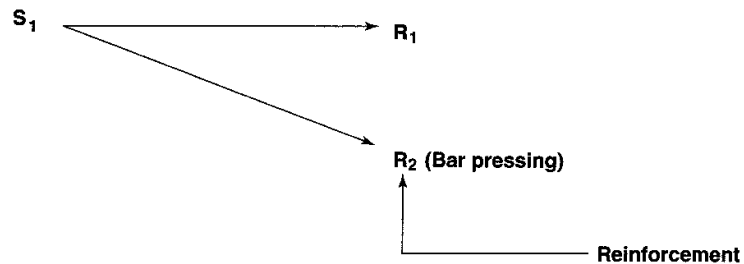
### The USMLE Requires You to Know:

- Differences between classical and operant conditioning
- Types of reinforcement
- The effects of different reinforcement schedules
- Applications of behavioral principles in clinical situations
- The behavioral substrate of depression
- The curvilinear relationship between arousal and performance
- Behavioral approaches to pain management

For example, breaking the pairing between chemotherapy and the medical setting by giving chemotherapy at home. The nausea-eliciting properties of hospitals will be extinguished.

**B. Operant or Instrumental Conditioning**

1. In operant conditioning, a new response is emitted, perhaps randomly at first, which results in a consequence.
  - a. The consequence acts as reinforcement and changes the probability of the response's future occurrence.
  - b. In the Skinner experiment, pressing a lever resulting in the delivery of food. After receiving food, the bar pressing behavior increased. Because it changed behavior, the food is a reinforcing event.
2. A new response occurs to an old stimulus. Note the triggering stimulus (reinforcement) occurs after the response.



**Figure 6-2. Operant or Instrumental Conditioning**

3. Definition of reinforcement (operant paradigm): a reinforcer is defined by its effects. Any stimulus is a reinforcer if it increases the probability of a response.
4. Types of reinforcers
  - a. A positive reinforcer is a stimulus that, when applied following an operant response, strengthens the probability of that response occurring.
    - i. E.g., increased pay leads to increased work from an employee
    - ii. E.g., increased complaining leads to increased attention from the nursing staff
  - b. A negative reinforcer is a stimulus that, when removed following an operant response, strengthens the probability of that response occurring.
    - i. E.g., a child learns that he can stop his parents' nagging by cleaning up his room.
    - ii. Aversive stimuli such as a loud noise, bright light, shock, can often be negative reinforcers
  - c. Both positive and negative reinforcement lead to an increase in response frequency or strength.
  - d. Punishment, like negative conditioning, usually uses a noxious stimulus.
    - i. However, this stimulus is imposed to weaken response.
    - ii. Ordinarily, punishment should be paired with positive reinforcement for alternative behaviors.

- iii. E.g., physical punishment of a child will suppress naughty behavior, but may fade when the punishment is removed and may model aggressive physical behavior for the child.
- e. **Extinction** refers to the removal of a reinforcer, resulting in lower response frequency and strength.
  - i. E.g., a nurse who is bombarded by constant complaints from a patient stops paying attention to the patient whenever he complains.
  - ii. E.g., a child is ignored by the parents when he throws temper tantrums.
  - iii. If successful, the unwanted behavior will stop.

Table 6-1. Types of Reinforcement

		Stimulus: (S)	
		Add	Remove
Behavior: (R)	Stops	Punishment	Extinction
	Continues	Positive reinforcement	Negative reinforcement

5. Reinforcement schedules

- a. **Continuous reinforcement**: every response is followed by a reinforcement.
  - i. Results in fast learning (acquisition)
  - ii. Results in fast extinction when reinforcement is stopped
- b. **Intermittent (or partial) reinforcement**: not every response is reinforced
  - i. Learning is slower
  - ii. Response is harder to extinguish
  - iii. E.g., a child throws a tantrum and the parents ignore it for long periods of time in the hope that the child will stop. They don't want to reinforce such behavior with attention. However, if their patience wears thin and, after a long spell of ignoring, they attend to the baby, they are putting the child on an intermittent reinforcement schedule and will find it harder to extinguish the tantrums.
  - iv. Extinction of intermittent reinforcement often requires a change back to continuous reinforcement.
  - v. Interval schedules: based on the passage of time before reinforcement is given
    - **Fixed interval schedule** reinforces the response that occurs after a fixed period of time elapses.
    - Response pattern: on and off
    - Animal or person learns to delay response until near end of time period
    - E.g., cramming before an exam or working extra hard before bonus at the holidays
    - **Variable interval schedule** delivers reinforcements after unpredictable time periods elapse
    - Higher, steadier rate of responding

- Cannot learn when next response will be reinforced, leading to a steadier response rate
- E.g., pop quizzes or surprise bonuses at work
- vi. Ratio schedules: based on the number of behaviors elicited before reinforcement is given
  - Fixed ratio schedule delivers reinforcement after a fixed number of responses.
  - Produces high response rate
  - Rewards a set of behaviors rather than a single behavior, e.g., paying workers on a piecework basis.
  - Variable ratio schedule delivers reinforcement after a changing number of responses.
  - Produces the greatest resistance to extinction
  - Eg, in gambling, a large number of responses may be made without reward. Since any response may be the lucky one, person keeps on trying. Slot machines

Table 6-2. Reinforcement Schedules

		Contingency	
		Time	Behaviors
Schedule:	Constant	Fixed interval (FI)	Fixed ratio (FR)
	Changing	Variable interval (VI)	Variable ratio (VR)

6. Spontaneous recovery: after extinction, the response occurs again without any further reinforcement.
7. Secondary reinforcement: a symbol or a token gains reinforcement value because of its association with a real reinforcer (e.g., money is not valuable in itself but because of what you can do with it).

**C. Modeling, Observational, or Social Learning**

1. Watching someone else get reinforcement is enough to change behavior
2. Follows the same principles as in operant conditioning
3. Correlating the effects of watching violence on television with committing violence “in the real world” stems from this concept.
4. Part of why group therapy works
5. Other applications: assertiveness training, social skills training, preparing children for various frightening or painful medical or surgical procedures



#### D. Behavior Therapy and Behavior Modification

Focus on treating symptoms directly rather than changing underlying internal conflicts.

1. Therapy/modification based on classic conditioning
  - a. Systematic desensitization
    - i. Often used to treat anxiety and phobias
    - ii. Based on the counterconditioning or reciprocal inhibition of anxiety responses
      - Step 1: Hierarchy of fear-eliciting stimuli is created, building from least to most stressful.
      - Step 2: Therapist teaches the technique of muscle relaxation, a response that is incompatible with anxiety.
      - Step 3: Patient is taught to relax in the presence, real or imagined, of each stimulus on the hierarchy from least to most stressful.
    - iii. When the person is relaxed in the presence of the feared stimulus, objectively, there is no more phobia.
    - iv. Note that this works by replacing anxiety with relaxation, an incompatible response.
  - b. Exposure
    - i. Simple phobias can sometimes be treated by forced exposure to the feared object.
    - ii. Exposure maintained until fear response is extinguished
    - iii. E.g., fear of heights treated by having patient to ride up elevator
    - iv. In more extreme form, called "flooding" or "implosion" therapy
  - c. Aversive conditioning occurs when a stimulus that produces deviant behavior is paired with an aversive stimulus.
    - i. Key properties of the original stimulus are changed
      - E.g., Pavlov's dog being presented with spoiled meat upon ringing bell. The dog does not salivate, but instead recoils as the spoiled meat is presented.
    - ii. Used in the treatment of alcoholism and some forms of sexual deviance
      - E.g., an alcoholic is given a nausea-inducing drug (disulfiram) whenever he drinks so that drinking eventually comes to elicit unpleasant rather than pleasant events; chili peppers and thumb-sucking
2. Therapy/modification based on operant conditioning
  - a. Shaping (or successive approximations)
    - i. Achieves final target behavior by reinforcing successive approximations of the desired response
    - ii. Reinforcement is gradually modified to move behaviors from the more general to the specific responses desired.
    - iii. E.g., an autistic boy who won't speak is first reinforced, perhaps with candy, for any utterance. From those utterances, the appropriate phonemes are selected and reinforced until the child utters the sought-after sounds. Eventually, reinforcement is contingent on his using speech correctly in the proper context.

b. Extinction

- i. Discontinuing the reinforcement that is maintaining an undesired behavior
- ii. E.g., if complaining results in a patient receiving a lot of attention, stopping the attention will eventually stop the undesired behavior.
- iii. E.g., instituting a “time out” with children who are acting inappropriately or test-takers who are anxious

c. Stimulus control

- i. Sometimes stimuli inadvertently acquire control over behavior. When this is true, removal of that stimulus can extinguish the response
- ii. E.g., a person’s eating behavior is tied to a particular stimulus, such as television watching. Reducing the time watching television should reduce the amount eaten.
- iii. E.g., an insomniac is permitted in his bed only when he is so tired that he falls asleep almost at once.

d. Biofeedback (neurofeedback)

- i. Using external feedback to modify internal physiologic states
- ii. Used to be thought that certain functions of the autonomic nervous system (heart rate, blood pressure, body temperature) were beyond the deliberate control of a person. We now know that both animals and humans can attain a measure of control over some of their own bodily functions through the technique of biofeedback.
  - Often uses electronic devices to present physiologic information, e.g., heart monitor to show heart rate
- iii. Biofeedback involves providing the person with information about his internal responses to stimuli and methods to control and/or modify them.
- iv. Biofeedback works by means of trial-and-error learning and requires repeated practice to be effective.
- v. Uses: treatment of hypertension, migraine and muscle-contraction headaches, Raynaud syndrome, torticollis, cardiac arrhythmias, and anxiety
- vi. Galvanic skin response: reduced skin conductivity = anxiety reduction
- vii. Most biofeedback affects the parasympathetic system.

e. Fading

- i. Gradually removing the reinforcement without the subject discerning the difference
- ii. E.g., promoting smoking cessation by reducing the nicotine content of the cigarettes gradually and “silently” over a period of time
- iii. E.g., gradually replacing postoperative painkiller with a placebo

E. Behavioral Models of Depression

1. Learned helplessness
  - a. Laboratory model of depression
  - b. All normal avoidance responses are extinguished.
    - i. A rat is shocked and not allowed to escape. Eventually, the rat will not take an obvious avoidance route even when it is offered.
  - c. Symptoms of helplessness (in animals) include passivity, norepinephrine depletion, difficulty learning that responses that produce relief, weight, and appetite loss
  - d. Characterized (in people) by an attitude of "when nothing works, why bother"
  - e. Increased levels of GABA in hippocampus decrease likelihood of learned helplessness response
2. Low rate of response-contingent reinforcement
  - a. Another explanation for depression
  - b. Too little predictable positive reinforcement
  - c. Person may lack the social skills necessary to elicit this positive reinforcement.
  - d. Depression can be seen as a prolonged extinction schedule.
  - e. Results in passivity

F. Special Topics

1. Preparedness and learning
  - a. Certain neutral stimuli are more likely to become conditioned stimuli than are others.
  - b. People easily develop dog phobias but few develop phobias of electrical outlets, which can certainly be as dangerous as dogs.
  - c. There is no such thing as a universal reinforcer. Reinforcement depends on the internal state of the organism.
    - i. E.g., consider how likely you are to say "thank you" to a turkey sandwich offered when you missed lunch versus just after Thanksgiving dinner

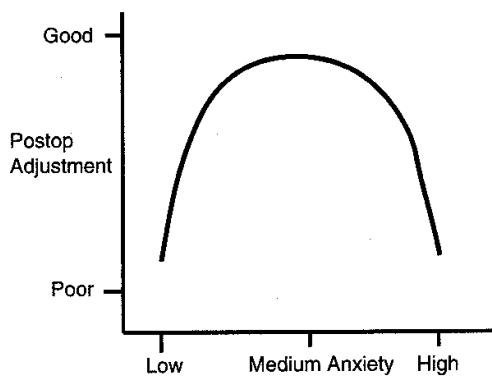


Figure 6-3. Relationship Between Anxiety and Postoperative Adjustment

2. Curvilinear relationship between anxiety and learning
  - a. Too much or too little anxiety has a disruptive effect on learning.
  - b. This curvilinear relationship applies to:
    - i. Anxiety and performance
    - ii. Fear induction and adherence (health belief model)
    - iii. Motivation and learning
    - iv. Stimulus complexity and personal preferences
    - v. Postsurgical recovery and anxiety
3. Behavioral approaches to pain management
  - a. Involves no assumptions about physical or psychological origin of pain (or even if person really is in pain)
  - b. Pain is a subjective state and, therefore, not objectively measurable.
  - c. Focus is on pain behaviors (complaining, taking medications, missing work) rather than on subjective state or unconscious determinants
  - d. Involves assessing changes in pain behavior and changing environmental contingencies, including medications
  - e. Time contingent: takes control and administers medications at preset intervals
  - f. Contrasts with hospice
    - i. Pain contingent approach
    - ii. Emphasizes self-control and self-administered pain medication

### Chapter Summary

To think like a behaviorist, focus only on what can be seen, observed, or measured.

Two primary types of learning:

- Classic conditioning: an old response to a new stimulus; triggering stimulus must precede response.
- Operant conditioning: a new response to an old stimulus; triggering stimulus (reinforcement) must follow response.

Types of reinforcement patterns: positive, negative, punishment, and extinction

Continuous reinforcement makes learning easier and extinction easier.

Intermittent reinforcement makes learning harder and extinction harder.

Types of intermittent reinforcement: fixed interval, variable interval, fixed ratio, variable ratio

Variable ratio reinforcement is hardest to extinguish.

Observational Learning: same principles as operant learning

#### Behavioral therapy techniques

Classic conditioning techniques

- Systematic desensitization: relaxation with gradual presentation of feared stimulus
- Exposure: maintaining stimulus until fear extinguishes
- Aversive conditioning: change the original stimulus to produce an aversive response

Operant conditioning techniques

- Shaping: successive approximations toward desired behavior
- Extinction: identify and remove reinforcing agent. "Time out"
- Stimulus control: avoiding stimuli producing unwanted behavior
- Biofeedback: trial and error conditioning to change internal physiology using external feedback
- Fading: gradually removing the active ingredient while still maintaining behavior

Moderate arousal is optimal for most learning, performance, and medical recovery.

The behavioral approach to pain management focuses on the behaviors produced by the pain, not the pain itself.



# Defense Mechanisms

# 7

## A. General Issues

1. Defense mechanisms are a concept born out of Freudian psychology. Recall that the Freudian psyche consists of:
  - a. Id: instinctive urges, sex, aggression, and other primary processes
  - b. Ego: rational and language-based executors linking to reality
  - c. Superego: the conscience, the moral compass insisting on socially acceptable behavior, sometimes to the point of individual deprivation
2. Defenses are the primary tools of the ego, used to manage the internal conflicts between the demands of the id and the restrictions of the superego. They are the means by which the ego wards off anxiety and controls instinctive urges and unpleasant affects (emotions).
  - a. All defenses are unconscious.
  - b. Defenses change over time.
  - c. Defenses are adaptive as well as pathologic. We all use defenses all the time. They are how we cope.
  - d. Psychopathology is an issue of intensity and extent. Psychopathology = too much all at once, or for too extended a period of time. The key issue in psychopathology is the degree to which the use of defense mechanisms is disruptive of a person's ability to deal with the world around him or her. Unlike behaviorism, defenses are identified by what the person does in conjunction with his or her internal (unconscious) thought processes.

## B. Four Clusters of Defenses

1. Narcissistic defenses
  - a. **Projection:** person attributes his or her own wishes, desires, thoughts, or emotions to someone else. Internal states are perceived as a part of someone else or of the world in general.
    - i. Examples:
      - A man who has committed adultery becomes convinced that his wife is having an affair even though there is no evidence of it.
      - A girl talks about her doll as having certain feelings, which are really what the girl feels.
      - A physician believes that the nursing staff is uncomfortable talking to him, when in fact, he is uncomfortable talking with them.
    - ii. Paranoid delusions result from the use of projection.

## Note

### The USMLE Requires You to Know:

- How to recognize the presence of defense mechanisms and the impact they have on human behaviors and perceptions.
- Special attention should be paid to the impact these defense mechanisms may have on medical practice.
- Which defense mechanisms are commonly associated with specific psychiatric diagnoses.

- b. **Denial**: not allowing reality to penetrate. Asserting that some clear feature of external reality just is not true. Used to avoid becoming aware of a painful aspect of reality
- i. Examples:
    - After surviving a heart attack, a patient insists on continuing his lifestyle as if nothing had happened.
    - A child who is abused insists that she has been treated well.
    - A woman prepares dinner for her husband expecting him to come home, even though he died a month earlier.
  - ii. Often the first response to bad news, such as the impending death of a loved one or oneself. Substance abusers are often “in denial,” claiming that they are not addicted and do not have a problem in the face of clearly dysfunctional or dangerous behavior.
- c. **Splitting**: people and things in the world are perceived as all bad or all good (God or the Devil). The world is pictured in extreme terms rather than a more realistic blend of good and bad qualities.
- i. Examples:
    - “This doctor is a miracle worker, but that doctor is totally incompetent.”
    - “He’s just so perfect and wonderful,” says a teenage girl in love.
    - “No one from that family will ever amount to anything; they are all just plain no good.”
  - ii. Borderline personality disorders use splitting and vacillate between seeing individuals in the world as all good or all bad. Prejudice and stereotypes are often the result of splitting.
2. Immature defenses
- a. **Blocking**: temporary or transient block in thinking, or an inability to remember
- i. Examples:
    - “Mr. Jones, you are suffering from... gee, I just can’t remember what it is called.”
    - A student is unable to recall the fact needed to answer the exam question, although he recalls it as he walks out of the exam.
    - In the middle of a conversation, a woman pauses, looks confused, and asks, “What was I just talking about?”
  - ii. Blocking is disruptive and can be embarrassing.
- b. **Regression**: returning to an earlier stage of development. “Acting childish” or at least younger than is typical for that individual
- i. Examples:
    - An older patient giggles uncontrollably, or breaks down crying when told bad news.
    - A husband speaks to his wife in “baby talk.”
    - A patient lies in bed curled up in a fetal position.
  - ii. Play is regressive, i.e., a more free, simpler expression from an earlier age.
  - iii. Regression is common when people are tired, ill, or uncomfortable.
  - iv. Enuresis that develops in a child who previously had been continent following the birth of a new sibling is the result of regression. Similarly,



when a new child is born, older children who have been weaned may demand to go back to breast-feeding.

- c. **Somatization**: psychic derivatives are converted into bodily symptoms. Feelings are manifest as physical symptoms rather than psychological distress.
  - i. Examples:
    - Getting a headache while taking an exam
    - Feeling queasy and nauseated before asking someone out on a date
    - Developing a ringing in the ears while making a presentation for Grand Rounds
  - ii. Extreme forms of somatization are diagnosed as somatoform disorders (see section on DSM IV).
  - iii. Symptoms created are physically real, not merely imagined
- d. **Introjection** (Identification): features of external world or persons are taken in and made part of the self. The opposite of projection
  - i. Examples:
    - A resident dresses and acts like the attending physician.
    - A child scolds herself out loud in the same manner that her mother scolded her the day before.
    - A teenager adopts the style and mannerisms of a rock star.
  - ii. When identifying with others is done consciously, it is labeled "imitation".
  - iii. The superego is formed, in part, by the introjection of the same gender parent as a resolution to the Oedipal crisis.
  - iv. Introjection is why children act like their parents. "I always swore that I would treat my children differently, yet there I was saying the same things to my children that my mother always used to say to me!"
  - v. Being a sports fan or a soap opera fan involves introjection.
  - vi. Patients in psychotherapy gain a different (hopefully healthier) sense of self, in part, by introjecting their therapist.

### 3. Anxiety defenses

- a. **Displacement**: changing the target of an emotion or drive, while the person having the feeling remains the same
  - i. Examples:
    - A man who is angry at his boss pounds on his desk rather than telling his boss what he really thinks.
    - An attending physician scolds a resident who later expresses his anger by yelling at a medical student.
    - A married man who is sexually aroused by a woman he meets goes home and makes love to his wife.
  - ii. In family therapy, one child in the family is often singled out and blamed for all the family's problems, i.e., is treated as a scapegoat by others displacing their symptoms onto this child.
  - iii. Displacement often "runs down hill," i.e., from higher to lower in a power hierarchy.
  - iv. Phobias are the result of displacement.

- b. Repression: an idea or feeling is eliminated from consciousness. Note that the content may once have been known, but now has become inaccessible.
- i. Examples:
    - A child who was abused by her mother and was treated for the abuse, now has no memory of any mistreatment by her mother.
    - A man who survived 6 months in a concentration camp cannot recall anything about his life during that time period.
  - ii. You forget, and then forget that you forgot.
  - iii. Content usually not recoverable without some trauma or psychoanalysis
  - iv. Differentiated from denial in that the reality was once accepted, but is now discarded
  - v. One of the most basic defense mechanisms
- c. Isolation of affect: reality is accepted, but without the expected human emotional response to that reality. Separation of an idea from the affect that accompanies it
- i. Examples:
    - A child who has been beaten discusses the beatings without any display of emotions.
    - A physician informs a patient of his poor prognosis in bland, matter-of-fact tones.
    - A patient who has had a finger severed in an accident describes the incident to his physician without any emotional reaction.
  - ii. Facts without feelings
  - iii. The bland affect of schizophrenics, *la belle indifférence*, that often accompanies conversion disorder is a manifestation of this defense mechanism.
- d. Intellectualization: affect is stripped away and replaced by an excessive use of intellectual processes. Cognition replaces affect. The intellectual content is academically, but not humanly, relevant.
- i. Examples:
    - “Notice how the bone is protruding from my leg. It is interesting to contemplate the physics that allows such an event to happen.”
    - A physician tells a patient about his poor prognosis and talks a great deal about the technical aspects by which the prognosis was derived.
    - A boy who is about to ask a girl out on a date for the first time talks with his friend about the importance of mating rituals for the long-term survival of the species and the mechanisms by which societies arrange for these rituals.
    - Intellect in place of emotion
  - ii. Physicians who are too concerned with the technical aspects of the profession and not enough with the patient may well be using this defense mechanism.
  - iii. In obsessive–compulsive anxiety disorder, rumination can result from this defense mechanism.
- e. Acting out: massive emotional or behavioral outburst to cover up underlying feeling or idea. Strong action or emotions to cover up unacceptable emotions. Note: The real emotion is covered, not expressed.

- i. Examples:
  - Temper tantrum is thrown by an abandoned child to cover the depression he really feels
  - “Whistling in the dark” hides the real underlying fear.
  - For adolescents, substance abuse, overeating, or getting into fights are “strong” actions that coverup underlying feelings of vulnerability.
- ii. Differentiated from displacement in that the emotion is covered up, not redirected
- iii. Common in borderline and antisocial personality disorders
- f. **Rationalization:** rational explanations are used to justify attitudes, beliefs, or behaviors that are unacceptable.
  - i. Examples:
    - “Yes, I believe killing is wrong, but I killed him because he deserved it.”
    - A man who is unfaithful to his wife tells himself that this liaison will actually make him appreciate his wife more.
    - A young single woman tells herself that engaging in oral sex with a married man is not the same thing as having a “sexual relationship” with him.
    - Look for the “string of reasons”
  - ii. Note that this is not a reasoned action, but a search for reasons to allow an unacceptable action already selected.
  - iii. Used to relieve guilt and shame
  - iv. Often accompanies obsessive–compulsive behavior
- g. **Reaction formation:** an unacceptable impulse is transformed into its opposite. A global reversal in which love is expressed as hate, for example
  - i. Examples:
    - A student who always wanted to be a physician expresses relief and says, “This is the best news I’ve ever heard,” after not being accepted into medical school.
    - A teenage boy intrigued by “dirty pictures” organizes an anti-pornography campaign.
    - Two coworkers fight all the time because they are actually very attracted to each other.
  - ii. Excessive over-reaction can often be a sign of reaction formation. As if the person is trying to convince self, or anyone else, that the original feeling or impulse did not exist. From Shakespeare: “The lady doth protest too much, methinks.”
  - iii. Found in many anxiety disorders
- h. **Undoing:** acting out the reverse of unacceptable behavior. Repairs or fixes the impulse
  - i. Examples:
    - A man who is sexually aroused by woman he meets immediately leaves and buys his wife flowers.
    - Superstitions such as “knock on wood” after wishing someone well
    - A man repeatedly checks the burners on the stove to make sure that they are turned off before leaving the house.

- ii. Many religions offer a type of institutionally sanctioned undoing: the penance after confession or making the sign of the cross to ward off anxiety.
- iii. Obsessive-compulsive behavior (e.g., repeated hand washing) is undoing.
- i. Passive-aggressive: nonperformance or poor performance after setting up the expectation of performance. Regarded as a passive (indirect) expression of hostility
  - i. Examples:
    - “I could give you a good example of this, but I’m not going to.”
    - A student agrees to share class notes but goes home without sharing them.
    - A physician ignores and does not answer the direct questions of a patient whom he finds annoying.
  - ii. The feelings of hostility are unconscious, and the person using the defense is generally unaware of them.
  - iii. If you consciously set someone up, it is not a defense, but simply being mean.
  - iv. Often used by borderline personality disorders and young children
- j. Dissociation: separates self from one’s experience. Third person rather than first person experience. The facts of the events are accepted, but the self is protected from the full impact of the experience.
  - i. Examples:
    - A woman who was raped reports that it was as if she was floating on the ceiling watching it happen.
    - The survivor of an automobile accident tells of the feeling that everything happened in slow motion.
    - A child who was sexually abused recalls only the bad man who came to her in her dreams.
  - ii. Increasingly common in clinical settings
  - iii. In extreme forms, this becomes a dissociative disorder, e.g., fugue states, amnesia, identity (multiple personality) disorder (see section on DSM IV).

4. Mature defenses

These defenses distort reality less than the other defenses and are thus considered more mature

- a. Humor: permits the overt expression of feelings and thoughts without personal discomfort
  - i. Examples:
    - A man laughs when told he is going to be fired.
    - A student smiles when he realizes that a particularly intimidating professor looks like a penguin.
    - A terminally ill cancer patient makes fun of his condition.
  - ii. Laughter covers the pain and anxiety.
  - iii. We laugh the easiest at the things that make us most anxious.

- b. **Sublimation:** impulse-gratification is achieved by channeling the unacceptable impulse into a socially acceptable direction. The unacceptable impulse becomes the motive force for social benefit.
  - i. Examples:
    - Dante wrote the *Inferno* as an outlet for his adoration of the woman Beatrice.
    - An executive who is attracted to a female associate becomes her mentor and advisor.
    - A patient with exhibitionist fantasies becomes a stripper.
  - ii. Much art and literature spring from sublimation.
  - iii. Considered by some to be the most mature defense mechanism
- c. **Suppression:** conscious decision to postpone attention to an impulse or conflict. Conscious set-up and unconscious follow through. The suppressed content temporarily resides in the unconscious.
  - i. Examples:
    - A student decides to forget about a pending exam to go out and have a good time for an evening.
    - A woman who is afraid of heights ignores the drop of the cliff to appreciate the beautiful vista.
    - A terminally ill cancer patient puts aside his anxiety and enjoys a family gathering.
  - ii. Unlike repression, suppressed content is recalled with the right cue or stimulus.
  - iii. Forget, but remember that you forgot

### C. Transference

The patient unconsciously transfers thoughts and feelings about a parent or significant other person onto his physician. This is not a defense mechanism. Can be positive (cause you to unaccountably like someone) or negative (cause you to unaccountably dislike someone)

1. Easily established in cases of physical illness, because the patient often undergoes a psychological regression
2. Not necessarily related to the length of time the patient has known physician
3. Note that for a learning theorist, transference is just another instance of stimulus generalization.
4. Countertransference is transference from the physician to the patient.

Table 7-1. Common Freudian Defense Mechanisms

Defense Mechanism	Short Definition	Important Associations
Projection	Seeing the inside in the outside	Paranoid behavior
Denial	Saying it is not so	Substance abuse, reaction to death
Splitting	The world composed of polar opposites	Borderline personality; good vs evil
Blocking	Transient inability to remember	Momentary lapse
Regression	Returning to an earlier stage of development	Enuresis, primitive behaviors
Somatization	Physical symptoms for psychological reasons	Somatoform disorders
Introjection	The outside becomes inside	Superego, being like parents
Displacement	Source stays the same, target changes	Redirected emotion, phobias, scapegoat
Repression	Forgetting so it is nonretrievable	Forget and forget
Isolation of affect	Facts without feeling	Blunted affect, <i>la belle indifférence</i>
Intellectualization	Affect replaced by academic content	Academic, not human, reaction
Acting out	Affect covered up by excessive action or sensation	Substance abuse, fighting, gambling
Rationalization	Why the unacceptable is OK in this instance	Justification, string of reasons
Reaction formation	Unacceptable transformed into its opposite	Manifesting the opposite, feel love but show hate, "Girls have cooties"
Undoing	Action to symbolically reverse the unacceptable	Fixing or repairing, obsessive-compulsive behaviors
Passive-aggressive	Passive nonperformance after promise	Unconscious, indirect hostility
Dissociation	Separating self from one's own experience	Fugue, depersonalization, amnesia, multiple personality
Humor	A pleasant release from anxiety	Laughter hides the pain
Sublimation	Unacceptable impulse into acceptable channel	Art, literature, mentoring
Suppression	Forgetting but it is retrievable	Forget and remember

**Chapter Summary**

Defense mechanisms are developed from Freudian concepts and our ego wards off unpleasant emotions.

Defense mechanisms are unconscious and normal as well as pathologic.

Review Table 7-1, which summarizes common defense mechanisms and important associations.

## Review Questions

51. Psychiatric conditions must be understood as the result of biochemical imbalances and maladaptive behavioral patterns. The concept of "learned helplessness," important for the understanding of the behavioral patterns common in depressed patients, originates from animal studies in which the experimenter prevents
- (A) spontaneous recovery
  - (B) extinction behavior
  - (C) stimulus generalization
  - (D) operant reinforcement
  - (E) avoidance behavior
52. At the direction of his parents, a child has learned to pick up his toys and clean his room before he goes to bed each night. To most increase the chances that the child will continue this behavior in the future, even when the parents are not present, from this point forward reinforcement of the child should follow what type of reinforcement schedule?
- (A) fixed ratio reinforcement
  - (B) fixed interval reinforcement
  - (C) variable ratio reinforcement
  - (D) variable interval reinforcement
  - (E) noncontingent reinforcement
53. A child's crying can be the manifestation of an innate biological response or of conditioned behavior. Operant conditioning is most likely to account for which of the following instances of crying in an 18-month-old child? Crying that
- (A) occurs spontaneously without any apparent cause
  - (B) increases in intensity when the adult does not respond
  - (C) occurs when the child is hungry
  - (D) occurs in response to an unexpected, sudden, painful stimulus
  - (E) occurs when the mother leaves the child in the care of a new baby-sitter
54. Two brothers have been fighting. Exasperated, the mother says to one of her sons, "Go to your room until you apologize to your brother for hitting him!" The mother's words are an example of the application of
- (A) operant conditioning
  - (B) punishment
  - (C) aversive conditioning
  - (D) negative reinforcement
  - (E) extinction

55. After repeated exposure to a nurse in a white coat followed by an injection, a child learns to cower and cry in response to anyone approaching in a white coat. The child's behavior can best be explained as an example of
- (A) shaping
  - (B) instrumental conditioning
  - (C) mediated reflex response arc
  - (D) classic conditioning
  - (E) observational learning
56. A man who has smoked two packs of cigarettes a day for the past 20 years decides to give up smoking, but is unsuccessful. When questioned by his physician, he notes that he has the most trouble refraining from smoking when he has his usual glass of bourbon every evening. Having "bourbon and a smoke" is how he relaxes at the end of the day. The physician suggests that he refrain from having his bourbon each evening and substitute an evening stroll instead. The physician's advice is based on an application of the principle of
- (A) aversive conditioning
  - (B) biofeedback
  - (C) systematic desensitization
  - (D) fading
  - (E) stimulus control
57. A 56-year-old male patient has just been diagnosed with diabetes. His physician is concerned about fostering adherence with a treatment regimen that includes regular medication and dietary changes. The patient is most likely to follow the instructions given by the physician if the conversation with the physician makes the patient
- (A) calm and collected
  - (B) calm and questioning
  - (C) concerned and attentive
  - (D) worried and distracted
  - (E) fearful and self-absorbed
58. "No, I don't remember, and I don't want to remember," cries a man asked to recall a painful episode from his childhood. The defense mechanism most closely suggested by this man's words and behavior is
- (A) projection
  - (B) denial
  - (C) intellectualization
  - (D) dissociation
  - (E) repression



59. A woman finds herself in a town some distance from her home, without any recollection of how she got there. The defense mechanism that most likely accounts for this scenario is
- (A) repression
  - (B) suppression
  - (C) dissociation
  - (D) reaction formation
  - (E) denial
60. When asked about his impending heart operation, the patient recounts the procedures in detail. He seems remarkably well versed and, upon questioning, admits that he has been "reading everything I can get my hands on" about it. He discusses the details for hours, yet shows no emotional reaction to the impending events. The defense mechanism that most likely accounts for this scenario is
- (A) rationalization
  - (B) repression
  - (C) regression
  - (D) isolation
  - (E) intellectualization
61. A woman with no previous history of promiscuity suddenly begins to take on sexual partners of both sexes, one right after the other. The record shows that her new pattern of sexual behavior started soon after the death of a child to whom she was very close. Yet, there is no indication of a period of mourning. The woman's behavior suggests the defense mechanism of
- (A) isolation
  - (B) suppression
  - (C) denial
  - (D) acting out
  - (E) undoing
62. A 32-year-old Irish male appears at the clinic complaining of "a slight pain" on his left side. Upon examination, he is found to have two broken ribs. When informed of this, the man insists that it cannot be that serious and asks only for some medication for the pain. This is best characterized as the defense mechanism of
- (A) displacement
  - (B) denial
  - (C) depression
  - (D) isolation
  - (E) reaction formation

63. A father, who has lost his daughter as the result of a traffic accident involving a drunk driver, organizes a local chapter of a national group campaigning to stop the sale of liquor to minors and legislate mandatory jail time for anyone convicted of drunk driving. "If I can't have my girl back, at least I can make sure it doesn't happen to some other father," he says. The defense mechanism that most likely accounts for this behavior is
- (A) acting out
  - (B) suppression
  - (C) reaction formation
  - (D) displacement
  - (E) sublimation
64. A 64-year-old male factory worker is hospitalized after barely surviving a serious myocardial infarction. His life was saved by the administration of emergency balloon angioplasty. The following day his primary care physician visits the patient's hospital room. Much to his surprise, he finds the patient, who never did much exercise before, on the floor doing push-ups and saying, "Time to get in shape, doc!" The patient's word and behavior in this instance are most likely the result of the defense mechanism of
- (A) denial
  - (B) dissociation
  - (C) acting out
  - (D) undoing
  - (E) reaction formation
65. Bob is an avid sports fan who runs five miles everyday for fitness and relaxation, and frequently plays touch football with others in this neighborhood. One day after he had had an argument with his wife, Bob got into a fist-fight during a football game and had to be restrained by his teammates. The defense mechanism that most likely accounts for Bob's behavior is
- (A) acting out
  - (B) denial
  - (C) displacement
  - (D) dissociation
  - (E) intellectualization
  - (F) introjection
  - (G) isolation
  - (H) passive-aggressive
  - (I) projection
  - (J) rationalization
  - (K) reaction formation
  - (L) regression
  - (M) repression
  - (N) splitting

**Answers**

51. **Answer: E.** In the animal studies, the researcher prevents the animal from getting away from the painful stimulus: avoidance is prevented.
52. **Answer: C.** Variable ratio reinforcement is most resistant to extinction. Think of gambling.
53. **Answer: B.** Operant behavior is evident when an environmental stimulus, such as eye contact or the lack of response by the adult, evokes a learned behavior. Pain response is not learned, but innate.
54. **Answer: D.** The key here is the contingency; the child gets out of his room (removal of a stimuli) when he apologizes. This removal, making a behavior more likely, is the definition of negative reinforcement. Note, the mother's words are not punishment. That would be "you have been fighting with your brother, go to your room," trying to inflict punishment to limit a behavior.
55. **Answer: D.** White coat comes to be associated with pain, just as the bell comes to be associated with the meat for Pavlov. Classic, or its synonym, respondent conditioning.
56. **Answer: E.** By avoiding the stimulus that triggers the unwanted behavior, the unwanted behavior becomes less likely. Note that this is an application of operant conditioning.
57. **Answer: C.** The Health Belief model tells us that medium levels of anxiety are best for adherence.
58. **Answer: E.** Repression is forgetting, and forgetting that you forgot. It is enduring and motivated by unconscious desires. Repression is one of the most basic defense mechanisms.
59. **Answer: C.** Amnesia with travel is the classic definition of psychogenic fugue state, the result of dissociation as a defense mechanism.
60. **Answer: E.** Rather than responding with the expected level of apprehension and anxiety, the patient spends his time reading and cognitive activity. Anxiety is replaced by cognitive activity: intellectualization.
61. **Answer: D.** Rather than showing the expected grief reactions, the woman embarks on a new course of behavior. This behavior masks the underlying, unexpressed feeling and constitutes acting out.
62. **Answer: B.** The patient responds to the reality of broken ribs by saying that it is not so. This bald-faced negation of objective facts is denial.
63. **Answer: E.** The father gets gratification from the impulse to save his daughter by helping others. The behavior is not simply redirected as with displacement, but targeted directly to the issue of concern to the benefit of others.
64. **Answer: D.** The patient is doing action to fix or makeup for his heart condition. This behaviorally focused reversal is what undoing is all about.
65. **Answer: C.** The anger Bob feels toward his wife is redirected into a fight with someone else. Bob is still angry, but the recipient of the anger changes from his wife to another.



# Psychologic Health and Testing

# 8

## A. Psychologic Health and Physical Health

1. Type A behavior pattern (or the Coronary Prone Behavior Pattern)
  - a. A cluster of behavioral traits that has been associated with increased prevalence and incidence of coronary heart disease
  - b. The extreme Type A person is engaged in a chronic struggle to obtain an unlimited number of things from his environment in the shortest possible period of time.
  - c. Traits: impatient, competitive, preoccupied with deadlines, and highly involved with their jobs
  - d. Recent data suggest that how people handle hostility is the key component of Type A behavior. People who get hostile and angry at everyday slights are more at risk.
  - e. One major prospective study has shown that the Type A behavior pattern is associated with a twofold increase in incidence of coronary heart disease, even after controlling for the major risk factors (systolic blood pressure, cigarette smoking, cholesterol).
  - f. Following a first heart attack, Type As who survived had a lower chance of a second attack than did Type Bs.

## B. Psychologic Adjustment and Physical Health

1. A study of physically healthy men (Harvard sophomores between 1942 and 1944) followed for nearly 40 years showed that mentally healthy individuals do not deteriorate in physical health as quickly as do those in poor mental health. Chronic anxiety, depression, and emotional maladjustment predict negative health events later in life.
2. Stressful life events: Holmes and Rahe scale used to quantify stressful life events
  - a. On this scale, different life events contribute different weightings to the total score.
  - b. The death of a spouse is weighed as the most stressful event
  - c. Not only negative events, such as death of a spouse, divorce, or getting fired, are considered stressful.
  - d. Marriage, promotions, even the celebration of holidays earn points on this measure of stress.
  - e. People who get a higher score on this scale are more likely to become ill over the next 6 months.
  - f. The correlation between stressful life events and developing illness is a small but significant positive correlation between +0.30 and +0.40.

## Note

### The USMLE Requires You to Know:

- Type A behavior pattern, how stress impacts physical health, and what intelligence is and the basic tests for measuring it
- The difference between objective and projective tests and common examples of each
- Commonly used neuropsychologic tests
- Computing and understanding the IQ

3. Why individuals react differently to the same objective stressors
  - a. The individual's appraisal of the meaning of the stressor
  - b. Hardy personality type: clear sense of values, goals, and capabilities; an unshakable sense of the meaningfulness of life; and a strong sense of control over one's own fate
  - c. Social support
    - i. Belief is more important than objective support.
    - ii. Having one significant person to turn to is key.
    - iii. Women use support more effectively than do men.
    - iv. Presence of a familiar person lowers blood pressure in a person under stress.
    - v. Widows and widowers have higher rates of heart attacks in the year just after a spouse dies.
4. Physiologic changes in response to stress
  - a. Key stress response pathway: hypothalamic-pituitary-adrenal axis
  - b. Cortisol levels rise then fall within 24 hours after stressor.
  - c. Secondary spike in cortisol levels 48 to 72 hours after stressor

**C. Intelligence Quotient (IQ)**

1. Definition: a general estimate of the functional capacities of the person
2. 70% inherited, recent studies suggest most from mother
3. IQ is not an absolute score but a comparison among people.
4. Distribution mean: 100; standard deviation: 15

**Table 8-1. Distribution of IQ Scores in the General Population**

Range	Label	Distribution
Less than 69	Mentally disabled	About 2.5% of the population
70 to 79	Borderline	
80 to 89	Low average	
90 to 109	Average	About 50% of the population
110 to 119	High average	
120 to 129	Superior	
over 130	Very superior	About 2.5% of the population

5. Scaling intelligence: calculating an intelligence quotient
  - a. Mental age method
    - i. Mental age (MA)=median test score for a given age
    - ii. Chronological age (CA)=actual age of the person taking the test
    - iii. Formula:  $(MA/CA) \times 100 = IQ$  score
    - iv. Example: A 10-year-old child got a test score of 25. If 25 is the median score of 13-year-olds, then MA = 13, CA = 10, and  $(13/10) \times 100 = 130$
    - v. Note that as CA goes up, if MA stays constant, IQ goes down.

- b. Deviation from norms method
    - i. For each age range (cohort), take a sample of the IQ test scores.
    - ii. Convert this distribution of scores using a Z-score type formula to a distribution where the mean is 100 and the standard deviation is 15. This provides a separate distribution for each age.
    - iii. Any test score for any person at any age can then be converted to match this distribution to provide a standardized comparison. These precomputed comparison distributions come as charts accompanying the IQ test scoring kit.
    - iv. If a child age 10 scores a 25 on the test, simply find the table for age 10 and look up a score of 25 to see what IQ level the score corresponds to
    - v. The same absolute performance at different ages gives different IQ scores because different norms are used for each age
  - c. Error margin for both mental age method and deviation from norms method is  $\pm 5$  points.
6. IQ facts
- a. IQ is highly correlated with education and is an excellent predictor of academic achievement.
  - b. Mental illness is distributed across all ranges of intelligence, although measured IQ may be lower when assessed because of interference of symptoms.
  - c. IQ is not related to suicide risk.
  - d. Autistic children tend to be of below average intelligence, with 80% having IQs less than 70.
  - e. Longitudinal tests for intelligence show:
    - i. Very little decline in the elderly
    - ii. Verbal ability holds up best
    - iii. Perceptual and motor tests show some decline
  - f. Cross-sectional studies of IQ show lower levels for older persons because older persons tend to be less educated than are the young.
  - g. IQ is very stable from age 5 onward.
  - h. Increased exposure to verbal behavior early in life leads to a higher IQ.
  - i. IQ tests contain elements of cultural bias, asking about words and objects more familiar in some cultures, while less familiar or nonexistent in others.
7. Commonly used IQ tests
- a. Wechsler Adult Intelligence Scale, Revised (WAIS-R) is for adults, aged 17 and older.
  - b. Wechsler Intelligence Scale for Children, Revised (WISC-R) is for children aged 6 to 17.
  - c. Wechsler Preschool and Primary Scale of Intelligence (WPPSI) is for children aged 4 to 6.
  - d. Stanford-Binet Scale is the first formal IQ test (1905) and is used for children aged 2 to 18. Today, it's most useful with children younger than 6, the impaired, or the very bright.

**D. Personality Tests**

1. **Objective tests:** simple stimuli (usually questions), restricted range of responses possible (select between choices given), scored mechanistically using scoring key; no clinical experience required to score. There are two types of objective personality tests:
  - a. Criterion referenced
    - i. Results are given meaning by comparing them with a preset standard.
    - ii. E.g., USMLE Steps 1, 2, and 3
    - iii. "Every student who scores above 75% will pass."
  - b. Norm referenced
    - i. Results are given meaning by comparing them with a normative group.
    - ii. High or low scores indicate deviation from that group.
    - iii. "The top 25% of the students will pass."
    - iv. Classic example: Minnesota Multiphasic Personality Inventory (MMPI) revised 1989
      - 550 statements to which respondent answers true or false
      - Most widely used (and misused) personality test. Serves as criterion for newly developed tests
      - Raw scores converted to T-scores with a mean of 50 and a standard deviation of 10. Scores greater or lesser than two standard deviations from the mean are clinically significant.
      - Yields 10 primary clinical dimensions and three validity scales
      - As a normed reference test, must be interpreted with care. Demographics, SES, education, and lifestyle choices may cause deviant readings.
2. **Projective tests:** ambiguous stimuli; wide range of responses possible, scored by experienced clinician using consensual standards
  - a. Meaning of responses found by clinical correlation between collected cases of responses and personal characteristics, psychopathologies
  - b. Classic examples:
    - i. Rorschach Inkblot Test
      - Major projective test
      - 10 inkblots, five in color and five not
      - Exner scoring method gives good reliability
    - ii. Thematic Aperception Test (TAT)
      - Evaluates the conflicts, drives, motives, and emotions that may be unconscious to the individual
      - Patients are asked to tell a story about what is going on in the pictures.
      - Stories are scored for themes of achievement, power, intimacy, and other clinically relevant themes.
    - iii. Sentence Completion Test
      - Patient is asked to complete a set of sentence stems with the first thing that comes to mind
      - Responses are scored for fears, desires, aspirations, relationships



iv. Projective drawings

- Patient given a sheet of paper and asked to draw a house, a tree, a person, a family, or some other subject
- Artistic form is irrelevant. Instead, drawings are scored for size, placement, distortion, erasures, details, omissions, shading
- Interpretation centers on unconscious aspects of patient's life

E. Neuropsychologic Tests

1. Halsted-Reitan Battery

- a. Tests for presence and localization of brain dysfunction
- b. Consists of five basic tests: category test, tactual performance test, rhythm test, speech sounds perception test, finger oscillation test. These are combined to provide an impairment index.

2. Luria Nebraska Battery

- a. Tests level of impairment and functioning
- b. Subscales: motor, rhythm, tactile, visual-spatial, receptive speech, expressive speech, writing, reading, arithmetic, amnesic, intellectual, right and left hemisphere function

3. Bender Visual Motor Gestalt Test

- a. Screens for brain dysfunction
- b. Nine designs are presented to the patient and copied by him. The patient is then asked to recall as many designs as he or she can

4. Benton Visual Retention Test

- a. Spatial construction, drawing task
- b. 10 designs that the patient copies as presented or from memory

5. Wechsler Memory Scale

- a. Assess memory impairment
- b. Subcomponents: recall of current and past information, orientation, attention, concentration, memory for story details, memory designs, and learning
- c. Yields a memory quotient

### Chapter Summary

Type A behavior pattern is associated with an increased chance of developing and dying from cardiovascular disease. How people deal with hostility seems to be the most important component.

Good physical health is associated with positive mental health. Good mental health early in life is predictive of better physical health later in life.

A convergence of stressful events (the Holmes and Rahe scale) has a negative impact on physical health.

Successful coping in the face of stress is related to the appraisal of the event, the Hardy personality type, and having social support available.

The hypothalamic-pituitary-adrenal axis is the key stress pathway. Its activation results in a bimodal spurt of cortisol excretion.

#### Intelligence Quotient (IQ):

The IQ is an estimate of the functional capacity of an individual and is mostly, but not entirely, determined by inheritance.

The IQ has a mean of 100 and a standard deviation of 15. IQ is very stable from age 5 onward and is measured with an error of  $\pm 5$  points.

Both mental age and deviation from norms methods can be used to compute IQ.

Objective tests use simple stimuli, limited response sets, and can be machine scored. Objective test can be scored as either norm referenced (comparing with others) or criterion referenced (comparing to a preset standard).

Projective tests use ambiguous stimuli, allow a wide range of responses, and must be scored by a skilled clinician.

Important neuropsychologic tests include Halsted-Reitan Battery, Luria Nebraska Battery, Bender Visual Motor Gestalt Test, Benton Visual Retention Test, and Wechsler Memory Scale.

# Child Development

# 9

## A. General Patterns in Human Development

1. Development occurs along multiple lines: physical, cognitive, intellectual, and social.
2. We tend to chart development for each of these lines in terms of milestones, i.e., skills achieved by a certain age. Milestones are simply normative markers at median ages. Some children develop slower and some faster. The ages for the milestones are therefore only approximate and should not be taken as dogma.
3. Although children generally progress along the lines of development together, they often may not. Thus, a child may match the milestones for cognitive development but show slower growth in the social area.

## B. Infants

1. Recent research has changed our past assumptions about the capabilities of infants. Evidenced at birth:
  - a. Reaching and grasping behavior
  - b. Ability to imitate facial expressions
  - c. Ability to synchronize their limb movements with speech of others (coupling or entrainment)
  - d. Attachment behaviors, such as crying and clinging
2. Newborn preferences
  - a. Large, bright objects with lots of contrast
  - b. Moving objects
  - c. Curves versus lines
  - d. Complex versus simple designs
  - e. Evidence of a preference for facial stimuli
3. The fact that a neonate will demonstrate defensive movements if an object looms toward his or her face suggests the ability to perceive a three-dimensional world.
4. Recent research also suggests that the neonatal nervous system gives special attention to language versus nonlanguage stimuli.
  - a. Left-brain-evoked potentials are larger than right-brain-evoked potentials to language stimuli (but not to nonlanguage stimuli).
  - b. Neonates can discriminate between language and nonlanguage stimuli.
  - c. Infants do not learn language but learn to use the language capacity they are born with (Broca's area).
5. At just 1 week old, the infant responds differently to the smell of the mother compared with the father.

## Note

### The USMLE Requires You to Know:

- Capacities and preferences of infants
- Basic developmental patterns, including reproducing shapes and learning movements
- Common ages corresponding to physical milestones
- The basic issues in personality development
- How social capacities change with age
- The sequence of cognitive development
- How language skills develop with age
- Characteristic patterns of play at given ages
- How to discipline children
- Coping with attachment and loss
- Differentiating grief and depression and children's conceptions of death and illness
- Dealing with abuse

6. Smiling

- a. The smile develops from an innate reflex present at birth (endogenous smile).
- b. An infant shows exogenous smiling in response to a face at 8 weeks.
- c. A preferential social smile, e.g., to the mother's rather than another's face, appears about 12 to 16 weeks.

7. Physical development

- a. Hands and feet are the first parts of the body to reach adult size.
- b. Motor development follows set patterns:
  - i. Grasp precedes release
  - ii. Palm up maneuvers occur before palm down maneuvers
  - iii. Proximal to distal progression
  - iv. Ulnar to radial progression
- c. Capacity to copy shapes follows in alphabetical order:
  - i. Circle, cross, rectangle, square, triangle
  - ii. The exception is a "diamond," which can generally not be reproduced until age 7.
- d. First words (10 months), then first birthday, then first steps (13 months)






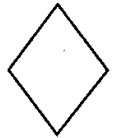
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	Cross	4
	Rectangle	4½
	Square	5
	Triangle	6
	Diamond	7

Figure 9-1. Figures Copied and Approximate Ages

8. Key developmental issues

- a. Brain-growth spurt: "critical period" of great vulnerability to environmental influence
  - i. Extending from last trimester of pregnancy through first 14 postnatal months
- b. Earliest memories, roughly ages 2–4
- c. First words (10 months), then first birthday, then first steps (13 months)
  - i. Size of cortical cells and complexity of cell interconnections undergo their most rapid increase. Brain adapts structure to match environmental stimulation.
- d. Stranger anxiety: distress in the presence of unfamiliar people
  - i. It appears at 6 months, reaches its peak at 8 months, disappears after 12 months
  - ii. Can occur even when child is held by parent
- e. Separation anxiety: distress of infant following separation from a caretaker
  - i. Appears at 8–12 months
  - ii. Begins to disappear at 20–24 months
  - iii. Continued separation, especially prior to 12 months leads to withdrawal and risk of anaclitic depression
  - iv. School phobia (Separation Anxiety Disorder) is failure to resolve separation anxiety. Treatment focuses on child's interaction with parents, not on activities in school
- f. Imprinting: an interesting facet of attachment behavior in animals
  - i. Some animals (geese, ducks, quail) will follow the first object they see after birth.
  - ii. May even run to it, rather than to the mother, when frightened
  - iii. Does not apply to humans

Table 9-1. Child Development Milestones

Age	Physical Developments	Social Developments	Motor Developments	Cognitive Developments (Piaget)	Language Developments
1 <sup>st</sup> year of life	<ul style="list-style-type: none"> <li>• Puts everything in mouth</li> <li>• Sits with support (4 mo)</li> <li>• Stands with help (8 mo)</li> <li>• Crawls, fear of falling (9 mo)</li> <li>• Pincer grasp (12 mo)</li> </ul>	<ul style="list-style-type: none"> <li>• Parental figure central</li> <li>• Issues of trust are key</li> <li>• Stranger anxiety (6 mo)</li> <li>• Separation anxiety (12 mo)</li> <li>• Play is solitary and exploratory</li> <li>• Pat-a-cake, peek-a-boo (10 mo)</li> </ul>	<ul style="list-style-type: none"> <li>• Follows objects to midline (4 wk)</li> <li>• One-handed approach/grasp of toy</li> <li>• Feet in mouth (5 mo)</li> <li>• Bang and rattle stage</li> <li>• Changes hands with toy (6 mo)</li> </ul>	<ul style="list-style-type: none"> <li>• Sensation/movement</li> <li>• Schemas</li> <li>• Assimilation and accommodation</li> </ul>	<ul style="list-style-type: none"> <li>• Laughs aloud (4 mo)</li> <li>• Repetitive responding (8 mo)</li> <li>• "ma-ma, da-da" (10 mo)</li> </ul>
Age 1	<ul style="list-style-type: none"> <li>• Climbs stairs alone (18 mo)</li> <li>• Emergence of hand preference (18 mo)</li> <li>• Walks alone (13 mo)</li> </ul>	<ul style="list-style-type: none"> <li>• Dependency on parental figure (rapprochement)</li> <li>• Onlooker and parallel play</li> </ul>	<ul style="list-style-type: none"> <li>• Kicks ball, throws ball</li> <li>• Pats pictures in book</li> <li>• Stacks three cubes (18 mo)</li> </ul>	<ul style="list-style-type: none"> <li>• Achieves object permanence</li> </ul>	<ul style="list-style-type: none"> <li>• Great variation in timing of language development</li> <li>• Uses 10 words</li> </ul>
Age 2	<ul style="list-style-type: none"> <li>• High activity level</li> <li>• Walks backwards</li> <li>• Can turn doorknob, unscrew jar lid</li> <li>• Scribbles with crayon</li> </ul>	<ul style="list-style-type: none"> <li>• Selfish and self-centered</li> <li>• Imitates mannerisms and activities</li> <li>• May be aggressive</li> <li>• "No" is favorite word</li> </ul>	<ul style="list-style-type: none"> <li>• Stands on tiptoes (30 mo)</li> <li>• Able to aim thrown ball</li> <li>• Stacks six cubes (24 mo)</li> </ul>	<ul style="list-style-type: none"> <li>• A world of objects</li> <li>• Can use symbols</li> <li>• Transition objects</li> <li>• Strong egocentrism</li> <li>• Concrete use of objects</li> </ul>	<ul style="list-style-type: none"> <li>• Use of pronouns</li> <li>• Parents understand more</li> <li>• Telegraphic sentences</li> <li>• Two-word sentences</li> <li>• Uses 250 words</li> </ul>
Age 3	<ul style="list-style-type: none"> <li>• Rides tricycle</li> <li>• Alternates feet going up stairs</li> <li>• Bowel and bladder control (toilet training)</li> <li>• Draws recognizable figures</li> </ul>	<ul style="list-style-type: none"> <li>• Fixed gender identity</li> <li>• Sex-specific play</li> <li>• Understands "taking turns"</li> <li>• Knows sex and full name</li> </ul>	<ul style="list-style-type: none"> <li>• Catches ball with arms</li> <li>• Stacks 9 cubes (36 mo.)</li> <li>• Cuts paper with scissors</li> <li>• Unbuttons buttons</li> </ul>	<ul style="list-style-type: none"> <li>• Complete sentences</li> <li>• Uses 900 words</li> <li>• Understands 4x that</li> <li>• Strangers can understand</li> <li>• Recognizes common objects in pictures</li> </ul>	<ul style="list-style-type: none"> <li>• Complete sentences</li> <li>• Uses 900 words</li> <li>• Understands 4x that</li> <li>• Strangers can understand</li> <li>• Recognizes common objects in pictures</li> </ul>
Age 4	<ul style="list-style-type: none"> <li>• Alternates feet going down stairs</li> <li>• Hops on one foot</li> </ul>	<ul style="list-style-type: none"> <li>• Imitation of adult roles</li> <li>• Curiosity about sex (playing doctor)</li> <li>• Nightmares and monster fears</li> <li>• Imaginary friends</li> </ul>	<ul style="list-style-type: none"> <li>• Grooms self (brushes teeth)</li> </ul>	<ul style="list-style-type: none"> <li>• Points to and counts three objects</li> <li>• Repeats four digits</li> <li>• Names colors</li> </ul>	<ul style="list-style-type: none"> <li>• Can tell stories</li> <li>• Uses prepositions</li> <li>• Uses plurals</li> <li>• Compound sentences</li> </ul>

(continued next page)

Table 9-1. Child Development Milestones (continued)

Age	Physical Development	Social Development	Motor Development	Cognitive Development (Piaget)	Language Development
Age 5	<ul style="list-style-type: none"> <li>• Complete sphincter control</li> <li>• Brain at 75% of adult weight</li> </ul>	<ul style="list-style-type: none"> <li>• Conformity to peers important</li> <li>• Romantic feeling for others</li> <li>• Oedipal phase</li> </ul>	<ul style="list-style-type: none"> <li>• Draws recognizable man with head, body, and limbs</li> <li>• Dresses and undresses self</li> <li>• Catches ball with two hands</li> </ul>	<ul style="list-style-type: none"> <li>• Counts 10 objects correctly</li> </ul>	<ul style="list-style-type: none"> <li>• Asks the meaning of words</li> <li>• Abstract words elusive</li> </ul>
Ages 6 to 12	<ul style="list-style-type: none"> <li>• Boys heavier than girls</li> <li>• Permanent teeth (11 y)</li> <li>• Refined motor skills</li> </ul>	<ul style="list-style-type: none"> <li>• "Rules of the Game" are key</li> <li>• Organized sport possible</li> <li>• Being team member focal for many</li> <li>• Separation of the sexes</li> <li>• Sexual feelings not apparent</li> <li>• Demonstrating competence is key</li> </ul>	<ul style="list-style-type: none"> <li>• Rides bicycle</li> <li>• Prints letters</li> <li>• Gains athletic skill</li> <li>• Coordination increases</li> </ul>	<ul style="list-style-type: none"> <li>• Abstract from objects</li> <li>• Law of conservation achieved</li> <li>• Adherence to logic</li> <li>• Seriation</li> <li>• No hypotheticals</li> <li>• Mnemonic strategies</li> <li>• Personal sense of right and wrong</li> </ul>	<ul style="list-style-type: none"> <li>• Shift from egocentric to social speech</li> <li>• Incomplete sentences decline</li> <li>• Vocabulary expands geometrically (50,000 words by age 12)</li> </ul>
Age 12 + (adolescence)	<ul style="list-style-type: none"> <li>• Adolescent "growth spurt" (girls before boys)</li> <li>• Onset of sexual maturity (10+ y)</li> <li>• Development of primary and secondary sexual characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Identity is critical issue</li> <li>• Conformity most important (11-12 y)</li> <li>• Organized sports diminish for many</li> <li>• Cross-gender relationships</li> </ul>		<ul style="list-style-type: none"> <li>• Abstract from abstractions</li> <li>• Systematic problem-solving strategies</li> <li>• Can handle hypotheticals</li> <li>• Deals with past, present, future</li> </ul>	<ul style="list-style-type: none"> <li>• Adopts personal speech patterns</li> <li>• Communication becomes focus of relationships</li> </ul>

**C. Discipline of Children**

1. Be sure discipline is developmentally age-appropriate. Abstract, cognitive reasonings mean little to a child younger than 6 years.
2. If trying to stop a young child from hitting another, don't expect the child to understand how the other feels.
3. Best application of discipline would be "time out."
4. Punishment by hitting the child is too confusing; you are doing exactly what you are telling the child not to do.
5. Discipline should be clearly connected (in time and space) to behavior to be modified.

**D. Teenagers**

1. Identity formation is the key issue. Issues of independence and self-definition predominate.
2. The teenage years may be stressful but are not generally filled with the type of traumas often portrayed in the popular press.
3. Teenagers' values reflect those of their parents.
4. Rebellion is manifested as minor disagreements regarding hair, music, dress, friends.
5. Rebellion is most likely in early teenage years.
6. Sexual experimentation with opposite- and same-sex partners is common.

**E. Attachment and Loss**

1. In childhood
  - a. Bowlby postulates three phases of response to prolonged separation of children aged 7 months to 5 years
    - i. Protest: crying, alarm, aggression
    - ii. Despair: hopes of regaining loved one fades
    - iii. Detachment: feelings of yearning and anger are repressed
  - b. Psychological upset is more easily reversed in stages of protest or despair than after detachment has set in.
  - c. Because separation has behavioral consequences, pediatric hospitalization must take it into account through provision of parental contact (e.g., rooming-in practices, flexible visiting hours, assurances that mother will be present when child awakes from surgery).
2. In adults
  - a. Adults who are bereaved or are mourning the loss of a loved one also go through a series of phases.
  - b. Initial phase (protest, acute disbelief)
    - i. Lasts several weeks
    - ii. Weeping
    - iii. Hostility and protest
  - c. Intermediate phase (grief, disorganization)
    - i. 3 weeks to 1 year
    - ii. Sadness, yearning, somatic symptoms



- iii. Obsessional review, searching for deceased
- iv. May believe they see or hear deceased
- v. Confronting reality
- d. Recovery (or reorganization) phase
  - i. Reinvestment of energies and interests
  - ii. Begins second year after death, memories fade in intensity

**Table 9-2. Normal Grief versus Depression**

Normal Grief	Depression
Normal up to 1 year	After 1 year, sooner if symptoms severe
Crying, decreased libido, weight loss, insomnia	Same
Longing, wish to see loved one, may think they hear or see loved one in a crowd	Abnormal overidentification, personality change
Loss of other	Loss of self
Suicidal ideation is rare	Suicidal ideation is common
Self-limited, usually less than 6 months	Symptoms do not stop (may persist for years)
Antidepressants not helpful	Antidepressants helpful

**F. Dealing With Dying Patients**

1. Stages of adjustment (Kubler-Ross)
  - a. Denial
  - b. Anger
  - c. Bargaining
  - d. Depression
  - e. Acceptance
2. People move back and forth through the stages. Not everyone passes through all stages or reaches adequate adjustment.
3. Similar stages for dealing with loss or separation
4. Rules for dealing with the dying:
  - a. Tell the patient everything.
  - b. Do not give false hope.
  - c. Allow person to talk about feelings.
  - d. Keep involved in activities.
  - e. Avoid social isolation.

**G. Children's Conceptions of Illness and Death**

1. Children do not see the real world, do not live in the same world that we do.
  - a. They have a limited cognitive repertoire; their thinking is concrete and egocentric.
  - b. When they become ill, they may interpret this as a punishment and may have all sorts of misconceptions about what is wrong with them.
2. Children from birth to 5 years old really have no conception of death as an irreversible process.
3. More than death, the preschool child is more likely to fear:
  - a. Separation from parents
  - b. Punishment
  - c. Mutilation (Freud's castration anxiety)
4. Only after age 8 or 9 is there understanding of the universality, inevitability, and irreversibility of death.

**H. Facts About the Elderly and Aging**

1. U.S. population aged 65 or older:
  - a. 4% in 1960
  - b. 15% in 2000
  - c. 25% in 2030 (estimate)
2. Fastest growing age cohort is persons older than 85.
3. The elderly account for more than one-third of all health care expenditures.
4. Roughly 70% of men older than 75 are married, but only 22% of women.
5. 13% of the elderly are below the poverty line.
  - a. This is the same rate as the rate for the total population.
  - b. The rate is two times greater for Hispanics and three times greater for blacks.
6. Only 5 to 10% of those older than 65 have moderate or severe dementia.
  - a. Older than 85, the rate is 25%.
  - b. 50% of dementia cases are due to Alzheimer.
7. With the exception of cognitive impairment, the elderly have a *lower* incidence of all psychiatric disorders compared with younger adults.
8. The elderly in the United States are generally not isolated or lonely, but may not receive the same respect as in other cultures.
  - a. 80% have children and most have frequent contact with them.
  - b. The family is still the major social support system for the elderly in times of illness.
  - c. Institutionalization is undertaken only as a last resort.
9. 85% of the elderly have at least one chronic illness.
  - a. 50% have some limitation to their activities.
  - b. Only 5% are homebound.
10. Among noninstitutionalized, 60% call their health excellent or good, 20% fair.

11. Suicide rates per 100,000:

<u>Ages</u>	<u>Males</u>	<u>Females</u>
65 to 74	30.4	6.5
75 to 84	42.3	5.5
85 and older	50.6	5.5

12. Currently about 2 million, or about 6%, of the elderly population are institutionalized.
13. One in 10 persons aged 75 or older is in a nursing home; for 85 and older, the ratio is 1 in 5.
14. Preventive occupational therapy (OT) programs offer clear advantages over "just keeping busy" to reduce decline in mental and physical health in the elderly.
15. Best predictor of nursing home admissions: falls and fall related injuries. Exercise improves balance and reduces risk of falls in the elderly.
16. Life expectancy (1995):
- |                     |                   |
|---------------------|-------------------|
| White female = 79.6 | White male = 73.3 |
| Black female = 73.9 | Black male = 64.9 |

I. Abuse

1. Child abuse

- a. More than 6,000 children are killed by parents or caretakers each year in the United States.
- b. More than 3 million annually are reported abused, 50% of these are confirmed by investigation.
- c. Likely that many abuse cases unreported
- d. Defining abuse
  - i. Tissue damage
  - ii. Neglect
  - iii. Sexual exploitation
  - iv. Mental cruelty
- e. Mandatory reportable offense up to age 18
  - i. Failure to do so is criminal offense.
  - ii. If case is reported in error, the physician is protected from legal liability.
  - iii. Remember your duty to protect the child (separate from the parents), as well as the duty to report.
- f. Clinical signs:
  - i. Broken bones in first year of life
  - ii. Sexually transmitted disease (STD) in young children
  - iii. 92% of injuries are soft tissue injuries (bruises, burns, lacerations).
  - iv. 5% have no physical signs.
  - v. Nonaccidental burns have a particularly poor prognosis.
    - They are associated with death or foster home placement.
    - If burn is on arms and hands, it was likely an accident.
    - If burn is on arms but not hands, it is more likely abuse.
  - vi. Shaken baby syndrome: look for broken blood vessels in eyes

- g. Children at risk for abuse are
  - i. Younger than 1 year of age
  - ii. Stepchildren
  - iii. Premature children
  - iv. Very active
  - v. "Defective" children
- h. Parents likely themselves to have been abused, and/or perceive child as ungrateful and as cause of their problems
- i. Be careful not to mistake benign cultural practices such as "coining" or "moxibustion" as child abuse
  - i. These and other folk medicine practices should usually be accepted.
  - ii. Key is whether practice causes enduring pain or long-term damage to child
  - iii. Treat female circumcision as abuse
  - iv. Look for an opening to discuss with parents how they treated child prior to seeing the physician
- j. Children who are abused are more likely to:
  - i. Be aggressive in the classroom
  - ii. Perceive others as hostile
  - iii. View aggression as a good way to solve problems
  - iv. Have abnormally high rate of withdrawal (girls)
  - v. Be unpopular with school peers and other children; the friends they do have tend to be younger.

2. Child sexual abuse

- a. 150,000 to 200,000 cases of sexual abuse per year

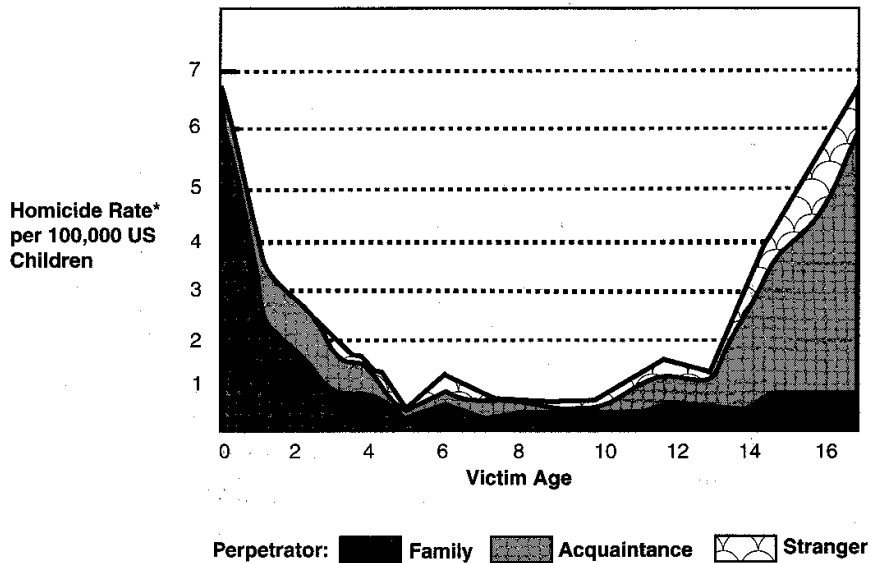


Figure 9-2. Relationship of Child Homicide Victims to Perpetrators

- b. 50% of sexual abuse cases are within the family.
  - c. 60% of victims are female.
  - d. Most victims are aged 9 to 12 years.
  - e. 25% of victims younger than 8 years
  - f. Most likely source: uncles and older siblings, although stepfathers are also more likely
  - g. In general, males more likely to be sources
  - h. Risk factors:
    - i. Single-parent families
    - ii. Marital conflict
    - iii. History of physical abuse
    - iv. Social isolation
  - i. More than 25% of adult women report being sexually abused as a child (defined as sex experience before age 18 with a person 5 years older).
    - i. 50% by family members
    - ii. 50% told no one
  - j. Sexually abused women are more likely to:
    - i. Have more sexual partners
    - ii. Have three to four times more learning disabilities
    - iii. Have two times more pelvic pain and inflammation
    - iv. Be overweight (slight increased risk)
3. Spousal abuse
- a. An estimated 4 to 6 million women are beaten each year.
  - b. Each year, 1,500 women are killed by their abusers.
  - c. Not mandatory reportable offense. If confronted with a case, give the victim information about local shelters and counseling.
  - d. Number of attacks has held steady since mid-1970s.
  - e. Domestic violence is the #1 cause of injury to American women (for men, traffic accidents and other unintentional injuries are #1).
  - f. Occurs in all racial and religious backgrounds, and across all SES groups
  - g. More frequent in families with drug abuse, especially alcoholism
  - h. If one attack occurs, more are likely.
  - i. Male more likely abuser if:
    - i. Considers wife his belonging
    - ii. He is jealous or possessive.
    - iii. There are verbal assaults to his self-esteem.
  - j. Female more likely abused if:
    - i. Grew up in a violent home (about 50%)
    - ii. Married at a young age
    - iii. Perceives self as unable to function alone (dependent)
    - iv. Abused spouses tend to blame themselves for the abuse, identification with the aggressor.
    - v. Pregnant, last trimester (highest risk)

4. Elder abuse

- a. Elder abuse is a mandatory reportable offense.
- b. Prevalence rate 5 to 10%
- c. Includes physical, psychological, financial, or neglect
- d. Neglect is the most common type (50% of all reported cases).
- e. Caretaker is the most likely source of abuse; spouses are often caretakers.

Table 9-3. Types of Abuse and Important Issues

	Child Abuse	Elder Abuse	Spousal Abuse
Annual cases	Over 2 million	5 to 10% in population	Over 4 million
Most common type	Physical battery/neglect	Neglect	Physical battery
Likely gender of victim	Before age 5: female After age 5: male	63% Female	Female
Likely gender of perpetrator	Female	Male or Female	Male
Mandatory reportable?	Yes	Yes	No
Physician's response	Protect and report	Protect and report	Counseling and information

### Chapter Summary

Development occurs along multiple dimensions. Progress along these dimensions are assessed by using "milestones" or approximate ages.

The neonate has inherent physical responses and preferences, will respond defensively to objectives moved toward its face, and pays special attention to language-based stimuli.

At 1 week of age, an infant recognizes its mother's smell. Infants only achieve a preferential social smile to those in the environment by 12 to 16 weeks of age. It preferentially responds to its mother's face.

Figure IX-1 illustrates the figures that can be copied by children at various ages.

The developmental milestones from the first year of life to adolescence are summarized in Table IX-1.

Key normal developmental issues include:

*Stranger anxiety*: fear at the presence of unfamiliar people (6 to 12 months)

*Separation anxiety*: distress at the absence of primary caretaker (12 to 24 months). If not resolved can re-emerge as separation anxiety disorder when child starts school.

Discipline for children should be developmentally age-appropriate and be based on proven behavioral psychology principles.

Identity is the key issue for teenage years.

Because of the potential adverse consequences, physicians should provide mechanisms for parent contact with children within medical settings.

Adult bereavement consists of three similar stages: protest and acute disbelief, grief, and then recovery.

Review the differential diagnosis between normal bereavement and depression in Table 9-2.

Prior to the age of 5 children do not know what we mean by death. Only after reaching an age of 8 or 9 do they understand that death is irreversible.

The proportion of elderly in the U.S. is increasing. Most are not in poverty and have frequent contact with family. Most elderly are *not* demented, but most do have at least one chronic, long-term medical treatment.

Table 9-3 summarizes the most important issues relating to child, spousal, and elderly abuse.

### Review Questions

66. An 8-year-old girl attains a score of 35 on a standard intelligence test. Included in the test-scoring packet is a table showing median test scores for specific ages. An extract from the table is presented below:

Age	Median Score
4	15
5	18
6	22
7	25
8	29
9	32
10	35
11	40
12	45

Based on this table, the most likely IQ for this 8-year-old girl is

- (A) 85
  - (B) 100
  - (C) 110
  - (D) 125
  - (E) 140
67. A psychiatric researcher develops an observational test to assess the level impulse control of found bipolar patients. As a part of the test development strategy, the results of this observational test are compared with patients' scores on a standard paper-and-pencil test that also assesses impulse control. If the observational test has a high correlation with the paper-and-pencil test, the researcher would be most likely to regard this as evidence for
- (A) construct validity
  - (B) test-retest reliability
  - (C) predictive validity
  - (D) split-half reliability
  - (E) convergent validity
68. A 55-year-old executive makes a habit of doing several things at once. He always seems to be in a hurry and frequently worries that there is just not enough hours in the day to get things done. He is impatient with his subordinates and often gets angry with them when they do not perform to his standards or get their work in to him on time. The pattern of behavior displayed by this man suggests that in the next 10 years he is most at risk for developing
- (A) a gastric ulcer
  - (B) prostate cancer
  - (C) respiratory difficulties
  - (D) mental health problems
  - (E) an acute myocardial event



69. A 5-year-old child is referred to a mental health practitioner for evaluation. The practitioner wants to gain insight into the conscious and unconscious preoccupations of the child. To accomplish this objective, the practitioner is most likely to make use of
- (A) Luria Nebraska Battery
  - (B) Halsted-Reitan Battery
  - (C) Minnesota Multiphasic Personality Inventory
  - (D) Projective Drawing Test
  - (E) Rorschach test
  - (F) Wechsler Intelligence Scale for Children
70. A 3-year-old boy talks when his parents are talking in spite of being repeatedly told not to do so. His parents become frustrated with his behavior and ask his physician about the reason for this behavior pattern. The physician should advise the parents that this tendency of children to test the extremes of behavior that their parents will tolerate
- (A) is indicative of later maladjustment
  - (B) persists with partial parental reinforcement
  - (C) results from the action of classic conditioning
  - (D) can be resolved by a clear, reasoned explanation to the child
  - (E) is more commonly observed in boys than girls
71. A 5-month-old and a 12-month-old infant observe their mothers leaving the room. Which one will most likely begin to cry?
- (A) the 5-month-old
  - (B) the 12-month-old
  - (C) both will cry
  - (D) neither will cry
72. A young child is able to walk when held by one hand and speaks in strings of unrecognizable words. When placed in a room with other children, the child stays close to his mother, but plays by himself. Based on these observations, in the next six to eight months the child is most likely to learn to
- (A) ride a tricycle
  - (B) stand on his tiptoes
  - (C) draw a circle
  - (D) build a tower of three blocks
  - (E) play peek-a-boo
73. A child is observed walking down the stairs using alternating feet, can throw and catch a ball, states her gender accurately, and is able to correctly name the colors of presented objects. Based on this evidence, which of the following geometric shapes did the child most recently learn to draw?
- (A) cross
  - (B) diamond
  - (C) square
  - (D) triangle
  - (E) circle

74. Conformity with peers is a core characteristic of a number of normative developmental stages. In general, conformity of children to the norms of their peer groups is most intense at a time of development that also features
- (A) toilet training
  - (B) use of transition objects
  - (C) focal attachment to the caretaker
  - (D) beginning of formal schooling
  - (E) puberty
75. Studies of infants in wartime and natural disasters have revealed a number of characteristic changes in the expected developmental sequence. In comparison with those undergoing normal development, infants who experience severe psychosocial deprivation are more likely to display
- (A) separation anxiety
  - (B) infantile symbiosis
  - (C) anxiety with strangers
  - (D) delayed language development
  - (E) rapprochement
76. Although much of human behavior is learned, infants are born with certain capacities. Which of the following important behavioral skills are present in most infants at birth?
- (A) following objects to midline
  - (B) laughing aloud
  - (C) putting feet into mouth
  - (D) reaching and grasping
  - (E) recognition of the mother
77. A 4-year-old girl is brought by her mother to see the local pediatrician. The mother insists that the girl be given a complete physical exam. The physical exam turns up nothing abnormal. The mother insists that something must be wrong with the girl because she spends hours playing by herself and talking with a "friend" that no one else can see. In addition, two to three times a week the girl wakes up screaming from nightmares and is convinced that there is some sort of "monster" in her closet that is going to eat her as she sleeps. The physician's next action should be to
- (A) ask the mother about any recent trauma or changes in the girl's life
  - (B) reassure the mother that the girl is displaying normal behavior for her age
  - (C) re-examine the girl for signs of sexual abuse
  - (D) schedule the girl for psychiatric evaluation
  - (E) send the girl for a neurological consultation

78. An 8-year-old girl is brought to the emergency department by her grandmother who reports that she found the girl sitting in her apartment, dirty and disheveled, during a heat wave. The girl reports that she had not eaten in two days or seen her mother in the past 24 hours. Physical examination shows the girl to be severely dehydrated and lethargic in her responses to physical stimuli. At this point, the physician's next step would be to
- (A) ask the girl if she would like to stay in the hospital for a while
  - (B) contact the local child welfare agency
  - (C) contact the police and report the girl's mother for neglect
  - (D) initiate IV fluids for the child
  - (E) obtain permission from the grandmother to begin treatment for the child
  - (F) try to contact the girl's mother
79. A 67-year-old woman visits her physician four months after the death of her husband. She reports that she has difficulty sleeping and often finds herself crying at the "smallest things." The physician notices that she has lost weight and seems to avoid eye contact when interviewed. With some embarrassment, she confesses that she came to see the physician after thinking that she saw her husband across the street in a crowd, an experience that left her confused and shaken. At this point, the physician's best response would be to
- (A) ask her if she has much interest in sex lately
  - (B) ask her to talk about her relationship with her husband prior to his death
  - (C) detain her for observation as a suicide precaution
  - (D) explain to her that she has an adjustment disorder
  - (E) schedule her for a psychiatric evaluation
  - (F) tell her that these are normal reactions and that adjustment takes time
  - (G) write her a prescription for antidepressants

### Answers

66. **Answer: D.** Use the mental age method.  $(MA/CA) \times 100 = IQ$ . A score of 35 is median for a 10-year-old. Therefore,  $(10/8) \times 100 = 125$ .
67. **Answer: E.** Reliability means consistency. Validity means detecting truth. When two similar tests produce the same result, we have a confirmation of truth called convergent validity.
68. **Answer: E.** The question presents an example of Type A behavior pattern. People who display this behavior pattern are more than twice as likely to experience a heart attack.
69. **Answer: D.** The limited verbal skills of the child make this the best choice. Note that the Wechsler is an IQ test that does not give the information sought. The Halsted-Reitan and the Luria Nebraska are batteries that assess and localize brain dysfunction.
70. **Answer: B.** Children will always learn by testing. This is normal behavior and not indicative of maladjustment. However, it persists, like any behavior, if the parents reinforce it, however, unintentionally.
71. **Answer: B.** The key issue here is the timing of separation anxiety. It begins between 8 to 12 months of age and continues for most of the second year of life. The 5-month-old is too young. The 12-month-old is in the right age range.
72. **Answer: D.** The child described is about 1 year of age. Stacking three blocks is expected by about 18 months of age. The child should already know peek-a-boo, standing on tip-toes is achieved at about 30 months of age, riding tricycle and drawing a circle are skills learned at about three years of age.
73. **Answer: A.** The child described is about 4 years of age and has most recently learned to draw a cross. Circle is 3 years of age. Square is 5 years of age. The other options are for age 6 and up.
74. **Answer: E.** Conformity is most intense between the ages of 11 and 13, although it is also important during ages 4 to 6.
75. **Answer: D.** All of these listed are part of normal development with the exception of delayed language development. Infantile symbiosis is part of the early attachment relationship between mother and child. Rapprochement occurs as the child is learning separation from the parents.
76. **Answer: D.** Following objects to midline is 4 weeks, feet in mouth and laughing aloud about 4 to 5 months. It takes the infant about a week after birth before it can recognize the mother.
77. **Answer: B.** Imaginary friends and nightmares are common in children of this age. They represent normal developmental patterns and are NOT indicative of abuse, trauma, or more deep-seated psychological problems.
78. **Answer: D.** This victim of child neglect requires essential medical intervention. Care for the patient's needs first, and then worry about contacting the appropriate child welfare agency.
79. **Answer: F.** The question portrays a woman in normal grief, both by description and time frame. She needs reassurance that her reactions, including "seeing" her husband, are a part of a normal grief process.

# Sleep and Sleep Disorders

# 10

## A. Sleep Architecture

1. Sleep consists of two distinct states: NREM and REM.
  - a. NREM: non-rapid eye movement sleep
    - i. Divided into four stages on the basis of EEG criteria
    - ii. NREM sleep alternates with REM sleep throughout the sleep period and is characterized by:
      - Slowing of the EEG rhythms
      - Higher muscle tone
      - Absence of eye movements
      - Absence of "thoughtlike" mental activity
    - iii. NREM sleep is an idling brain in a movable body.
  - b. REM: rapid eye movement sleep
    - i. REM is characterized by:
      - An aroused EEG pattern
      - Sexual arousal
      - Saccadic eye movements
      - Elaborate visual imagery (dreaming)
      - Associated with pons
    - ii. REM sleep is an awake brain in a paralyzed body.

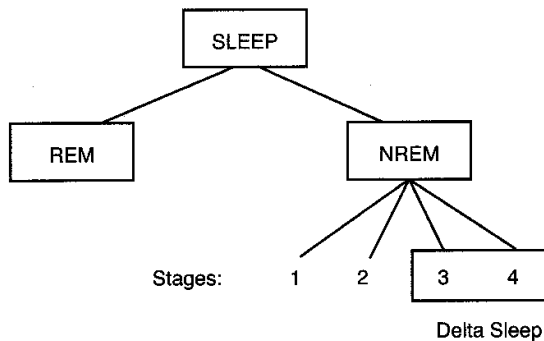


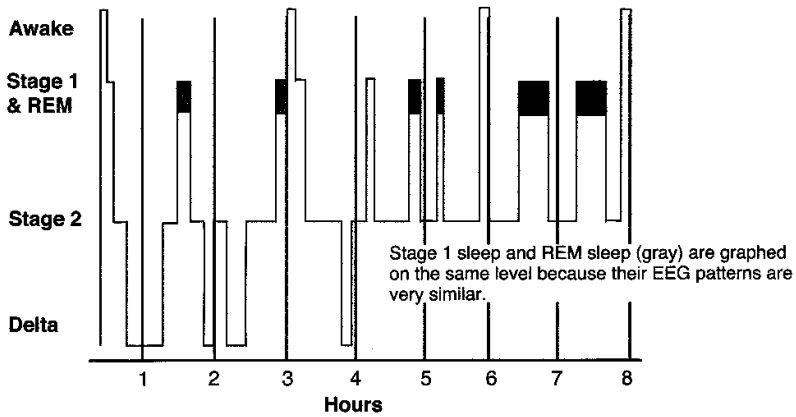
Figure 10-1. Types of Sleep

## Note

### The USMLE Requires You to Know:

- Students should know sleep architecture, including how to read sleep diagrams and EEG tracings
- Developmental changes in sleep patterns, including sleep for infants and the elderly
- The effects of sleep deprivation
- Diagnosis and treatment of sleep disorders
- Clinical correlates of sleep patterns with psychiatric conditions and pharmacology
- The biochemistry of sleep

2. Biologic rhythms
  - a. The sleep-wake cycle itself is a circadian rhythm, i.e., an endogenous cyclic change occurs in an organism with a periodicity of roughly 24 hours.
  - b. The cycle is regulated by the superchiasmatic nucleus (SCN).
  - c. The REM cycle, which is approximately 90 minutes, is an example of an ultradian rhythm, occurring with a periodicity of less than 24 hours.
3. Some notable facts about sleep architecture:
  - a. Most of NREM Stages 3 and 4 (the deepest sleep levels) occur during the first half of the night.
  - b. Stages 3 and 4 together are referred to as delta sleep.
  - c. Most REM sleep occurs during the last half of the night. REM sleep gets progressively longer as the night goes on.
  - d. The average adult spends most sleep time in Stage 2, least in Stage 1. Adults most commonly wake out of REM or Stage 2 sleep.
  - e. Duration of delta sleep is 65% inherited.
4. Latency
  - a. Sleep latency: period between trying to sleep until sleep onset. Insomniacs have long sleep latencies.
  - b. REM latency: period between falling asleep until first REM. In the average adult, REM latency is 90 minutes.



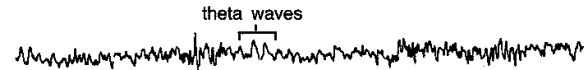
**A wake-low voltage-random fast-beta waves**



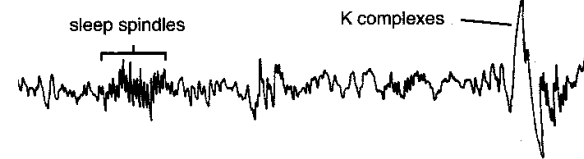
**Drowsy-8 to 12 cps-alpha waves**



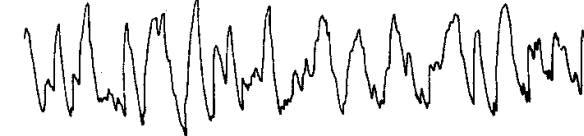
**Stage 1-3 to 7 cps theta waves**



**Stage 2-12 to 14 cps-sleep spindles and K complexes**



**Delta sleep-1/2 to 2 cps-delta waves >75**



**REM sleep-low voltage-random, fast with sawtooth waves**



**Figure 10-2. Sleep Architecture Diagram  
Showing Stages of Sleep in Sequence**

**B. Sleep Deprivation**

1. The cerebral cortex shows the greatest effects of sleep deprivation but has the capacity to cope with one night's sleep loss.
2. The rest of the body seems relatively unaffected by sleep deprivation. Physical restitution of the body comes from the immobility that is a by-product of sleep, not from sleep itself.
3. Only about one-third of sleep is made up.
  - a. 80% of lost Stage 4 is recovered.
  - b. About one-half of the missing REM is recovered.
4. The longer the prior period of wakefulness, the more Stage 4 sleep increases during the first part of the night and the more REM declines.
5. Short sleepers lose the latter part of REM sleep.
6. Lymphocyte levels decline and cortisol levels rise in sleep-deprived individuals.
7. REM sleep appears to increase somewhat in both children and adults after learning, especially the learning of complex material, in the previous waking period.
  - a. REM seems to "clear out the brain."
    - i. Removes partially processed material by "memory consolidation"
    - ii. Dampens excitement, which aids in the prolonging of sleep. Adult human REM sleep is more fetallike than is NREM sleep. REM provides cerebral stimulation while maintaining the sleeping state.
  - b. REM sleep is essential to get the most out of studying. It is when most long-term memories are consolidated by the hippocampus.
8. REM deprivation
  - a. Does not impede the performance of simple tasks
  - b. Interferes with the performance of more complex tasks
  - c. Makes it more difficult to learn complex tasks
  - d. Decreases attention to details but not the capacity to deal with crisis situations
9. In both adults and children, during the first 3 hours of sleep:
  - a. There is a very large output of human growth hormone (related to Stage 4 sleep). This is by far the greatest release of this hormone in a 24-hour period.
  - b. Prolactin rises rapidly and dopamine falls, in both sexes.
  - c. Serotonin (5-HT) rises.
  - d. Sleep inhibits the release of thyroid-stimulating hormone (TSH)
10. Melatonin, which is not related to sleeping, but to feelings of sleepiness:
  - a. Produced in the pineal gland and directly in the retinas of the eyes
  - b. Sensitive to light via a pathway from the eyes
  - c. Release is inhibited by daylight, and, at nighttime, levels rise dramatically
  - d. Likely mechanism by which light and dark regulate circadian rhythm
  - e. Responsible for "jet lag"
11. Delta sleep increases after exercise and seems to be the result of raised cerebral temperature.



C. Developmental Aspects of Sleep

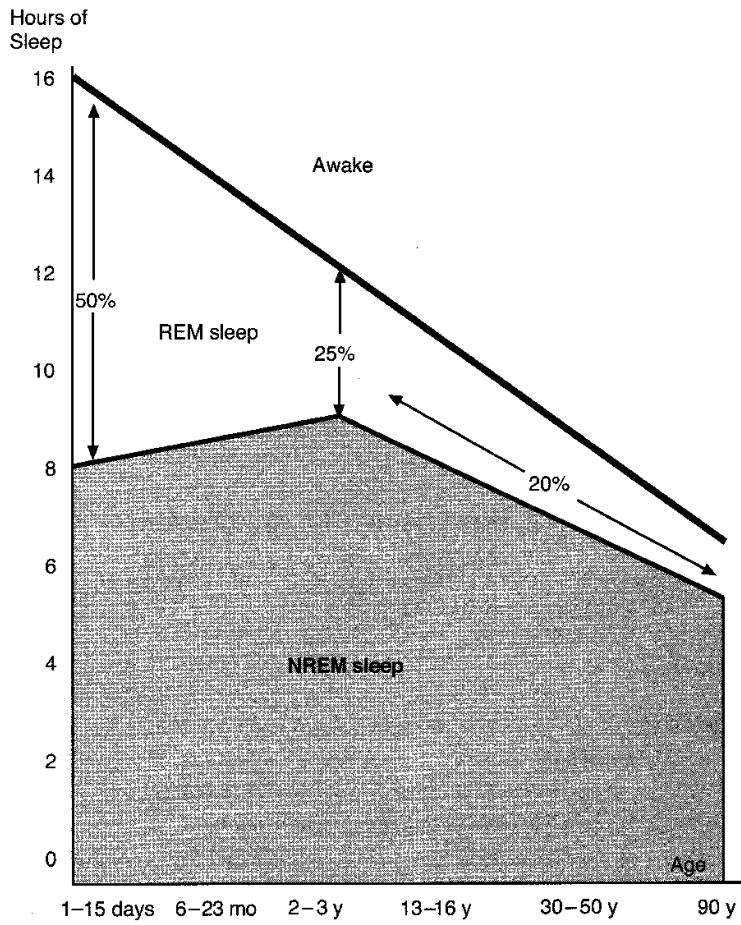


Figure 10-3. Changes in Daily Sleep Over the Life Cycle

1. Sleep develops during childhood and adolescence into adult patterns.

Age	Total Sleep Time/24 Hours
Neonate	16-18 h
1 y	12 h
10 y	10 h
13-16 y	8 h

<u>Age</u>	<u>Number of Sleep Periods/24 Hours</u>
Neonate	6–9
1–2 y	2–3
5–10 y	1

2. Infants

- a. Premature infants do not demonstrate a discernible sleep-wake cycle.
- b. EEG demonstrates adultlike rhythms of sleep and wakefulness by about 1 year.
- c. Neonatal sleep cycle: starts at 30 to 40 minutes, gradually lengthens to 90 minutes by teens

3. Adults

- a. Initial REM cycle: approximately 90 minutes. Subsequent cycles across the evening are shorter.
- b. REM: 20% of sleep time
- c. Total sleep time/24-hour period decreases gradually with age.

4. Elderly

- a. Total sleep time continues to decline.
- b. REM percentage remains constant (20%) up to around 80 years of age, then declines further.
- c. Stage 4, then Stage 3 NREM (delta sleep) vanish. Elderly often complain that they don't feel as rested as they used to feel.

D. Sleep Disorders

1. Narcolepsy

- a. The narcoleptic tetrad:
  - i. Sleep attacks and excessive daytime sleepiness (EDS)
  - ii. Cataplexy (pathognomonic sign)
  - iii. Hypnagogic hallucinations (hypnopompic can occur but not pathognomonic)
    - Hypnagogic: while falling asleep
    - Hypnopompic: while waking up
  - iv. Sleep paralysis
- b. Narcolepsy is a disorder of REM sleep: onset of REM within 10 minutes.
- c. Linked to deficiency in hypocretin protein (orexin) transport
- d. Treatment (there is no cure)
  - i. The pathophysiology is not well understood.
  - ii. CNS stimulants control the EDS (methylphenidate, dextroamphetamine).
  - iii. Tricyclic antidepressants control the cataplexy (imipramine)
  - iv. Modafinil (new): a nonamphetamine alternative to CNS stimulants

2. Sleep apnea syndromes: the absence of respiration during sleep (breathing related sleep disorder)

- a. Code on Axis III

- b. Subtypes:
    - i. Obstructive (upper airway) sleep apnea
      - Rasping snoring
      - Overweight
      - Middle-aged
    - ii. Central (diaphragmatic) sleep apnea
      - Elderly
      - Overweight
      - Cheyne-Stokes: 60-second hyperventilation, followed by apnea
    - iii. Mixed sleep apnea
  - c. Clinical presentation and features:
    - i. High risk of sudden death during sleep, development of severe nocturnal hypoxemia, pulmonary and systemic hypertension (with elevated diastolic pressure)
    - ii. Nocturnal cardiac arrhythmias (potentially life-threatening)
    - iii. Bradycardia, then tachycardia
    - iv. Males outnumber females (premenopausal) by 8 to 1
    - v. EDS and insomnia often reported
    - vi. Heavy snoring with frequent pauses
    - vii. Obesity is often part of the clinical picture, but not always.
    - viii. Short sleep duration, frequent waking, insomnia, decreased Stage 1, decreased delta and REM
  - d. Treatment:
    - i. Weight loss (if applicable)
    - ii. Respiratory stimulants for purely central apnea (medroxy-progesterone). Therapeutic efficacy not proven
    - iii. Continuous positive airway pressure (CPAP). Most likely medical intervention
    - iv. For severe obstructive and mixed apnea: tonsillectomy or tracheostomy
3. Sudden infant death syndrome (SIDS): unexplained death in children younger than 1 year
- a. 3,000 deaths annually
  - b. 50% reduction in incidence if baby placed on back, rather than on stomach
  - c. Avoid overstuffed toys and pillows
  - d. Rate is two to three times higher in families where someone smokes
  - e. Fetal exposure to maternal smoking also strong risk factor
4. Insomnia
- a. Possible reasons:
    - i. Secondary to hypnotic medication abuse
      - Development of tolerance to sedative hypnotics is common and leads to escalating doses
      - Sleep architecture becomes disrupted and sleep fragmentation occurs.
    - ii. Emotional problems, especially anxiety and depression

- iii. Conditioned poor sleep: sleep cycle is so disrupted that habit of sleep is lost
- iv. Withdrawal from drugs or alcohol
- b. When working up an insomniac, examine for medical explanations such as apnea and drug use (prescription or illicit), as well as psychiatric factors such as depression, anxiety, and schizophrenia
- c. 50% of insomnia in sleep labs is due to psychological factors.
- d. Treatment:
  - i. Triazolam (Halcion) is quick.
  - ii. Zolpidem (new), nonbenzodiazepine (take 5 to 7 days only)
  - iii. Behavior therapy still is best (most effective).
    - Muscle relaxation
    - Stimulus control

5. Night terrors

- a. Occur during NREM (Stage 4) sleep
- b. Accompanied by extreme physiologic arousal
- c. Not recalled on waking
- d. Often some waking-time anxiety present
- e. Run in families
- f. More common in boys
- g. Shown to be precursor to temporal lobe epilepsy

6. Nightmares

- a. Occur during REM sleep
- b. Involve lower levels of physiologic arousal compared with night terrors
- c. Are essentially frightening dreams
- d. Are recalled after waking
- e. Often some waking-time anxiety present
- f. If chronic:
  - i. Great likelihood of some serious pathology
  - ii. Marked improvement after one desensitization behavioral therapy session

7. Somnambulism (sleep walking)

- a. First third of the night
- b. Stage 4 sleep
- c. If awakened, the person is confused and disoriented.

8. Enuresis (bed-wetting)

- a. Stages 3 and 4 sleep
- b. Boys twice as likely as girls. At age 5, 7% of boys, 3% of girls
- c. Boys cease wetting later.
- d. Often history with same-sex parent
- e. Common after change or new sibling born. Defense mechanism of regression
- f. Pharmacology: imipramine

**Note**

Recent research suggests that getting an extra 30 to 40 minutes of sleep a night greatly reduces both nightmares and night terrors.

9. Bruxism (teeth grinding)
  - a. Stage 2 sleep
  - b. Prevention
    - i. Oral devices
    - ii. Reduction of anxiety

**E. Chemical and Psychiatric Correlates of Sleep**

1. Dopamine
  - a. Any pharmacology that increases dopamine increases wakefulness.
  - b. Dopamine blockers (e.g., phenothiazines) increase sleep somewhat.
2. Benzodiazepines
  - a. Limited decrease in REM and Stage 4 sleep, much less than previously thought
  - b. Little rebound effect
  - c. Chronic use increases sleep latency.
3. Moderate alcohol consumption
  - a. Early sleep onset
  - b. Increased wakefulness during the second half of the night
4. Alcohol intoxication
  - a. Decreases REM
  - b. REM rebound (with nightmares) during withdrawal
5. Barbiturates
  - a. Decreases REM
  - b. REM rebound, including nightmares, follows stoppage of chronic use.
6. Major depression
  - a. Increases REM
  - b. Decreases REM latency (45 rather than 90 minutes)
  - c. Decreases Stages 4 and 3 sleep
  - d. Increased sleep in multiple periods over 24 hours
  - e. Early morning waking
  - f. Diurnal improvement
  - g. Sleep deprivation gives 60% remission from symptoms
  - h. People who characteristically get a lot of REM are more susceptible to onset of depression

**F. Neurotransmitters Associated With Sleep: "SANDman"**

1. Serotonin: helps initiate sleep
2. Acetylcholine (ACh): higher during REM sleep (associated with erections in men)
3. Norepinephrine (NE): lower during REM sleep
  - a. Ratio of ACh and NE is the biochemical trigger for REM sleep.
  - b. NE pathway begins in the pons, which regulates REM sleep.
4. Dopamine: produces arousal and wakefulness. Rises with waking

### Chapter Summary

Sleep consists of two distinct stages:

REM: brain awake, body paralyzed, most dreams here

NREM: brain in idle, body moves freely. Stages 1, 2, 3, 4

Stage 3 and 4 sleep constitute delta sleep, the deepest sleep.

The initial sleep cycle is 90 minutes in adults. Delta sleep occurs during the first part of the night and most REM sleep in the last part of the night.

Figure 10-2 shows sleep stages in sequence and the various EEG patterns.

Recovery from sleep deprivation is marked by an increase in Stage 4 and REM sleep. Only 1/3 of lost sleep time is never recovered.

REM sleep appears to provide memory consolidation and to help in learning.

Melatonin, inhibited by daylight, is why we feel sleepy and is also responsible for "jet lag" and seasonal affective disorder.

As illustrated in Figure 10-3, both total sleep time and the amount of REM sleep we get decreases with age. Elderly people do not get delta sleep.

The characteristic features and treatments associated with narcolepsy, the sleep apnea syndromes, sudden infant death syndrome, insomnia, night terrors, nightmares, somnambulism, enuresis, and bruxism are discussed.

The effects of L-tryptophan, dopamine, the benzodiazepines, moderate and excess alcohol consumption, barbiturates, and major depression on sleep patterns are outlined.

As sleep begins, serotonin rises and dopamine falls. The biochemical marker for REM sleep is the ratio of acetylcholine relative to norepinephrine.

# Physician-Patient Relationships

11

## A. General Rules About Physician-Patient Relationships

- Rule #1:** Patient is number one; always place the interests of the patient first.
- Choose the patient's comfort and safety over anyone else's.
  - The goal is to serve the patient, not to worry about legal protection for the physician.
- Rule #2:** Always respond to the patient.
- Answer any question that is asked.
  - Respond to the emotional as well as the factual content of questions.
- Rule #3:** Tell the patient everything, even if he or she does not ask.
- Do not force a patient to hear bad news if he does not want it at that moment, but do try to discuss it with him or her as soon as possible.
  - Information should flow through the patient to the family, not the reverse.
  - If you have only partial information, say that it is partial, and tell what you know.
- Rule #4:** Work on long-term relationships with patients, not just short-term problems.
- Make eye contact.
  - Defined touch: tell him or her what you are doing.
  - Talk to patient, not colleagues: patient is always the focus.
  - Arrange seating for comfortable, close communication.
  - Shy away from large desks and tables.
  - Both patient and physician should both be sitting if at all possible.
- Rule #5:** Listening is better than talking.
- Getting the patient to talk is generally better than having the physician talk.
  - Take time to listen to the patient before you, even if other patients or colleagues are waiting.
- Rule #6:** Negotiate rather than order.
- Treatment choices are the result of agreement, not commands by the physician.
  - Remember, the patient makes medical decisions from the choices provided by the physician.
- Rule #7:** Trust must be built, not assumed.
- Don't assume that the patient likes or trusts you.
  - Treat difficult or suspicious patients in a friendly, open manner.

### Note

#### The USMLE Requires You to Know:

- This section lays out a set of rules that seek to orient students as to what constitutes the best answer on the USMLE. Apply these rules to answer presented questions on the exam.
- Note that a number of these rules are different than current medical practice.

- Rule #8: Admit to the patient when you make a mistake.
- Take responsibility. Don't blame it on the nursing staff or on a medical student.
  - Admit the mistake even if it was corrected and the patient is fine.
- Rule #9: Never "pass off" your patient to someone else.
- Refer to psychiatrist or other specialist when beyond your expertise (but usually not the case).
  - Refer only for ophthalmology or related subspecialties.
  - Provide instruction in aspects of care, e.g., nutrition, use of medications.
- Rule #10: Express empathy, then give control. "I'm sorry, what would you like to do?"
- Important when faced with a patient who is grieving or is angry.
  - Important when faced with angry or upset family members.
- Rule #11: Agree on problem before moving to solution.
- Tell the patient your perceptions and conclusions about the condition before moving to treatment recommendations.
  - Informed consent requires the patient to fully understand what is wrong.
  - Offering a correct treatment before the patient understands his or her condition is wrong.
- Rule #12: Be sure you understand what the patient is talking about before intervening.
- Seek information before acting.
  - When presented with a problem, get some details before offering a solution.
  - Begin with open-ended questions, then move to closed-ended questions.
- Rule #13: Patients do not get to select inappropriate treatments.
- Patients select treatments, but only from presented, appropriate choices.
  - If a patient asks for an inappropriate medication that he heard advertised, explain why it is not indicated and suggest an alternative.
- Rule #14: Be sure who your patient is.
- Is it the injured child, or the mother who brings him in? (the child)
  - Is it your long-term patient who is now in a coma, or her husband? (the patient)
- Rule #15: Never lie.
- Not to patients, their families, or insurance companies.
  - Do not deceive to protect a colleague.
- Rule #16: Accept the health beliefs of patients.
- Be accepting of benign folk medicine practices. Expect them. Diagnoses need to be explained in the way patients can understand, even if not technically precise.
  - Be careful about having young family members translate for elderly patients.
- Rule #17: Accept patients' religious beliefs and participate if possible.
- Your goal is to make the patient comfortable. Religion is a source of comfort to many.
  - A growing body of research suggests that patients who pray and are prayed for have better outcomes.



- c. Ask about a patient's religious beliefs if you are not sure (but not as a prelude to passing off to the chaplain!).
- d. Of course, you are not expected to do anything against your own religious or moral beliefs.

Rule #18: Anything that increases communication is good.

- a. Take the time to talk with patients, even if others are waiting.
- b. Ask "why?"
- c. Seek information about the patient beyond the disease.

Rule #19: Be an advocate for the patient.

- a. Work to get the patient what he or she needs.
- b. Never refuse to treat a patient because he or she cannot pay.

Rule #20: The key is not so much what you do, but how you do it.

- a. The right choices are those that are humane and sensitive, and put the interests of the patient first.
- b. Treat family members with courtesy and tact, but the wishes and interests of the patient come first.

Theme: The key is not what physicians *actually* do, but what the most ideal physician *should* do.

## B. Miscellaneous Physician-Patient Relationship Topics

1. Types of questions and statements
  - a. Open-ended question: allows broad range for answer
  - b. Closed-ended question: limits answer, e.g., yes or no
  - c. Leading question: suggests or indicates preferred answer
  - d. Confrontation: brings to the patient's attention some aspect of appearance or demeanor
  - e. Facilitation: gets the patient to continue a thought, talk more, "tell me about that..."
  - f. Redirection: puts question back to the patient
  - g. Direct question: seeks information directly. Avoid judgmental terms.
2. Components of the sick role
  - a. Exempt from normal responsibilities
  - b. Not to blame for illness
  - c. Obligated to get well
  - d. Obligated to seek competent help
  - e. Note: The sick role generally does not apply to chronic illness or very minor illnesses.
3. The significance of a good relationship with the patient
  - a. The key is not the amount of time spent with a patient, but what is done during that time.
  - b. Lack of rapport is the chief reason that terminally ill patients reject medical advice, or why patients change physicians or miss appointments.
  - c. Failure of patient to cooperate, or even to keep appointments, should be seen as the result of physician insensitivity or seeming indifference.

- d. An early Scandinavian study found a significant increase in sudden deaths on a coronary care unit during or immediately following ward rounds. The formality of rounds and the imposing authority that physicians project onto patients may have raised patient anxiety to dangerous levels.
- e. The amount of information that surgical candidates receive about their upcoming operation and about the postsurgical pain affects outcome.
  - i. Patients given more information about what to anticipate and what they can do about it were ready for discharge 2.7 days earlier than were controls.
  - ii. They also requested 50% less morphine.
- f. A good rapport:
  - i. Fosters adherence to treatment regimens
  - ii. Is positively associated with a reduction of malpractice suits

4. Fostering patient adherence with treatment recommendations

- a. It is not enough for a physician to provide information and treatment and leave adherence to the patient. Rather, the physician must present information in ways that will optimize patient adherence.
- b. Patients are less compliant when limited information has been exchanged and when there is dissatisfaction with the interview. A consistent complaint is that insufficient medical information was made available to the patient (or to the parents). Fewer positive statements made by the physician and less sought-after information offered by the physician results in less patient compliance.
- c. For best adherence:
  - i. Attend to the amount of information
  - ii. Explain its complexity
  - iii. Note the patient's affective state
  - iv. Explain why this particular treatment is being recommended
  - v. Stress the threat to health of nonadherence
  - vi. Stress the effectiveness of the prescribed regimen
  - vii. Give instructions both orally and in writing
  - viii. Arrange for periodic follow-up
  - ix. Ask patient to do less
- d. Research has shown that physicians cannot tell which of their patients do and do not adhere. They assume that more of their patients are adhering than actually are.
- e. When a patient does fail to adhere, do not blame the patient.
- f. If the patient is nonadherent, check for these problems:
  - i. Patient dissatisfaction with the physician
  - ii. Misunderstanding of instructions
  - iii. Interference by family
  - iv. Inability to afford medications
- g. The health belief model:
  - i. Adherence is a function of perceived threat.
  - ii. Moderate fear level is best for adherence. Recall curvilinear relationship between fear and adherence.

- iii. Perceived threat is a function of:
  - Perceived seriousness
  - Perceived susceptibility
- iv. External barriers, such as finances or lack of access to care, can prevent adherence even if perceived threat is sufficient.

### Chapter Summary

#### Physician-Patient Relationship Rules:

1. The patient is number one.
2. Always respond to the patient.
3. Tell the patient everything.
4. Work on long-term relationships, not just short-term problems.
5. Listening is better than talking.
6. Negotiate rather than order.
7. Trust must be built, not assumed.
8. Admit to the patient when you have made a mistake.
9. Never "pass off" a patient to someone else.
10. Express empathy, give control.
11. Agree on the problem before moving to a solution.
12. Understand what the patient is talking about before intervening.
13. Patients do not get to select inappropriate treatments.
14. Be sure who your patient is.
15. Never lie.
16. Accept the health beliefs of your patient.
17. Accept patients' religious beliefs and participate, if possible.
18. Anything that increases communication is good.
19. Be an advocate for the patient.
20. The key is not so much what you do, but *how* you do it.

### Review Questions

80. Psychiatric diagnoses and exogenous pharmacology have long been associated with specific changes in sleep patterns. Based on current sleep laboratory data, decreases in rapid eye movement sleep would most likely occur in a patient who has been
- (A) abusing alcohol
  - (B) taking L-tryptophan purchased at a health food store
  - (C) diagnosed with a major affective disorder
  - (D) taking lithium carbonate
  - (E) diagnosed with a generalized anxiety disorder
81. A 35-year-old woman complains that she has trouble sleeping at night. Her physician prescribes a course of benzodiazapines to deal with this problem. As he hands her the prescription, he should also caution her that prolonged use of this class of medications to induce sleep will most likely result in the appearance of what side effect?
- (A) sleep apnea syndrome
  - (B) depressed mood
  - (C) insomnia
  - (D) nocturnal enuresis
  - (E) somnambulism
82. At about the same time that children are toilet trained, their sleep patterns are characterized by
- (A) about 50% of time in REM
  - (B) two to three sleep periods throughout the day
  - (C) about 15 hours of total sleep time per day
  - (D) achievement of the 90-minute sleep cycle
  - (E) initiation of Stage 4 sleep
83. K-complexes are characteristic of a stage of sleep also distinguished by
- (A) delta waves
  - (B) theta waves
  - (C) sawtooth waves
  - (D) alpha waves
  - (E) sleep spindles
84. In a typical 30-year-old adult, the first three hours of sleep each night are accompanied by a measurable increase in
- (A) corticosteroids
  - (B) output of human growth hormone
  - (C) dopamine
  - (D) thyroid-stimulating hormone
  - (E) norepinephrine

85. A measurable increase in delta stage sleep is often observed following
- (A) alcohol intoxication
  - (B) ingestion of melatonin
  - (C) medication with imipramine
  - (D) onset of major depression
  - (E) physical exercise
86. A 45-year-old male presents to his physician complaining of fatigue. He reports difficulty going to sleep each night, waking up multiple times each night, and headache upon awaking in the morning. His wife has started sleeping on the couch because of his loud snoring and thrashing during the night. Physical exam shows the patient to be 40 pounds overweight and hypertensive. Based on this preliminary information, the physician suspects that the most likely underlying cause of the patient's reported problems is
- (A) bruxism
  - (B) central apnea
  - (C) insomnia
  - (D) narcolepsy
  - (E) nightmares
  - (F) night terrors
  - (G) obstructive apnea
  - (H) restless legs syndrome
87. A 35-year-old woman goes to see a gynecologist for her first visit on a hot August day. The physician walks into the examination room to find the woman still fully dressed, fidgeting in her chair, and looking around the examination room nervously. The physician introduces himself and shakes the patient's hand. The patient's hand is sweating and clammy. At this point what should the physician say next?
- (A) "Boy, it sure is hot out today."
  - (B) "Don't worry. I have been doing this for years."
  - (C) "Is something wrong?"
  - (D) "I need you to get undressed so we can get started."
  - (E) "Let me tell you about my credentials and training."
  - (F) "So what brings you in here today?"
  - (G) "This is our first meeting. Tell me a little bit about yourself."
  - (H) "You need to relax. I won't hurt you."
  - (I) "You seem a little nervous. That's normal at this point."

88. Following an annual physical exam, a 43-year-old woman asks her physician for a prescription to cope with anxiety. When the physician points out that she has no symptoms and has never mentioned the need before, the woman confesses that the prescription is for her husband who works during normal office hours and is unable to come to see the doctor. The physician's best response would be
- (A) give her the prescription, but ask that her husband schedule an appointment as soon as possible
  - (B) give her the prescription, but instruct her that she should only give her husband the medication if he really needs it
  - (C) give her a referral for her husband to a local psychiatrist
  - (D) offer to write her husband a prescription if he will call and talk with you on the phone
  - (E) offer to write her husband the prescription after he comes in for a scheduled appointment
  - (F) refuse to write the prescription
  - (G) tell her that you will see her husband outside of normal office hours and evaluate the need for the prescription
89. A 68-year-old woman, referred by a health management organization (HMO), complains angrily to her physician about how long she had to wait before he was able to see her. The physician's best response would be
- (A) "I'll speak to the receptionist."
  - (B) "I'm very sorry you had to wait so long. How can we do better in the future?"
  - (C) "It will never happen again."
  - (D) "Please understand my staff is very busy."
  - (E) "Things just take longer with these HMOs."
  - (F) "Well, you are here now. What can I do for you?"
  - (G) "Would you like to come back on another day?"
90. A mother takes her 2-year-old boy suffering from severe diarrhea to see the pediatrician. Stool samples reveal the presence of *Campylobacter jejuni*. At this point, what is the next action the physician should take?
- (A) describe to the boy's mother the dangers inherent in severe diarrhea in a child of this age
  - (B) describe the medical problem to the boy in simple, easy to understand language
  - (C) explain to the boy's mother the nature of the problem and the important features of the pathogen involved
  - (D) instruct the boy's mother to give the boy fluids and schedule a follow-up appointment in 1 week
  - (E) provide the boy's mother with a prescription for the appropriate antibiotic
  - (F) refer the boy to an infectious disease specialist

91. A 56-year-old male executive complains to his physician that he has been having trouble sleeping for the past several months. His insomnia has become disruptive to both his professional and personal life. He mentions that a friend of his was given a prescription for benzodiazapines by his physician for a similar problem and asks you to give him the same medication to "make this go away." The physician's best response would be to
- (A) assess his current level of alcohol intake
  - (B) ask him about any recent stressors in his life
  - (C) inquire about the specifics of the insomnia
  - (D) give him some free samples of the medication he requests so he can try it out
  - (E) provide him with the prescription he requests
  - (F) instruct him to get more physical exercise
  - (G) refer him to a local psychiatrist for evaluation and counseling
92. A 24-year-old woman is scheduled for delivery by Cesarean section after her unborn child is determined to be wedged in a breech position. Prior to the surgery, the woman asks the physician to pray with her, and to carry a "charm", a dried animal tongue, with him as he performs the procedure. The physician is not religious and is taken aback by the request. He comes to you and asks your advice as to what he should do. Your best advice would be to tell him to
- (A) advise the patient that her beliefs are not in keeping with modern medical practice
  - (B) go along with the patient's request by praying with her and carrying the charm
  - (C) politely explain to the patient that he does not share her religious beliefs
  - (D) pray with her and tell her he will carry the charm, but leave it outside the operating theater for sanitary reasons
  - (E) schedule an appointment for the patient with the appropriate hospital chaplain
  - (F) stand in the room as she prays, but decline to carry the charm
  - (G) suggest to the patient that she might be more comfortable with another physician performing the procedure

### Answers

80. **Answer: A.** Alcohol abuse suppresses REM sleep. REM sleep increases for major depression. L-tryptophan decreases sleep latency. Lithium carbonate should increase REM as it allows the manic patient to get more sleep. Anxiety by itself has no demonstrated effect on REM.
81. **Answer: C.** Although often given to help patients to go to sleep, paradoxically, one of the side effects of sedative hypnotic medication is insomnia with long-term use.
82. **Answer: B.** By age 2 to 3 years, about 25% of the child's sleep time is spent in REM sleep. This sleep is characterized by several sleep periods totaling about 11 (less than 15) hours of sleep in each 24-hour period. Stage 4 sleep is present at birth. The 90-minute sleep cycle is achieved only during the teenage years.
83. **Answer: E.** Stage 2 sleep is characterized by sleep spindles and K-complexes. Delta waves go with Stages 3 and 4. Theta waves are Stage 1. Sawtooth waves appear in REM.
84. **Answer: B.** Human growth hormone and serotonin levels rise during the first three hours of sleep.
85. **Answer: E.** The increased cerebral temperature that results from exercise is associated with increased delta sleep.
86. **Answer: G.** These symptoms suggest sleep apnea. The age of the patient and the loud snoring indicate obstructive apnea.
87. **Answer: G.** Take time to find out a little bit about the patient. Rule #5 tells us that getting the patient to talk is the best approach.
88. **Answer: G.** Do not give a prescription before evaluating the patient. If your office hours are an impediment for the patient, see him outside of normal office hours. (Rule #14 and Rule #1)
89. **Answer: B.** Faced with an irate patient the rule is: express empathy, then give control. (Rule #10)
90. **Answer: C.** Before discussing treatment, be sure that the patient understands the problem. Discuss the disease before discussing treatment. (Rule #11)
91. **Answer: C.** Get the details about the patient's condition before proceeding to treatment. Of course you will not give medication just because the patient asks for it. You must be sure that it is needed.
92. **Answer: B.** Rule #17. Participating in the patient's religion is associated with better patient outcomes.



# Diagnostic and Statistical Manual IV (DSM IV)

# 12

## A. Five Major Axes of Diagnosis

Axis I: Clinical disorders, including schizophrenic, affective, anxiety, and somatoform disorders. Also includes anorexia nervosa, bulimia nervosa, sexual disorders, sleep disorders, and autism

Axis II: Personality disorders and mental retardation

Axis III: Physical conditions and disorders, i.e., any physical diagnosis

Axis IV: Psychosocial and environmental problems, including primary support group, social occupation, education, housing, economics, health care services, and legal issues

Axis V: Global assessment of functioning (GAF), scored on a descending scale of 100 to 1, where 100 represents superior functioning, 50 represents serious symptoms, and 10 represents persistent danger of hurting self or others

### 1. Example of multi-axial diagnosis

Axis I: Dysthymic disorder  
Reading disorder

Axis II: No diagnosis

Axis III: Influenza

Axis IV: Victim of child neglect

Axis V: GAF=44 (current)

## B. Disorders Usually Diagnosed in Childhood

### 1. Mental retardation

- Scored on Axis II
- Fetal alcohol syndrome (FAS) most common known cause
- Down and fragile-X syndromes most common genetic causes

## Note

### The USMLE Requires You to Know:

- Recognize and offer differential diagnosis of Axis I and Axis II diagnoses, including common treatment interventions.
- The material in this section will likely appear on the USMLE in the form of clinical case vignettes.
- Special attention should be paid to:

Mental retardation, eating disorders, and stress disorders

The relationship between biological markers and behavior patterns for schizophrenia and affective disorders

The preferred treatments for each of the separate anxiety disorders

The differential diagnosis of personality disorders

Table 12-1. Mental Retardation

Level	IQ	Functioning
Mild	70–50	Self-supporting with some guidance. 85% of retarded. Two times as many are male. Usually diagnosed first year in school.
Moderate	49–35	“Trainable,” benefits from vocational training, but needs supervision. Sheltered workshops.
Severe	34–20	Training not helpful, can learn to communicate, basic habits.
Profound	Below 20	Needs highly structured environment, constant nursing care supervision.

2. Pervasive developmental disorders: autism

- a. Scored on Axis I
- b. Usually diagnosed in infancy (30 months)
- c. Clinical signs
  - i. Problems with reciprocal social interaction, decreased repertoire of activities and interests
  - ii. Abnormal or delayed language development, impairment in verbal and nonverbal communication
  - iii. No separation anxiety
  - iv. Oblivious to external world
  - v. Fails to assume anticipatory posture, shrink from touch
  - vi. Pronoun reversal
  - vii. Preference for inanimate objects
  - viii. Stereotyped behavior and interests
- d. Male:female ratio = 4:1
- e. Linked to chromosome 15
- f. Occurs in four of every 10,000 births
- g. Monozygotic concordance greater than dizygotic concordance
- h. 80% have IQs below 70.
- i. Potential causes
  - i. Association with prenatal and perinatal injury, e.g., rubella in first trimester
  - ii. Failure of apoptosis (normal pruning of neural circuits)
- j. Treatment: behavioral techniques (shaping)

3. Attention deficit hyperactivity disorder (ADHD)

- a. Approximately 10% of lower class males and 5% of middle class
- b. Male to female ratio is 10:1.
- c. More common in first-born males
- d. Overtreatment appears common; differentiate from a child who is simply “overactive”
- e. Treatment: methylphenidate, dextroamphetamine, or pemoline

C. Schizophrenia

1. General overview

a. Criteria

- i. Bizarre delusions
  - **Delusions:** false beliefs not shared by culture
  - **Illusions:** misperception of real stimuli
  - **Hallucinations:** sensory impression, no stimuli
- ii. Auditory hallucinations (in 75%)
  - Impaired concentration
  - Note: not visual hallucinations
- iii. Blunted affect
- iv. Loose associations
- v. Deficiency in reality testing, distorted perception; impaired functioning overall
- vi. Disturbances in behavior and form and content of language and thought
- vii. Changes in psychomotor behavior: loss of prosody

b. Differential

- i. **Schizophreniform:** if symptoms less than 6 months
- ii. **Brief psychotic disorder**
  - Presence of delusions, hallucinations, or disorganized speech and behavior
  - From 1 to 30 days
  - Return to full former functioning
  - Not a cultural response pattern
  - Not due to substance abuse or organic cause

c. Potential causes

- i. Trinucleotide repeat amplification
- ii. Birth trauma (hypoxia likely if early onset)

d. Epidemiology

- i. Onset: male, age 15–24; female, age 25–34
- ii. Prevalence: 1% of population cross-culturally; however, less chronic and severe in developing countries than in developed countries
- iii. Downward drift to low SES
- iv. 50% patients attempt suicide, 10% succeed
- v. Over 50% of schizophrenics do not live with their families, nor are they institutionalized

e. Genetic contribution

- i. Rates for monozygotic twins reared apart = rates for MZ twins raised together (47%)
- ii. Dizygotic concordance: 13%
- iii. If two schizophrenic parents: 40% incidence
- iv. If one parent or one sibling: 12%

**Note**

**Definitions**

- **Anhedonia:** can't experience or even imagine any pleasant emotion
- **Clang associations:** illogical connections by rhythm or puns
- **Echolalia:** repeating in answer many of same words as in question
- **Echopraxia:** imitations of movements or gestures
- **Flight of ideas:** topics strung together
- **Loose associations:** jump from one topic to the next
- **Mannerisms, e.g., grimacing**
- **Mutism:** no speech
- **Neologisms:** new expressions
- **Perseveration:** responding to all questions the same way
- **Poverty of speech:** sparse and slow speech
- **Pressured speech:** abundant and accelerated speech
- **Verbigeration:** senseless repetition of same words or phrases

- v. Heritability index:  $(MZ - DZ)/(100 - DZ)$  = proportion of conditions due to genetic factors
- vi. Risk in biologic relatives 10 times general population (i.e., 10%)
- f. Related terms
  - i. Schizophrenogenic family: highly critical, negative emotions, double messages. Linked to schizoid personality disorders; not linked to development of schizophrenia
  - ii. High expressed-emotion families: relapse rate four to five times higher
- 2. Subtypes
  - a. Paranoid
    - i. Delusions of persecution or grandeur
    - ii. Often accompanied by hallucinations (voices)
    - iii. Older onset than other types with less regression of mental faculties and emotional response
  - b. Catatonic
    - i. Complete stupor or pronounced decrease in spontaneous movements
      - May be mute
      - Often negativism, echopraxia, automatic obedience
      - Rigidity of posture; can be left standing or sitting in awkward positions for long periods of time
      - Brief outbursts of violence without provocation
      - Waxy flexibility
    - ii. Alternatively, can be excited and evidence extreme motor agitation
      - Incoherent and often violent or destructive
      - In their excitement, can hurt themselves, or collapse in exhaustion
      - Repetitious, stereotyped behaviors
  - c. Disorganized
    - i. Incoherent, primitive, uninhibited
    - ii. Unorganized behaviors and speech
    - iii. Active, but aimless
    - iv. Poor personal appearance
    - v. Little contact with reality
    - vi. Pronounced thought disorder
    - vii. Explosive laughter
    - viii. Silliness
    - ix. Incongruous grinning
  - d. Undifferentiated
    - i. Psychotic symptoms
    - ii. Does not fit paranoid, catatonic, or disorganized diagnoses
  - e. Residual
    - i. Previous episode, but no prominent psychotic symptoms at evaluation
    - ii. Some lingering negative symptoms

3. Important terms

a. Positive symptoms (Type I)

- i. What schizophrenic persons have that normals do not, e.g., delusions, hallucinations, bizarre behavior
- ii. Associated with dopamine receptors

b. Negative symptoms (Type II)

- i. What normals have, that schizophrenics do not, e.g., flat affect, motor retardation, apathy, mutism
- ii. Associated with muscarinic receptors

c. Schizoaffective disorder

- i. Concurrent symptoms of schizophrenia and depression or mania

4. Predictors for good prognosis

- a. Paranoid or catatonic
- b. Late onset (female)
- c. Quick onset
- d. Positive symptoms
- e. No family history of schizophrenia
- f. Family history of mood disorder
- g. Absence of structural brain abnormalities

5. Neurochemical issues

a. The dopamine hypothesis is based on:

- i. The effectiveness of neuroleptic medications in ameliorating the symptoms of schizophrenia
- ii. The correlation of clinical efficacy with drug potency in dopamine receptor antagonists
- iii. Findings of increased dopamine receptor sensitivity in postmortem studies
- iv. Positron emission tomographic (PET) scan studies of schizophrenic patients compared with controls

b. Other neurotransmitters have come under increased scrutiny because of the limitations of the dopamine hypothesis. These include serotonin, glutamate, norepinephrine, and related excitatory amino acids, and the neuropeptides cholecystokinin and neurotensin.

c. Role of serotonin (5-HT)

- i. Genes involved in serotonergic neurotransmission are implicated on the pathogenesis of schizophrenia.
- ii. LSD affects serotonin and can produce a psychoticlike state.
- iii. Newer antipsychotics (e.g., clozapine) have high affinity for serotonin receptors.
- iv. Serotonin rises when dopamine falls in some areas of the brain.

d. Role of glutamate

- i. Major neurotransmitter in pathways key to schizophrenic symptoms
- ii. *N*-methyl-D-aspartate (NMDA) receptors
  - Regulates brain development and controls apoptosis

- Phencyclidine and ketamine block the NMDA channel: can create positive and negative psychotic symptoms identical to schizophrenia
  - iii. 2-(aminomethyl)phenylacetic acid (AMPA) receptors
    - Abnormally sparse in temporal lobes of schizophrenics
    - Ampakines (new drugs) selectively enhance transmission and improve memory in patients
6. Attention and information processing deficits
- a. Smooth pursuit eye movement (SPEM)
    - i. The capacity of the eye to follow a slow moving target is impaired in schizophrenic patients.
    - ii. Although normals perform this task without error, up to 80% of schizophrenic patients and half of their relatives show saccadic eye movement and deficits at this tracking task.
  - b. Backward masking: two images shown in rapid succession
    - i. If shown one-half second apart, later image "masks" the former for the schizophrenic
    - ii. For normals, less than one-fourth second is necessary for effect
    - iii. Explanation: schizophrenics are slower to fix impressions in short-term memory.
  - c. Event-related potentials (ERP)
    - i. Schizophrenia is associated with diminished amplitude of the auditory P300 ERP.
    - ii. P300 component is elicited by task-relevant stimuli.
    - iii. Abnormalities may be associated with impaired selective attention; therefore, schizophrenic patients do not conduct involuntary information processing normally.
    - iv. Diminished P300 amplitude is also observed in the healthy family members of schizophrenics.
  - d. Prefrontal cortical (PFC) impairment
    - i. Faced with a cognitive task, increased activity is found in the prefrontal cortex of normal individuals.
    - ii. Schizophrenics show decreased physiologic activity in prefrontal lobes when faced with these tasks.
    - iii. Impaired performance on the Wisconsin Card Sort (WCST), a test sensitive to prefrontal dysfunction
    - iv. Clinical profile has similarities with patients with frontal lobe injury (e.g., cognitive inflexibility, problem-solving difficulties, and apathy).
7. Brain structural and anatomic abnormalities
- a. Cortical abnormalities
    - i. Larger ventricle size and ventricular brain ratios (VBRs)
    - ii. Cortical atrophy
    - iii. Smaller frontal lobes
    - iv. Atrophy of temporal lobes

- v. Association with specific clinical and cognitive correlates, including deficit symptoms, cognitive impairment, and poor outcome
  - Correlation between ventricle size, type, and prognosis of illness
  - More dilation with negative symptoms
  - However, dilated ventricles also reported among patients having unipolar, bipolar, and schizoaffective disorders (sensitive, but not specific indicator)
- b. Subtle anomalies in limbic structures
  - i. Limbic system seen as the site of the primary pathology for schizophrenia
  - ii. Changes in hippocampus, parahippocampal gyrus, entorhinal cortex, amygdala, cingulate gyrus
    - Smaller volume of left hippocampus and amygdala
    - Also found in high-risk, nonsymptomatic patients
  - iii. Changes in parts of basal ganglia, thalamus, cortex, corpus callosum, and brainstem neurotransmitter systems
  - iv. Loss of inhibitory neurons in second layer of anterior cingulate gyrus
- 8. Long-term course
  - a. Antipsychotic medications reduce acute (positive) symptoms in 75% versus 25% with placebo
  - b. Relapse rates
    - i. 40% in 2 years if on medication
    - ii. 80% in 2 years if off medication
  - c. Prognosis
    - i. 33% of patients lead normal lives.
    - ii. 33% of patients experience symptoms but function in society.
    - iii. 33% require frequent hospitalizations
  - d. If no first-year relapse and medications are taken, 10% relapse thereafter

**D. Mood Disorders**

Depression and elation are normal human emotions. Disorder is when it gets too long-term or too extreme.

**Table 12-2. Mood Disorders**

	Mild	Severe
<b>Stable</b>	Dysthymia	Unipolar (major depression)
<b>Alternating</b>	Cyclothymia	Bipolar (manic-depression)

- 1. Basic subtypes
  - a. Dysthymia (nonpsychotic depression)
    - i. Depressed mood
    - ii. Loss of interest or pleasure
    - iii. Chronic (at least 2 years)

- iv. Not severe enough for hospitalization
  - v. Lifetime prevalence 45 in 1,000
  - vi. 30 to 50% of alcoholics have secondary depression.
  - vii. May be associated with:
    - Increased or decreased appetite
    - Increased or decreased sleep
    - Fatigue
    - Decreased self-esteem
    - Hopelessness
    - Lowered concentration
  - viii. Patient is functional, but at a suboptimal level
- b. Cyclothymia (nonpsychotic bipolar)
- i. Alternating states
  - ii. Chronic
  - iii. Often not recognized by the person (ego-syntonic)
  - iv. Lifetime prevalence <1%
- c. Seasonal affective disorder (SAD)
- i. Depressive symptoms during winter months
  - ii. Winter has shortest days/least amount of light
  - iii. "Atypical" symptoms:
    - Increased sleep
    - Increased appetite
    - Decreased energy
  - iv. Caused by abnormal melatonin metabolism
  - v. Treat with bright light therapy (not melatonin tablets)
- d. Unipolar disorder (major depression)
- i. Symptoms for at least 2 weeks
  - ii. Must represent a change from previous functioning
  - iii. May be associated with:
    - Anhedonia
    - No motivation
    - Feelings of worthlessness
    - Decreased concentration
    - Weight loss or gain
    - Depressed mood
    - Recurrent thoughts
    - Insomnia or hypersomnia
    - Psychomotor agitation or retardation
    - Somatic complaints
    - Delusions or hallucinations (if mood congruent)
    - Loss of sex drive
  - iv. Diurnal improvement as day progresses



- v. Suicide:
  - 60% of depressed patients have suicidal ideation.
  - 15% of depressed patients die by suicide.
- vi. Biologic correlates
  - PET scans show abnormally high glucose metabolism in amygdala of depressed people
  - Smaller hippocampus, atrophy greater if depressed longer
  - Linked to abnormally high levels of glucocorticoids
- vii. Decreases in most hormones
- viii. Neurochemical changes
  - Decreased norepinephrine
  - Decreased serotonin
  - Decreased dopamine
  - Metabolites of these also decreased
- ix. Sleep correlates
  - Increased REM in first half of sleep
  - Decreased REM latency
  - Decreased Stage 4 sleep
  - Increased REM time overall
  - Early morning waking
- e. Bipolar disorder (manic-depression)
  - i. Symptoms of major depression plus symptoms of mania: a period of abnormal and persistent elevated, expansive, or irritable mood
  - ii. Alternates between depression and mania
  - iii. Subtypes
    - Bipolar I: mania more prominent
    - Bipolar II: recurrent depressive episodes plus hypomanic episodes
    - If alternates within 48–72 hours, called “rapid cycling bipolar disorder”
  - iv. Manic symptoms
    - Increased self-esteem or grandiosity
    - Low frustration tolerance
    - Decreased need for sleep
    - Flight of ideas
    - Excessive involvement in activities
    - Weight loss and anorexia
    - Erratic and uninhibited behavior
    - Increased libido
  - v. Neurochemical changes
    - Increased norepinephrine (NE)
    - Increased serotonin
    - Slight increase in dopamine
  - vi. Sleep correlates
    - Multiple awakenings
    - Markedly decreased sleep time

Table 12-3. Epidemiology of Mood Disorders

	Unipolar	Bipolar
Point prevalence	Men 2 to 3%, women 5 to 9%	Men and women less than 1%
Gender differences	Women 2× men (stress of childbirth, hormonal effects, abused as children)	Rates are effectively equal
Lifetime prevalence	Men 10%, women 20%	Men and women 1%
Onset	Mean age 40	Mean age 30
SES	Low SES more likely	Higher SES more likely
Relationships	More prevalent among those with no close relationships, separation, divorce	More prevalent among single and divorced (causal?)
Family history	Higher risk if parents depressed or alcoholic; increased risk if parental loss before age 11	Higher risk if parent has bipolar

2. Corollaries of mood disorders

- a. Persons with multiple sclerosis have 13× rate of bipolar disorder compared with general population
- b. 50 to 60% in remission from bipolar or unipolar will have recurrences
- c. 80% with either unipolar or bipolar do not get proper treatment
- d. Evidence of genetic bipolar link stronger than with unipolar
  - i. If both parents: 50 to 75% for bipolar
  - ii. If both parents: 20 to 25% for unipolar
  - iii. Bipolar concordance rates: MZ twins = 70%, DZ twins = 20% (Heritability Index = 62.5%)
- e. Younger persons are more at risk for unipolar disorder

<u>Ages</u>	<u>Annual Incidence</u>
18-44	3.4%
45-64	2.2%
65+	1.0%

- f. Children of depressed mothers are:
  - i. Less involved with and more resentful of children
  - ii. Two times more likely to abuse children. If attempted suicide, 12 times more likely
  - iii. Children have higher relative risk for depression (1.6) and substance abuse (2.3)
- g. Smokers are two times as likely to develop depression.
  - i. Depressed smokers have more trouble quitting and are 40% less likely to succeed.
  - ii. Doxepin (cyclic antidepressant) seems to help even nondepressed smokers to quit.

3. Lab tests associated with depression
  - a. 3-methoxy, 5-hydroxy, phenyl-glucol (MHPG)
    - i. CNS metabolite of norepinephrine
    - ii. Depressed patients with low levels of MHPG are more likely to respond to imipramine than to amitriptyline.
  - b. Dexamethasone suppression test (DST)
    - i. Introduced in 1981
    - ii. Focuses on the hypothalamic-pituitary-adrenal axis
    - iii. Some depressed patients have high serum cortisol levels that are not suppressed in response to exogenous corticosteroid administration.
    - iv. DST is only 50% sensitive (although 70% sensitive for depression with psychotic features).
    - v. Not high specificity, yields too many false-positive results (anorexia, schizophrenia, Cushing's)
    - vi. Suppression of cortisol levels is good predictor of response to cyclic medications
  - c. Thyrotropin-releasing hormone (TRH) stimulation test
    - i. TRH, released from hypothalamus, is a tripeptide that stimulates secretion of thyroid-stimulating hormone (TSH) from pituitary gland
    - ii. Some depressed patients have a reduced response of TSH to an infusion of synthetic TRH.
    - iii. It is the only test that can be considered a useful laboratory test for depression.
  - d. Best way to assess depression is still with standardized scales or patient interview

## E. Eating Disorders

1. Bulimia nervosa
  - a. Compulsive, rapid ingestion of food followed by self-induced vomiting, use of laxatives, or exercise: binge and purge
  - b. Personality: outgoing and impulsive
  - c. Roughly 4% females and 0.5% males; 5 to 10% of women experience it at some point during their lives.
  - d. Clinical signs:
    - i. Scars on back of hand
    - ii. Esophageal tears
    - iii. Enlarged parotid gland
    - iv. Cooking preoccupation
    - v. Minimal public eating
  - e. Often associated with taking on responsibility (leaving home, getting a job)
  - f. Low baseline serotonin concentrations (repeated bingeing raises serotonin)
  - g. One-third have drug or alcohol problem.
  - h. Treatment: imipramine, SSRIs, insight, and group therapy

2. Anorexia nervosa

- a. Self-imposed dietary limitations, significant weight loss (15% to 20% below ideal body weight); self starvation
- b. Fear of gaining weight
- c. "Feel fat" even when very thin (body image disturbance)
- d. Appearance of lanugo (baby-fine hair)
- e. Amenorrhea
- f. Prevalence
  - i. 0.5% of population, 2% of adolescent females
  - ii. Ages 10 to 30 (85% between 13 and 20); uncommon in women older than 40
  - iii. 95% female
- g. Mortality: 5 to 18%
- h. Predisposing factors
  - i. Family dynamics linked to relationship with the father; harsh mother
  - ii. Mother with history, 50% of susceptibility inherited
  - iii. 50% of anorexics also have binge and purge
  - iv. 40 to 80% also seriously depressed
- i. Treatment
  - i. Usually resistant to treatment (denial of illness)
  - ii. Full treatment: stabilizing weight, then family and individual therapy
  - iii. Pharmacologic treatment: cyproheptadine, chlorpromazine, amitriptyline

Table 12-4. Eating Disorders

	Anorexia Nervosa	Bulimia Nervosa
Gender	W > M	W > M
Age	Mid-teenage years	Late adolescence/early adulthood
SES	Not specific to high	Not specific to high
Weight	>15% ideal body weight loss	Varies, usually nl. or >nl.
Neurotransmitters	Serotonin/norepinephrine?	Serotonin/norepinephrine?
Binge/purge	Yes	Yes
Laxative/diuretics	Yes	Yes
Sexual adjustment	Poor	Good
Medical complications	<ul style="list-style-type: none"> <li>• Amenorrhea</li> <li>• Lanugo</li> <li>• High mortality</li> <li>• Dental cavities</li> <li>• Electrolyte imbalances</li> </ul>	<ul style="list-style-type: none"> <li>• Electrolyte imbalances</li> <li>• Dental cavities</li> <li>• Callous on hands/fingers</li> <li>• Enlarged parotid and salivary glands</li> <li>• Cardiac abnormalities</li> </ul>

## F. Anxiety Disorders

1. Most common psychiatric disorders in women of all ages. For men, substance abuse is most common.
2. Be careful to rule out coronary heart disease and hyperthyroidism.
3. Anxiety can become self-generating, a spiral.

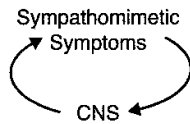


Figure 12-1

## 4. Subtypes

a. Generalized anxiety disorder

- i. Symptoms exhibited more days than not over a 6-month period. Anxiety is a universal emotion. The issue here is one of degree.
- ii. Lack of structure is a frequent contributing factor, e.g., "Sunday neurosis," planned activities bind anxiety.
- iii. Symptoms
  - Motor tension (fidgety, jumpy)
  - Autonomic hyperactivity (heart pounding, sweating, chest pains), hyperventilation
  - Apprehension (fear, worry, rumination), difficulty concentrating
  - Vigilance and scanning (impatient, hyperactive, distracted)
  - Fatigue and sleep disturbances common, especially insomnia and restlessness

b. Phobias

- i. General
  - Prevalence: 4% men, 9% women
  - Public speaking is the #1 phobia.
- ii. Specific phobias: fear of specific object, e.g., spiders, snakes
  - Anxiety when faced with identifiable object
  - Phobic object avoided
  - Fear must be persistent and disabling
- iii. Agoraphobia: fear of open spaces
  - Also sense of helplessness or humiliation
  - Manifest anxiety, paniclike symptoms
  - Travel restricted
  - Often occurs with panic disorder
- iv. Social phobia: fear of feeling or being stupid, shameful
  - Leads to dysfunctional circumspect behavior, e.g., inability to urinate in public washrooms

- Prevalence: 1% of general population
- May accompany avoidant personality disorder
- Discrete performance anxiety (stage fright): most common phobia, treat with atenolol or propranolol (beta blocker) or paroxetine (SSRI)
- Generalized social anxiety: treat with phenelzine (MAO inhibitor) or paroxetine (SSRI)

c. Obsessive-compulsive disorder

- Obsession: focusing on one thought, usually to avoid another
- Compulsion: repetitive action shields person from thoughts, action "fixes" bad thought
- Common defenses: isolation, undoing, and reaction formation
- Often recognized by patient as absurd and attempts to resist
- Primary concern of patient is to not lose control
- Epidemiology
  - 1.5% have disorder, 3% lifetime prevalence
  - 50% remain unmarried
  - Males = females
  - Major depression among two-thirds over lifetime
- Increased frontal lobe metabolism
- Increased activity in the caudate nucleus
- Treatment
  - Fluoxetine, fluvoxamine, or other SSRI
  - Clomipramine
  - Avoid neuroleptics

d. Panic disorder

- Three attacks in 3-week period
- No clear circumscribed stimulus
- Abrupt onset of symptoms, peak within 10 minutes
- Epidemiology
  - Onset early 20s
  - 1.5% of population has disorder; 4% lifetime prevalence
  - 70 to 80% are women
  - 10 to 14% of cardiology patients have panic attacks
- Clinical signs
  - Great apprehension and fear
  - Palpitations, trembling, sweating
  - Fear of dying or going crazy
  - Hyperventilation, "air hunger"
  - Sense of unreality
- Premenstrual period: heightened vulnerability
- Recurrent attacks leave patients demoralized, hypochondriacal, agoraphobic, depressed
- Can induce panic attacks by hyperventilation, carbon dioxide, yohimbine, sodium lactate, epinephrine (panicogens)

- ix. Treatment
  - Alprazolam (National Institute of Mental Health study)
  - Tricyclic antidepressants (imipramine)
  - Clonazepam
  - Any SSRI
  - Carbon dioxide (for hyperventilation)
- x. Relapse is common; keep on medication for 6 to 12 months

**G. Somatoform Disorders, Factitious Disorder, and Malingering**

1. Somatoform disorders

a. Somatization disorder

- i. Set of eight or more symptoms (four pain, two gastrointestinal, one sexual, one pseudoneurologic)
- ii. Onset before age 30
- iii. Symptoms can occur over a period of years
- iv. More common in females than in males (20 to 1)

b. Conversion disorder

- i. One or more symptoms
- ii. Altering of physical functioning, suggesting physical disorder
- iii. Usually skeletal, muscular, sensory, or some peripheral nonautonomic system, e.g., paralysis of the hand, loss of sight
- iv. Loss of functioning is real and unfeigned
- v. Look for *la belle indifférence*

c. Hypochondriasis

- i. Unrealistic interpretation of physical signs as abnormal
- ii. Preoccupation with illness or fear of illness when none present
- iii. Preoccupation persists in spite of reassurance
- iv. At least 6 months duration
- v. Treat by simple palliative care and fostering relationship

d. Somatoform pain disorder

- i. Severe, prolonged pain
- ii. No cause found
- iii. Pain disrupts day-to-day life
- iv. Rule out depression
- v. Look for secondary gain

e. Body dysmorphic disorder

- i. Preoccupation with unrealistic negative evaluation of personal appearance and attractiveness
- ii. Sees self as ugly or horrific when normal in appearance
- iii. Preoccupation disrupts day-to-day life
- iv. Not accounted for by other disorder (e.g., anorexia nervosa)
- v. May seek multiple plastic surgeries or other extreme interventions

**Table 12-5. Differentiating Somatoform Disorders From Factitious Disorders and Malingering**

	Somatoform	Factitious	Malingering
Symptom production	Unconscious	Intentional	Intentional
Motivation	Unconscious	Unconscious	Intentional

2. Differential diagnosis

- a. Somatoform disorders (as a group): everything unconscious
  - i. Unintentional or unconscious symptom production
  - ii. Unconscious motivation to be ill
  - iii. Both primary and secondary gain
- b. Malingering: everything conscious
  - i. Intentional symptom production
  - ii. Conscious motivation
  - iii. Symptoms purely for secondary gain, e.g., to avoid a court date, military induction, or school
  - iv. Treat by fostering relationship and understanding motive
- c. Factitious disorder: some conscious, some unconscious
  - i. Intentional illness production
  - ii. Unconscious motivation, therefore, a compulsion
  - iii. Patients aware of manufacturing their symptoms but unaware of why they go to such lengths
  - iv. Both primary and secondary gain
  - v. Munchausen syndrome or polysurgical addiction: chronic factitious illness with physical symptoms
  - vi. Munchausen by proxy: inducing symptoms in others (e.g., a mother producing symptoms in her child)
  - vii. Factitious disorders require treatment; foster relationship and look for motive

**H. Post-Traumatic Stress Disorder**

- 1. Manifestations:
  - a. Re-experience of the event as recurrent dreams or recollections (flashbacks)
  - b. Avoidance of associated stimuli
  - c. Diminished responsiveness to external world
  - d. Sleep disruption or excess
  - e. Irritability, loss of control, impulsivity
  - f. Headaches, inability to concentrate
  - g. Repetition compulsion
- 2. Symptoms must be exhibited for more than 1 month; if less, diagnose as acute stress disorder



3. Following psychologically stressful event outside the range of normal human experience
  - i. Most commonly, serious threat to life, family, children, home, or community
  - ii. Common reaction to rape for women
4. Often long latency period, e.g., abused as child, manifest symptoms as adult
5. Quicker onset correlates with better prognosis
6. Increased vulnerability if:
  - a. Prior emotional variability; excessive autonomic reactions is a predictor of occurrence
  - b. Prior cocaine/opiate use
7. Adults recover quicker; very young and very old have harder time coping
8. Prevalence: 0.5% in men, 1.2% in women
9. Sleep changes: increase in REM latency; decrease in amount of REM and Stage 4 sleep
10. Increased urinary secretion of norepinephrine
11. Treatment: group therapy to facilitate working through normal reactions blocked by disorder; seeking cathartic release. SSRIs can improve patients' functional level.

#### I. Adjustment Disorder

1. Residual category, use only if no other Axis I applies
2. Criteria:
  - a. Presence of identifiable stressor within 3 months of onset
  - b. Symptoms last less than 6 months after end of stressor
  - c. Symptoms are clinically significant, with significant social, occupational, and/or academic impairment
  - d. Not a grief response

#### J. Dissociative Disorders

1. Symptoms similar to patients with temporal lobe dysfunction
2. Reaction often precipitated by emotional crisis
  - a. Primary gain: anxiety reduction
  - b. Secondary gain: solution to the crisis (avoidance)
3. Subtypes
  - a. Fugue
    - i. Sudden unexpected travel
    - ii. Inability to recall one's past
    - iii. Confusion of identity or new identity
  - b. Amnesia
    - i. Inability to recall important personal information
    - ii. Linked to trauma
  - c. Dissociative identity disorder (multiple personality)
    - i. Presence of two or more distinct identities
    - ii. At least two identities control behavior
    - iii. Inability to recall important personal information

- d. Depersonalization disorder
  - i. Recurrent experiences of being detached from or outside of one's body
  - ii. Reality testing stays intact
  - iii. Causes significant impairment

#### K. Personality Disorders

- 1. General characteristics
  - a. Inflexible, inability to adapt
  - b. One way of responding
  - c. Lifelong
  - d. All areas of life
  - e. Maladaptive response to stress; response to social context
  - f. Can thrive if situation is right
  - g. Interactive, interpersonal disorders
    - i. Patients really annoy others
    - ii. Symptoms are ego-syntonic
    - iii. Patient seeks to change the world, not self
  - h. Overall, 10 to 15% prevalence (Nova Scotia and Manhattan studies)
  - i. Concordance rate for MZ twins three times that of DZ twins
- 2. Cluster A: odd or eccentric—higher prevalence in biologic relatives of schizophrenics; higher prevalence in males
  - a. Paranoid
    - i. Long-standing suspiciousness or mistrust of others: a base line of mistrust
    - ii. Preoccupied with issues of trust
    - iii. Reluctant to confide in others
    - iv. Reads hidden meaning into comments or events
    - v. Carries grudges
    - vi. May have history of misdemeanor arrests
    - vii. Differentiate from:
      - Paranoid schizophrenic has hallucinations and formal thought disorders; paranoid personality disorder does not
      - Delusional disorder, paranoid type has fixed, focal delusions; paranoid personality disorder does not
  - b. Schizoid
    - i. Lifelong pattern of social withdrawal, and they like it that way
    - ii. Seen by others as eccentric, isolated, withdrawn
    - iii. Restricted emotional expression
    - iv. Prevalence 7.5% of population
    - v. Males two times more than females

- c. Schizotypal
  - i. Very odd, strange, weird
  - ii. Magical thinking (including ESP and telepathy), ideas of reference, illusions
  - iii. Idiosyncratic meanings
  - iv. Social anxiety (paranoid)
  - v. Suspiciousness
  - vi. Lack of close friends
  - vii. Incongruous affect
  - viii. Odd speech, social isolation
  - ix. Collections (e.g., ball of barbed wire)
  - x. Ill-fitting or mismatched clothing
- 3. Cluster B: dramatic and emotional—often associated with alcoholism and somatization disorder
  - a. Histrionic
    - i. Colorful, dramatic, extroverted
    - ii. Inability to maintain long-lasting relationships
    - iii. Attention-seeking, constantly wanting the spotlight
    - iv. Seductive behavior
  - b. Narcissistic
    - i. Number of reported cases increasing
    - ii. Grandiose sense of self-importance
    - iii. Preoccupation with fantasies of unlimited wealth, power, love
    - iv. Demands constant attention
    - v. Fragile self-esteem, prone to depression
    - vi. Criticism met with indifference or rage
    - vii. Genuine surprise and anger when others don't do as they want
    - viii. Can be charismatic
  - c. Borderline
    - i. 1 to 2% of population
    - ii. Females two times more than males
    - iii. Very unstable affect, behavior, self-image
    - iv. In constant state of crisis, chaos
    - v. Self-detrimental impulsivity: promiscuity, gambling, overeating, substance abuse
    - vi. Unstable but intense interpersonal relationships: very dependent and hostile, love/hate
    - vii. Great problems with being alone
    - viii. Self-mutilation
    - ix. History of sexual abuse
    - x. Common defenses: splitting, passive-aggressive
    - xi. Particularly incapable of tolerating anxiety
    - xii. Often coupled with mood disorder
    - xiii. 5% commit suicide

d. Antisocial

- i. 3% males, 1% females
- ii. Continual criminal acts
- iii. Inability to conform to social norms: truancy, delinquency, theft, running away
- iv. Can't hold job, no enduring attachments, reckless, aggressive
- v. Onset before age 15; if younger than 18, diagnose as conduct disorder
- vi. Three times greater in areas of social disintegration; this matters more than does SES
- vii. Comprises 75% of prison populations
- viii. Five times more common among relatives with disorder

4. Cluster C: anxious and fearful—behaviors associated with fear and anxiety

a. Avoidant

- i. Extreme sensitivity to rejection
- ii. Sees self as socially inept
- iii. Excessive shyness, high anxiety levels
- iv. Social isolation, but an intense, internal desire for affection and acceptance
- v. Tends to stay in same job, same life situation, same relationships

Table 12-6. Personality Disorders

	Paranoid	Schizoid	Schizotypal	Histrionic	Narcissistic
Definition	Attributes involvement motives to others, suspicious	Isolated lifestyle, has no longing for others, "loner"	Eccentric behavior, thought, speech	Excessive emotion and attention seeking	Grandiose, overconcerned with issues of self-esteem
Epidemiology	1. Men greater than women 2. Increased incidence in families with schizophrenia	1. Men greater than women 2. Increased incidence in families with schizophrenia	1. Prevalence is 3% 2. Men greater than women	1. Women greater than men 2. Underdiagnosed in men	Common
Associated Defenses	Projection			1. Regression 2. Somatization 3. Conversion 4. Dissociation	Fixation at subphase of separation-individualization

b. Obsessive-compulsive

- i. Orderliness, inflexible, perfectionist
- ii. More common in males, first born, harsh discipline upbringing
- iii. Loves lists, rules, order
- iv. Unable to discard worn-out objects
- v. Doesn't want change
- vi. Excessively stubborn
- vii. Lacks sense of humor
- viii. Wants to keep routine
- ix. Differentiate from obsessive-compulsive anxiety disorder. The anxiety disorder has obsessions and compulsions that are focal and acquired. Personality disorders are life-long and pervasive.

c. Dependent

- i. Gets others to assume responsibility
- ii. Subordinates own needs to others
- iii. Can't express disagreement
- iv. Great fear of having to care for self
- v. May be linked to abusive spouse

Borderline	Antisocial	Avoidant	Dependent	Obsessive-Compulsive
Instability of mood, self-image, and relationships	Does not recognize the rights of others	Shy or timid, fears rejection	Dependent submissive	Perfectionistic and inflexible, orderly, rigid
1. Women greater than men 2. Increased mood disorders in families	Prevalence: 3% in men; 1% in women	1. Common 2. Possible deforming illness	1. Common 2. Women greater than men	1. Men greater than women 2. Increased concordance in identical twins
1. Splitting 2. Projective identification 3. Dissociation	Superego lacunae	Avoidance		1. Isolation 2. Reaction formation 3. Undoing 4. Intellectualization

### Chapter Summary

The five DSM IV axes of diagnosis are: I – clinical disorders, II – personality disorders and mental retardation, III – physical conditions and disorders, IV – psychosocial and environmental problems, and V – global assessment of function.

Important disorders usually diagnosed in childhood are mental retardation, pervasive development disorder (autism), and attention deficit hyperactivity disorder (ADHD).

Schizophrenia is a common illness typified by psychosis, a disintegration of logical thinking, and a loss of ability to maintain normal social behavior. Subtypes: paranoid, catatonic, disorganized, undifferentiated, and residual.

Positive symptoms are what normal persons do not have but schizophrenics do. Negative symptoms are what normal persons have but schizophrenics do not.

A malfunction of the dopamine neurotransmission system is responsible for schizophrenic symptoms, but serotonin and glutamate also play a role.

Schizophrenia-associated functional deficits: smooth pursuit eye movements, backward masking, event-related potential anomalies, and reduction in prefrontal cortical activity in the face of cognitive challenge.

Mood Disorders: dysthymia (mild, chronic depression); unipolar disorder (severe depression); cyclothymia (mild, chronic bipolar); bipolar disorder (manic-depression). Seasonal affect disorder (SAD) is characterized by the onset of symptoms of depression during winter months.

Laboratory tests related to depression: measurement of norepinephrine metabolites, the dexamethasone suppression test (DST), and the thyrotropin-releasing hormone (TRH) stimulation test.

Eating Disorders: bulimia nervosa and anorexia nervosa.

Anxiety Disorders: generalized anxiety disorder (GAD), phobias, obsessive-compulsive disorder (OCD), and panic disorder.

Somatoform Disorders: somatization, conversion, hypochondriasis, somatoform pain, body dysmorphic.

For the somatoform disorders, the patient is not aware of either symptom production or motivation. For factitious disorders, the patient is aware of symptom production, but not motivation. For malingering, both symptom production and motivation are known.

Post-Traumatic Stress Disorder: re-experience of event and avoidance of associated stimuli along with other dysfunctional symptoms following an event outside the realm of normal human experience.

Adjustment Disorder: residual disorder only given if no other Axis I diagnosis applies. Cannot be a grief response.

Dissociative Disorders: fugue, amnesia, dissociative identity disorder, and depersonalization disorder.

Personality Disorders: lifelong, pervasive, ego-syntonic. Specific types: paranoid (suspicious, untrusting), schizoid (isolated, withdrawn), schizotypal (weird), histrionic (colorful and seductive), narcissistic (grandiose), borderline (unstable with intense personal relationships), antisocial (lifelong criminal), avoidant (extremely shy), obsessive-compulsive (preoccupation with orderliness and control), and dependent (gets others to take responsibility). Table XII-6 summarizes the characteristics associated with the personality disorders.

## Review Questions

93. A 6-year-old boy was referred by his first grade teacher for evaluation after she noticed that he had trouble keeping up with the other children in his class. After psychological testing and an evaluation interview, the boy's IQ is assessed at 62. Based on this information, when he is an adult the boy most likely will
- (A) find work in a sheltered workshop setting
  - (B) have difficulty with basic reading and math skills
  - (C) lead a normal life with no special support required
  - (D) require custodial care
  - (E) will need guidance for important life decisions
94. A 45-year-old woman presents to her primary care physician complaining of fatigue and headaches. Over the past month, she reports that she has had trouble sleeping, difficulty concentrating, and episodes of crying for no reason. In addition, she says that she feels sad and worthless. The neurological pathway most likely implicated as the source of these symptoms is the
- (A) meso-limbic-cortico pathway
  - (B) locus ceruleus pathway
  - (C) nigrostriatal pathway
  - (D) nucleus accumbens pathway
  - (E) glycolytic pathway
95. A 42-year-old woman has always been extremely neat and conscientious, skills she makes good use of as the executive secretary to the president of a large corporation. Something of a perfectionist, she often stays long after normal working hours to check on the punctuation and spelling of letters that she prepared during the day. Although her work is impeccable, she has few close relationships with others. Her boss referred her for counseling after repeatedly getting into fights with her coworkers. "They just don't take the job to heart," she says disapprovingly about them. "All they seem to want to do is joke around all day." The most likely preliminary diagnosis for this patient is
- (A) obsessive-compulsive personality disorder
  - (B) paranoid personality disorder
  - (C) schizoid personality disorder
  - (D) hysterical personality disorder
  - (E) antisocial personality disorder
  - (F) narcissistic personality disorder
  - (G) borderline personality disorder
  - (H) dependent personality disorder
  - (I) avoidant personality disorder
  - (J) schizotypal personality disorder

96. A 22-year-old male patient refuses to provide answers to standard questions during an initial history and physical exam, including address and telephone number. When asked the reason for the refusal, he says he doesn't see why the physician needs such irrelevant information and eyes the physician suspiciously. When pressed further, he asks angrily, "Look, are you going to treat me or do I have to get my lawyer?" This behavior is most consistent with a diagnosis of
- (A) obsessive-compulsive personality disorder
  - (B) paranoid personality disorder
  - (C) schizoid personality disorder
  - (D) hysterical personality disorder
  - (E) antisocial personality disorder
  - (F) narcissistic personality disorder
  - (G) borderline personality disorder
  - (H) dependent personality disorder
  - (I) avoidant personality disorder
  - (J) schizotypal personality disorder
97. A patient's past medical history indicates numerous admissions to a local public hospital, mostly during the winter months. On each occasion, he has been brought to the hospital after passing out in a public location. His appearance is disheveled and his clothes are torn. He complains that the cold makes him dizzy and asks the physician, with tears in his eyes, to "please help him get better." Neurological examination is unable to uncover any underlying cause for his reported symptoms. The most likely preliminary diagnosis for this patient would be
- (A) dysthymia
  - (B) somatoform disorder
  - (C) delusional disorder
  - (D) factitious disorder
  - (E) malingering
98. A man awakens to find a bright sunny day. As he dresses, he makes sure to put on a yellow shirt to ensure that it will stay sunny all day. This behavior can best be described as
- (A) delusion
  - (B) hallucination
  - (C) idea of reference
  - (D) magical thinking
  - (E) illusion



99. Glenn is a model patient on the ward. He never is any trouble. Whatever he is told to do he does. He sits quietly for hours, rarely talking, and hardly moving, except to ape the movements of those who pass by him. The most likely diagnosis for Glenn is
- (A) schizophrenia, disorganized type
  - (B) schizophrenia, undifferentiated type
  - (C) schizophrenia, paranoid type
  - (D) schizophrenia, residual phase
  - (E) schizophrenia, catatonic type
100. According to twin studies, the strongest evidence of a genetic cause is for
- (A) schizophrenia
  - (B) bipolar disorder
  - (C) unipolar depression
  - (D) antisocial personality disorder
  - (E) alcoholism
101. A patient suffering from paranoid schizophrenia has been on his medication for a full year. During this time, his positive symptoms have abated and he shows no signs of relapse. If he continues to be adherent with his medication, his chance of relapse over the coming years is most likely to be
- (A) 80%
  - (B) 50%
  - (C) 40%
  - (D) 30%
  - (E) 10%
102. A 22-year-old mentally retarded male lives on his own but works in a sheltered workshop setting. He has an active social life and is well liked by his peers. He meets weekly with a counselor who helps him handle his money and provides advice about some life decisions. Based on this information, this man will most likely be considered as having what level of retardation?
- (A) below average
  - (B) mild
  - (C) moderate
  - (D) severe
  - (E) profound

103. A 38-year-old woman is brought by her husband to see her primary care physician. The husband reports that she is getting hard to live with. Physical exam reveals rapid heartbeat and profuse sweating. In conversation, the woman has a hard time focusing and gets up from her chair repeatedly. After some time, she reports that she is tired and has had difficulty sleeping for "what seems like a year, now." She attributes this difficulty sleeping to her tendency to worry about her children and confides that she checks on them 10 to 20 times a night. When questioned about friends, she states that she just doesn't see them much any more. Based on this preliminary information, the most likely diagnosis for this woman would be
- (A) agoraphobia
  - (B) generalized anxiety disorder
  - (C) generalized social anxiety
  - (D) obsessive-compulsive disorder
  - (E) panic disorder
104. A 42-year-old man who makes his living as a computer programmer and works out of his own home is referred by his employer for evaluation. He is reluctant to venture out to meet with other people, and rarely has people in to visit. When selected for a company-wide award, he refuses to have his picture taken for the company newsletter. During an assessment interview, he averts his face and asks the examiner to "stop looking at me." Although he is average in appearance, he is convinced that his face is ugly and misshapen and says that he stays away from people so they "won't have to look at me." The most likely diagnosis for this man would be
- (A) agoraphobia
  - (B) body dysmorphic disorder
  - (C) factitious disorder
  - (D) obsessive-compulsive disorder
  - (E) social phobia
  - (F) somatization disorder
105. A young woman of unknown age was brought by the police to the local emergency department for evaluation after they found her wandering in a local park. The woman carried no purse and no identification. Physical exam shows no abnormalities. When questioned, the woman was pleasant and attentive, making eye contact and answering each question as it was asked. She was unable to state her name or any details about her life, except that the name Phoenix seems familiar, although she was not sure why. The police in Phoenix, Arizona, are contacted and find a missing persons report matching the patient's description. Based on this information, the most likely diagnosis for this patient is
- (A) adjustment disorder
  - (B) amnesia
  - (C) conversion disorder
  - (D) depersonalization disorder
  - (E) dissociative identity disorder
  - (F) factitious disorder
  - (G) psychogenic fugue

106. For 3 weeks following an automobile accident where she watched her child die, a 28-year-old woman reports difficulty sleeping, headaches, and an inability to concentrate. Her family reports that she suffers from nightmares and violent emotional outbursts when awake. Since the accident, she refuses to either drive or ride in a car. The symptoms presented here are most consistent with a diagnosis of
- (A) adjustment disorder
  - (B) post-traumatic stress disorder
  - (C) acute stress disorder
  - (D) dysthymia
  - (E) unipolar disorder
  - (F) normal grief
107. A 28-year-old white male presents at a local clinic complaining of severe abdominal pain. He reports tenderness during palpation, dizziness, and difficulty concentrating. Review of the medical record shows that this is the fourth time in the past year that the patient has appeared for medical attention. On each previous occasion, no identifiable medical problem could be uncovered. When confronted with this history, the patient confesses that he manufactures his symptoms before coming to the clinic. He says that he knows this is wrong, but he cannot stop himself from doing this. Based on the information, the most likely diagnosis for this patient would be
- (A) somatization disorder
  - (B) conversion disorder
  - (C) hypochondriasis
  - (D) factitious disorder
  - (E) malingering

### Answers

93. **Answer: E.** The tested IQ suggests mild retardation. These individuals live their own lives and make their own decisions, but often need assistance at some of life's important transitions points. Note that they are legally competent.
94. **Answer: B.** Starting in the retrorolateral part of the pons, this is the major pathway for norepinephrine. Mesolimbic and nigrostriatal pathways are associated with dopamine and therefore, schizophrenia.
95. **Answer: A.** Focusing on details, loving routine, having a sense that there is only one right way to do things, lack of humor, and few close relationships suggests an obsessive-compulsive personality disorder.
96. **Answer: B.** General suspiciousness and mistrust suggests a paranoid personality disorder.
97. **Answer: E.** The timing during the winter months and the public venue for the passing out are all suggestive of the secondary gain of malingering.
98. **Answer: D.** The yellow shirt influences the sunny day. This is an example of magical thinking.
99. **Answer: E.** Catatonic schizophrenia can be of two types: agitated and stuporous. Glenn is an example of the stuporous type. Residual phase means no or few apparent symptoms.
100. **Answer: B.** The Heritability Index tells us that about 62% of bipolar disorder is due to inheritance. This is greater than schizophrenia (40%) and the other options.
101. **Answer: E.** If patients are compliant with medication and make it past the first year without relapse, the chance of relapse is a low 10%.
102. **Answer: C.** Moderate retardation (IQ 49 to 35). He is able to take care of some of his own affairs, but needs weekly help with finances and works in a sheltered workshop.
103. **Answer: B.** The symptoms and timeframe are consistent with a diagnosis of generalized anxiety disorder. Although some features of other disorders are present, they do not match criteria.
104. **Answer: B.** The central issue is the negative appraisal of his own appearance. All other symptoms arise from this.
105. **Answer: G.** One of the dissociative disorders defined as sudden travel and inability to recall one's past or confusion about one's identity.
106. **Answer: C.** Avoidance of associated stimuli and nightmares after an identified traumatic event are the criteria for PTSD. But the timeframe, 3 weeks, makes acute stress disorder the better answer.
107. **Answer: D.** Factitious disorders are characterized by conscious symptom production and unconscious motivation. Somatization disorder, conversion disorder, and hypochondria are all subtypes of somatoform disorders. Malingering is a conscious symptom production and there is clear, conscious secondary gain.

# Organic Disorders

# 13

## A. Tourette Syndrome

1. Definition: multiple motor and vocal tics
  - a. Tics occur many times every day or intermittently for more than 1 year.
  - b. Tics can be simple (rapid, repetitive contractions) or complex (appear as more ritualistic and purposeful).
  - c. Simple tics appear first.
2. Characteristics
  - a. Prevalence is 0.5 to 1 per 1,000.
  - b. Mean age of onset is 7 (onset must be before age 18).
  - c. Male to female ratio is 3:1.
  - d. Evidence of genetic transmission: about 50% concordance in monozygotic twins
  - e. Associated with increased levels of dopamine
  - f. Often first reported by teachers as ADHD, obsessive-compulsive symptoms, and learning problems. These disorders may be present along with Tourette's.
  - g. Highest risk is sons of mothers with Tourette's
  - h. Treatment: haloperidol, pimozide, or clonidine

## B. HIV-Related Dementia

1. Caused by chronic HIV encephalitis and myelitis
  - a. Two-thirds have insidious onset, one-third has florid onset
  - b. 70 to 95% of patients with AIDS have HIV-related dementia before death.
2. Clinically consists of the following:
  - a. Cognitive symptoms: forgetfulness, loss of concentration, confusion
  - b. Behavioral symptoms: apathy, withdrawal, dysphoric mood, organic psychosis
  - c. Motor symptoms: loss of balance, leg weakness, poor handwriting
3. Average survival from onset to death is 4.2 months
4. Early signs of HIV-related dementia: dysphoric mood, apathy, social withdrawal
5. Often misdiagnosed at first as depression
6. HIV levels in the spinal fluid are good predictors of onset

## C. Delirium versus Dementia

1. **Delirium:** acute onset, impaired cognitive functioning, fluctuating and brief, reversible
2. **Dementia:** loss of cognitive abilities, impaired social functioning, loss of memory, personality change; only 15% reversible; may be progressive or static

## Note

### The USMLE Requires You to Know:

- The signs and symptoms of common organic conditions.
- Special emphasis should be placed on differential diagnosis among related disorders and between organic disorders and psychiatric disorders.

Table 13-1. Delirium versus Dementia

	Delirium	Dementia
History	Acute, identifiable date	Chronic, cannot be dated
Onset	Rapid	Insidious
Duration	Days to weeks	Months to years
Course	Fluctuating	Chronically progressive
Level of consciousness	Fluctuating	Normal
Orientation	Impaired periodically	Disorientation to person
Memory	Recently markedly impaired	Recently remotely impaired
Perception	Visual hallucinations	Hallucinations less common
Sleep	Disrupted sleep-wake cycle	Less sleep disruption
Reversibility	Reversible	Most not reversible
Physiologic changes	Prominent	Minimal
Attention span	Very short	Not reduced

**D. Dementias**

1. Epidemiology

- a. 5% of population older than 65
- b. 20% older than 80
- c. 15% of dementias are reversible.

2. Primary degenerative dementia of the Alzheimer type (DAT)

a. Ten warning signs of Alzheimer disease

- i. Memory loss that effects job skills
- ii. Difficulty performing familiar tasks
- iii. Problems with language
- iv. Disorientation to time and place
- v. Poor judgment
- vi. Problems with abstract thought
- vii. Misplacing things
- viii. Changes in mood or behavior
- ix. Changes in personality
- x. Loss of initiative

b. Epidemiology

- i. Most common, represents 65% of dementias in patients older than 65
- ii. Prevalence increases with age
- iii. Women greater than men

- iv. Family history confers greater risk
  - v. Less risk for higher educated
  - vi. Linked to chromosomes 1 and 14 (mutations), 19 (apolipoprotein E), 21 (linked to Down syndrome)
- c. Etiology
- i. Unknown
  - ii. Theories: maternal age at birth, deficiency of brain choline, autoimmune disorders, viral etiology, familial
- d. Gross pathology
- i. Diffuse atrophy of the brain on CT or MRI
  - ii. Flattened cortical sulci
  - iii. Enlarged cerebral ventricles
  - iv. Deficient blood flow in parietal lobes correlated with cognitive decline
  - v. Reduction in choline acetyl transferase
  - vi. Reduced metabolism in temporal and parietal lobes
- e. Microscopic pathology
- i. Accumulation of amyloid beta-peptides (protein fragment)
  - ii. Senile plaques
  - iii. Neurofibrillary tangles
  - iv. Granulovascular degeneration of the neurons
  - v. Anatomic changes: to amygdala, hippocampus, cortex, basal forebrain
- f. Treatment
- i. Supportive
  - ii. Symptomatic
  - iii. Reduce environmental changes
  - iv. Donepezil hydrochloride
3. Vascular dementia (multi-infarct)
- a. Definition: decremental or patchy deterioration in cognitive functioning due to severe cerebrovascular disease
- b. Epidemiology
- i. Most prevalent between ages 60 and 70
  - ii. Appears earlier than does DAT
  - iii. Men > women
  - iv. Hypertension is predisposing factor
  - v. 15% of all dementias in the elderly
  - vi. Can often find some lateralizing neurologic signs
- c. Etiology
- i. Vascular disease is present.
  - ii. Affects small- and medium-sized cerebral vessels that infarct and produce parenchymal lesions over wide areas of the brain
- d. Treatment
- i. Treatment of underlying condition (hypertension, diabetes mellitus, hyperlipidemia)
  - ii. General measures for dementia

Table 13-2. Dementia, Alzheimer Type versus Vascular Dementia

Dementia, Alzheimer Type	Vascular Dementia
General deterioration	Patchy deterioration
More in women	More in men
Later onset	Earlier onset
Most common, 65% of dementias	Less common, 15% of dementias
Etiology unknown	Etiology features hypertension
Progressive onset	Quick onset
No lateral signs	Lateralizing neurologic signs

4. Pick disease

- a. Affects frontal and temporal lobes
- b. Very rare
- c. Similar picture to DAT
- d. Prominent frontal lobe symptoms (personality change)
- e. Reactive gliosis in frontal/temporal lobes
- f. CT or MRI sometimes shows frontal lobe involvement but definitive diagnosis is only at autopsy

5. Creutzfeldt-Jakob disease

- a. Dementia caused by prion (no DNA or RNA)
- b. Rapidly progressive
- c. Generally onset between ages 40 and 50
- d. Initially, vague somatic complaints and unspecified anxiety, followed by ataxia, choreoathetosis, and dysarthria
- e. Fatal in 2 years (usually sooner)
- f. CT demonstrates atrophy in cortex/cerebellum
- g. No treatment

6. Huntington chorea

- a. Autosomal dominant
- b. Defect in chromosome 4
- c. Males = females
- d. Basal ganglia and caudate atrophy
- e. Choreoathetoid movements and dementia
- f. Onset between ages 30 and 40
- g. Progressive deterioration
- h. Dementia, later with psychosis progressing to infantile state
- i. Death in 15–20 years
- j. Suicide is common.



7. Parkinson disease

- a. Decreased dopamine in substantia nigra
- b. Annual prevalence is 200 in 100,000
- c. Symptoms
  - i. Bradykinesia
  - ii. Resting tremor
  - iii. Pill-rolling tremor
  - iv. Masklike facies
  - v. Cogwheel rigidity
  - vi. Shuffling gait
- d. 40% to 80% develop dementia
- e. Depression is common; treat with antidepressants or electroconvulsive therapy (ECT)
- f. Treatment: L-dopa or deprenyl

8. Wilson disease

- a. Defect in chromosome 13
- b. Ceruloplasmin deficiency
- c. Abnormal copper metabolism
- d. Kaiser-Fleischer rings

9. Normal pressure hydrocephalus

- a. Symptom triad of:
  - i. Dementia
  - ii. Urinary incontinence
  - iii. Gait apraxia (magnetic gait)
- b. Increased ventricles on CT
- c. Normal pressure on lumbar puncture
- d. Treat with shunt if spinal tap is "therapeutic"

**E. Hemispheric Dominance**1. Left hemisphere

- a. Language
- b. Dominant in 97% of population, 60 to 70% in left-handed persons
- c. Calculation-type problem solving
- d. Stroke damage to left is more likely to lead to depression
- e. Larger in size than is the right side and processes information faster

2. Right hemisphere

- a. Perception, artistic, visual-spatial
- b. Activated for intuition-type problem solving
- c. Stroke damage to right is more likely to lead to apathy and indifference
- d. Prosody resides here.
- e. More 5-HT receptors

**Note**

- Apraxia: loss of ability to learn or to carry out specific movements, e.g., unable to flip a coin when asked to do so
- Agnosia: failure to recognize sensory stimuli, e.g., visual agnosia, unable to recognize object when shown but able to recognize when touched
- Alexia: acquired disorder of reading ability; often accompanied by aphasia. Distinguish from dyslexia (developmental reading problem)
- Agraphia: acquired inability to write

**F. Aphasias**

1. Broca's
  - a. Lesion of frontal lobe (Brodmann area 44)
  - b. Comprehension unimpaired
  - c. Speech production is telegraphic and ungrammatical.
  - d. Often accompanied by depressive symptoms
  - e. "I movies" instead of "I went to the movies"
  - f. Trouble repeating statements
  - g. Muscle weakness on the right side
2. Wernicke's
  - a. Lesions of superior temporal gyrus (Brodmann area 22)
  - b. Comprehension impaired
  - c. Speech is fluent but incoherent.
  - d. Trouble repeating statements
  - e. Verbal paraphasias (substituting one word for another, or making up word)
  - f. No muscle weakness
  - g. Resembles formal thought disorder
  - h. Manialike, rapid speech hyperactivity
3. Conduction
  - a. Lesion in the parietal lobe or arcuate fasciculus
  - b. Connection between Broca and Wernicke areas broken
  - c. Words comprehended correctly but cannot be passed on for speech or writing
  - d. Trouble repeating statements
4. Global
  - a. Wide lesions in the presylvian speech area
  - b. Both Broca and Wernicke areas damaged
  - c. Labored telegraphic speech with poor comprehension
  - d. Trouble repeating statements
5. Transcortical
  - a. Lesion in the prefrontal cortex
  - b. Capacity to repeat statements is unimpaired
  - c. Patient cannot speak spontaneously

## G. Brain and Behavior


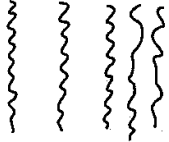


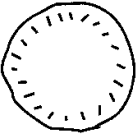
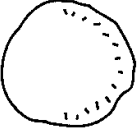
Original Drawing	Patient's Drawing	Name	Localization
		Perseveration	Frontal lobe
		Constructional apraxia	Nondominant (right) parietal lobe
		Hemineglect/ hemi-inattention	Right parietal lobe

Figure 13-1. Dysfunctions on Common Neurologic Exams

1. Frontal cortex: global orientation

## a. Key functions

- i. Speech
- ii. Critical to personality
- iii. Abstract thought
- iv. Memory and higher-order mental functions
- v. Capacity to initiate and stop tasks
- vi. Concentration

## b. Lesions of dorsal prefrontal cortex

- i. Apathy
- ii. Decreased drive, initiative
- iii. Poor grooming
- iv. Decreased attention
- v. Poor ability to think abstractly
- vi. Broca aphasia (if in dominant hemisphere)

## c. Lesions of orbitomedial frontal cortex

- i. Withdrawal
- ii. Fearfulness
- iii. Explosive mood
- iv. Loss of inhibitions
- v. Violent outbursts

2. Temporal cortex

- a. Functions
  - i. Language
  - ii. Memory
  - iii. Emotion
- b. Lesions stem from stroke, tumor, and trauma; herpes virus CNS infections often affect temporal cortex
- c. Bilateral lesions: dementia
- d. Lesions of the rostral (front) left temporal lobe: deficits in recall or learning of proper names
- e. Lesions of dominant lobe:
  - i. Euphoria
  - ii. Auditory hallucinations
  - iii. Delusions
  - iv. Thought disorders
  - v. Poor verbal comprehension (Wernicke)
- f. Lesions of nondominant lobe:
  - i. Dysphoria
  - ii. Irritability
  - iii. Decreased visual and musical ability

3. Parietal cortex

- a. Key function: intellectual processing of sensory information
  - i. Left: verbal processing (dominant)
  - ii. Right: visual-spatial processing (nondominant)
- b. Lesions of dominant lobe: Gerstmann syndrome
  - i. Agraphia
  - ii. Acalculia
  - iii. Finger agnosia
  - iv. Right-left disorientation
  - v. Dysfunctions in this area account for a proportion of learning disabilities
- c. Lesions of nondominant lobe:
  - i. Denial of illness (anosognosia)
  - ii. Construction apraxia (difficulty outlining objects)
  - iii. Neglect of the opposite side (e.g., not washing or dressing opposite side of body)

4. Occipital cortex

- a. Key functions
  - i. Visual input
  - ii. Recall of objects, scenes, and distances; PET scans show activity in this area during recall of visual images
- b. Destruction: cortical blindness

- c. Bilateral occlusion of posterior cerebral arteries: Anton syndrome
    - i. Cortical blindness
    - ii. Denial of blindness
  - d. Cannot see camouflaged objects
  - e. Occipital epileptic foci: visual hallucinations
5. Limbic system
- a. Consists of hippocampus, hypothalamus, anterior thalamus, cingulate gyrus, amygdala
  - b. Associated cortical areas can suppress external displays of internal states
  - c. Key functions
    - i. Motivation
    - ii. Memory
    - iii. Emotions (mediation between cortex and lower centers)
    - iv. Reflex arc for conditioned responses
    - v. Violent behaviors
    - vi. Sociosexual behaviors
  - d. Associated dysfunctions
    - i. Apathy
    - ii. Aggression
    - iii. Vegetative-endocrine disturbances
    - iv. Memory problems and learning new material
  - e. Hypothalamus
    - i. Implicated in involuntary internal responses that accompany emotional strategy
    - ii. Regulation of some physiologic responses
      - Increased heart and respiration
      - Elevation of blood pressure and diversion of blood to skeletal muscles when angry
      - Regulation of endocrine balance
      - Control of eating (hunger/thirst centers)
      - Regulation of body temperature
      - Regulation of sleep-wake cycle
    - iii. Dysfunctions
      - Destruction of ventromedial hypothalamus: hyperphagia and obesity
      - Destruction of lateral hypothalamus: anorexia and starvation
  - f. Thalamus
    - i. Critical to pain perception
    - ii. Dysfunctions lead to impaired memory and arousal
  - g. Reticular activating system (RAS)
    - i. Motivation
    - ii. Arousal
    - iii. Wakefulness

h. Hippocampus: critical for memory and new learning

Table 13-3. Lesions and Memory

Lesion	Short-Term Memory	Long-Term Memory	New Learning
Medial temporal lobe	Spared	Spared	Impaired
Hippocampus	Spared	Impaired	Impaired

i. Amygdala

- i. Dorsomedial portion of temporal lobe
- ii. Connection with corpus striatum
- iii. Direct link between limbic system and motor system
- iv. Critical role in emotional memory and rudimentary learning
- v. The “unconscious mind”?
- vi. Klüver-Bucy syndrome
  - Removal of the amygdala
  - Tame
  - No fear of natural enemies
  - Hyperactive sexually
  - High rage threshold
  - “Make love, not war”
- vii. Korsakoff syndrome
  - Amnesia resulting from chronic thiamin deficiency
  - Associated with alcoholism
  - Neuronal damage in the thalamus
  - Once neuronal damage in the thalamus, not treatable with thiamin

6. Basal ganglia

- a. Functions: initiation and control of movement, implicated in depression and dementia
- b. Dysfunctions (see Dementia section)
  - i. Parkinson disease
  - ii. Huntington chorea
  - iii. Wilson disease
  - iv. Fahr disease
    - Rare hereditary disorder
    - Calcification of the basal ganglia
    - Onset at age 30
    - Dementia at age 50
    - Resembles negative symptom schizophrenia

7. Pons

- a. Start of NE pathway
- b. Important for REM sleep
- c. Anomalies here linked to autism

8. Cerebellum

- a. Key for balance
- b. Skill-based memory
- c. Facilitates verbal recall
- d. Implicated in some learning disabilities

**Chapter Summary**

Organic Disorders: Tourette syndrome (multiple motor tics), HIV-related dementia (HIV-induced encephalitis and myelitis), Alzheimer's type dementia (most common age associated dementia), vascular dementia (multiple cerebral infarcts), Pick disease (very rare), Creutzfeldt-Jacob disease (prion induced), Huntington chorea (autosomal dominant, middle-age onset), and Parkinson disease (relatively common in elderly, dopamine deficiency).

Dementias are chronic and rarely reversible and must be distinguished from deliriums, which have an acute onset and usually are reversible. Table 13-1 compares the two.

Aphasias: Broca's, Wernicke's, conduction, global, and transcortical aphasias.

The functions and effects of lesions in the frontal cortex, temporal cortex, parietal cortex, occipital cortex, limbic system (hippocampus, hypothalamus, anterior thalamus, cingulate gyrus, and amygdala), basal ganglia, pons, and cerebellum are discussed. Table 13-3 compares the effect on memory of lesions in the medial temporal lobe to those in the hippocampus.





# Psychopharmacology

# 14

## A. Neurotransmitters

### 1. Acetylcholine (ACh)

- a. Neurotransmitter at nerve-muscle connections for all voluntary muscles of the body
- b. Also many of the involuntary (autonomic) nervous system synapses
- c. Despite long history, the exact role of ACh in the brain unclear
- d. Cholinergic neurons concentrated in the RAS and basal forebrain
- e. Significant role in Alzheimer disease
- f. Dementia in general associated with decreased ACh concentrations in amygdala, hippocampus, and temporal neocortex
- g. Associated with erections in males
- h. Muscarinic and nicotinic receptors
- i. In the corpus striatum, ACh circuits are in equilibrium with dopamine neurons.

### 2. Norepinephrine (NE)

- a. One of the catecholamine neurotransmitters
- b. Transmitter of the sympathetic nerves of the autonomic nervous system, which mediate emergency response
  - i. Acceleration of the heart
  - ii. Dilatation of the bronchi
  - iii. Elevation of blood pressure
- c. Implicated in altering attention, perception, and mood
- d. Key pathway: locus ceruleus in upper pons
- e. Implicated in monoamine hypothesis of affective disorders:
  - i. Depletion of NE leads to depression
  - ii. Excess of NE (and serotonin) leads to mania
  - iii. Based on two observations:
    - Reserpine depletes NE and causes depression.
    - Antidepressant drugs block NE re-uptake, thus increasing the amount of NE available postsynaptically.
- f. Receptors:
  - i. Alpha-1: sympathetic (vasoconstriction)
  - ii. Alpha-2: on cell bodies of presynaptic neurons, inhibit NE release
  - iii. Beta-1: excitatory for heart, lungs, brain
  - iv. Beta-2: excitatory for vasodilatation and bronchodilatation

## Note

### The USMLE Requires You to Know:

- When are drugs used
- What are side effects
- Management of side effects
- Pay special attention to the drugs listed in the "Drugs to Highlight" section

3. Dopamine

- a. The other catecholamine neurotransmitter
- b. Synthesized from the amino acid tyrosine
- c. D<sub>2</sub> receptors most important
- d. D<sub>1</sub> and D<sub>3</sub> stimulate G-protein and increase cAMP and excitation
- e. D<sub>2</sub>, D<sub>3</sub>, and D<sub>4</sub> inhibit G-protein and decrease cAMP and excitation
- f. Three pathways of known psychiatric importance:
  - i. Nigrostriatal pathway in substantia nigra (movement disorders)
    - Dopamine blockade via neuroleptics or destruction of dopaminergic cells in Parkinson disease
    - Leads to Parkinson symptoms (tremors, muscle rigidity, bradykinesia)
  - ii. Meso-limbic-cortico pathway (psychosis)
    - Postsynaptic dopamine blockade produces antipsychotic symptoms
    - Neuroleptic medications have an antidopaminergic effect and reduce the positive symptoms of schizophrenia (hallucinations, delusions).
    - Dopamine levels are also lower in depression and slightly higher in mania.
    - Amphetamines cause the release of dopamine and NE and block their re-uptake, thus aggravating psychotic symptoms.
    - Tourette's syndrome is also a disorder of a hyperactive dopamine system, for which haloperidol is sometimes effective.
  - iii. Tuberoinfundibular system
    - Dopamine is a prolactin-inhibiting factor.
    - Prolactin levels can serve as rough indicators of overall dopamine activity.
  - iv. Nucleus accumbens (NAC) pathway
    - Positive reinforcement occurs here.
    - The "addiction pathway"

4. Serotonin (5-hydroxytryptamine, 5-HT)

- a. The transmitter of a discrete group of neurons that all have cell bodies located in the raphe nuclei of the brain stem
- b. Changes in the activity of serotonin neurons are related to the actions of psychedelic drugs.
- c. Involved in the therapeutic mechanism of action of antidepressant treatments (most are 5-HT re-uptake inhibitors; a few new ones are 5-HT agonists)
- d. Has inhibitory influence; linked to impulse control
- e. Low 5-HT = low impulse control
- f. Has role in regulation of mood, sleep, sexual activity, aggression, anxiety, motor activity, cognitive function, appetite, circadian rhythms, neuroendocrine function, and body temperature
- g. Involved in various neuropsychiatric disorders, e.g., depression, mania, impulsive aggression, schizophrenia, anxiety, obsessive-compulsive disorder, autism, Alzheimer disease, chronic pain, anorexia, bulimia, narcolepsy, myoclonus
- h. Characteristics in blood platelets are good model for the brain

5. Glutamic acid
  - a. One of the major amino acids in general metabolism and protein synthesis, also a neurotransmitter
  - b. Stimulates neurons to fire; principal excitatory neurotransmitter in the brain
  - c. The neurotransmitter of the major neuronal pathway that connects the cerebral cortex and the corpus striatum
  - d. Also the transmitter of the granule cells, which are the most numerous neurons in the cerebellum
  - e. Evidence that glutamic acid is the principal neurotransmitter of the visual pathway
  - f. May have a role in producing schizophrenic symptoms
  - g. Reason for PCP symptoms (antagonist of NMDA glutamate receptors)
  - h. Glutamate agonists produce seizures in animal studies
6. Enkephalins
  - a. Composed of two peptides, each containing five amino acids
  - b. Normally occurring substances that act on opiate receptors, mimicking the effects of opiates
  - c. Neurons are localized to areas of the brain that regulate functions influenced by opiate drugs.
7. Substance P
  - a. Peptide containing 11 amino acids
  - b. A major transmitter of sensory neurons that convey pain sensation from the periphery, especially the skin, into the spinal cord
  - c. Also found in numerous brain regions
  - d. Opiates relieve pain in part by blocking the release of substance P.
  - e. New class of antidepressant medications being tested to work on substance P
8. Gamma amino-butyric acid (GABA)
  - a. One of the amino-acid transmitters in the brain
  - b. Occurs almost exclusively in the brain
  - c. Reduces the firing of neurons; principle inhibitory neurotransmitter in the brain
  - d. The transmitter present at 25 to 40% of all synapses in the brain
  - e. Quantitatively, the predominant transmitter in the brain
  - f. Associated with anxiety, cannabis, benzodiazepines

## B. Antipsychotics (Neuroleptics)

1. Treatment concerns
  - a. Most common cause of relapse is nonadherence
  - b. Most common reason for failure of treatment is inadequate dosage
  - c. Worse behavioral symptoms on antipsychotics, check for undiagnosed organic condition
2. Common uses
  - a. Schizophrenia: thought disorders, hallucinations, alterations of affect, autism, ideas of reference

- b. Any general psychosis, regardless of diagnosis
    - i. Alcoholic hallucinosis
    - ii. Amphetamine psychosis
  - c. Organic psychiatric disorders (agitated dementia): can treat agitation in dementia or delirium
  - d. Tourette syndrome: haloperidol, pimozide, clonidine
  - e. Movement disorders: Tourette, Huntington, and hemiballism (flailing movements)
  - f. Nausea and vomiting
  - g. Intractable hiccups
  - h. Pruritus
3. Involuntary medication of chronically ill psychiatric patients who persistently refuse treatment does not result in earlier release, more cooperation, or more insight
4. Mechanisms of action
- a. Dopamine blockage at postsynaptic receptors
  - b. Alpha-adrenergic blockade; therefore, hypotensive effect
  - c. Anticholinergic action by blocking the muscarinic receptors
  - d. Blocks both NE re-uptake and serotonin and histamine receptors
5. Adverse effects
- a. Neurologic effects
    - i. Anticholinergic effects: very common, effects additive if given with other anticholinergic agents
      - Dry mouth
      - Blurry vision
      - Constipation
      - Urinary retention
      - Delirium
      - Memory aid: "blind as a bat, dry as a bone, red as a beet, mad as a hatter"
      - Especially frequent in the elderly
    - ii. CNS effects: from antagonism of H1 receptors
      - Weight gain
      - Sedation very common
      - Impaired memory
    - iii. Extrapyramidal (EP) reactions: due to decreased dopamine; appear in one-half of all patients in first few months
      - Treat with anti-Parkinson drugs, e.g., amantadine, benzotropine

**Note**

Extrapyramidal reactions:

- Choreiform: jerky movements
- Athetoid: slow, continuous movements
- Rhythmic: stereotypical movements

Table 14-1. Extrapyrimal Reactions to Antipsychotic Medications

Side Effects	Peak
Dystonic reactions (jerky movements, trouble speaking)	1 week (younger are more at risk)
Akinesia	2 weeks
Rigidity	3 weeks
Tremors	6 weeks
Akathisia	10 weeks
Pisa and Rabbit syndromes	18+ weeks

- iv. Tardive dyskinesia (TD): the primary reason for nonadherence to treatment
  - Rarely before 3 to 6 months, 1 month if older than 60
  - Occurs in 20 to 35% of patients
  - Signs: tongue protrusion, tremors and spasms of the neck, body, and limbs
  - Persists after medications are terminated (5 to 10% remit); incapacitating in 5% of cases
  - Cause: supersensitivity of postsynaptic dopamine receptors
  - Predisposing factors include older patients, long treatment, smoking, diabetes mellitus
  - Symptoms do not occur during sleep
  - Suppressed by voluntary movements for short time (versus cerebellar disease tremor, which worsens with intentional movement)
  - Stress and movements in other body parts aggravates
  - Anti-Parkinson drugs aggravate
  - No treatment, focus on prevention: pimozide or loxapine has less chance of inducing TD, clozapine not associated with TD at all
- b. Non-neurologic effects
  - i. Cardiovascular effects: orthostatic hypotension (do not use epinephrine, lowers blood pressure further)
  - ii. Particular taste (also dental cavities)
  - iii. Vomiting common with long-term use, especially among smokers
  - iv. Sexual effects: prolactin elevated
    - Men: decreased libido, inhibition of ejaculation, retrograde ejaculation
    - Women: breast enlargement and lactation, changes in libido
  - v. Altered bodily response to temperature

Table 14-2. Potency of Antipsychotic Medications

Potency	Extrapyramidal Symptoms	Anticholinergic Effects
High (haloperidol)	High	Low
Low (chlorpromazine)	Low	High

**Note**

**Drugs to Highlight**

1. Haloperidol is the most used (for acute symptoms)

2. Thioridazine
  - Retinitis pigmentosa
  - Retrograde ejaculation

Atypical antipsychotics (serotonin/dopamine antagonists)

3. Clozapine, a dibenzoxapine
  - Weak reaction on D2 receptors
  - High affinity for serotonin receptors
  - Only about 30% effective
  - Affects negative and positive symptoms
  - Side effects: agranulocytosis (more common in Jews) and seizures (14% of doses >600 mg)
  - Not associated with EP, TD, prolactin, or sexual effects

4. Risperidone
  - Clozapine-like, but no agranulocytosis
  - Affects positive and negative symptoms, thought disorders
  - Side effects: dizziness, fatigue, dry mouth, tachycardia, hypotension
  - Raises prolactin levels, EP effects

5. Olanzapine
  - Affects positive and negative symptoms, thought disorders
  - Unusually low rate of side effects
  - Little EP or prolactin effects

6. Potency of the antipsychotic is inversely related to its anticholinergic effect.
7. In general, low-potency antipsychotics have fewer EP side effects, a greater sedative effect, a greater hypotensive effect, and more anticholinergic side effects.

Table 14-3. Typical versus Atypical Antipsychotics

Typical	Atypical
Dopamine	Dopamine and serotonin
Treats mostly positive symptoms	Treats positive and negative symptoms
More side effects	Fewer side effects

**C. Antidepressants**

1. Common uses
  - a. Depression (any drug)
  - b. Enuresis (imipramine)
  - c. Panic disorder (imipramine)
  - d. Obsessive-compulsive disorder (fluoxetine, clomipramine)
  - e. Chronic pain, with and without depression (amitriptyline)
2. Cyclic antidepressants
  - a. For severe, hospitalized patients
  - b. Action: blocking of re-uptake of serotonin and norepinephrine, blocking of alpha-1 adrenergic receptors, and muscarinic receptors.
  - c. Pharmacokinetics
    - i. Fat soluble
    - ii. Metabolized by the liver and excreted by the kidneys
    - iii. Requires reaching plasma levels for imipramine, nortriptyline, desipramine, and amitriptyline for efficacy
  - d. Adverse effects
    - i. Anticholinergic effects (see Antipsychotics section)
    - ii. CNS effects
      - Drowsiness
      - Insomnia and agitation
      - Disorientation and confusion
      - Headache
      - Fine tremor
    - iii. Cardiovascular: from antagonism of alpha-1 adrenoreceptors and inhibition of 5-HT re-uptake
      - Most common in elderly

- Tachycardia
- Orthostatic hypotension: managed by sodium chloride tablets, caffeine, support hose, or biofeedback
- iv. Sexual
  - Men: impotence, testicular swelling
  - Women: anorgasmia and breast enlargement (treat with cyproheptadine)
- v. Metabolic: changes in blood sugar levels
- e. Cautions
  - i. Effective in only 70% of depressed patients
  - ii. Motor activity increased before depression affected: window of increased suicide risk
  - iii. Not for patients with respiratory difficulties; dries up bronchial secretions
  - iv. May lower seizure threshold
  - v. May impair driving
  - vi. Potentiates effects of alcohol
  - vii. Manic episode induced in 50% of bipolars
  - viii. Avoid during first trimester
  - ix. Baby gets 1% of mother's dose in breast milk
- f. Withdrawal
  - i. After prolonged use, should be gradual
  - ii. Akathisia, dyskinesia, anxiety, sweating, dizziness, vomiting, cholinergic rebound, depression rebound
- 3. Selective serotonin re-uptake inhibitors (SSRI)
  - a. Most widely used antidepressants
  - b. Also used for obsessive-compulsive disorders, Tourette syndrome
  - c. No effect on NE or dopamine, very selective blockage of re-uptake of serotonin
  - d. Fewest adverse effects of any antidepressants currently available, also the largest selling
  - e. Adverse effects:
    - i. Anorgasmia and delayed orgasm in 15 to 20% of patients
    - ii. Serotonin syndrome
      - Associated with: high doses, MAOI and SSRI combo, MAOI and synthetic narcotic combo
      - Symptoms: general restlessness, sweating, insomnia, nausea, diarrhea, cramps, delirium
      - Treatment: remove causative agent, reduce SSRIs, give cyproheptadine
  - f. Drugs from this class
    - i. Fluoxetine: most commonly prescribed
    - ii. Sertraline: metabolized faster by liver and remains in blood shorter time
    - iii. Paroxetine: most potent

**Note**

**Drugs to Highlight**

1. Trazodone
  - 5-HT receptor antagonist, alpha-1 blocker
  - Almost no anticholinergic adverse effects
  - Sedating, but effective at improving sleep quality, does not decrease Stage 4 sleep
  - May lead to priapism; therefore, sometimes used to treat erectile dysfunction
2. Mirtazapine
  - Stimulates NE and 5-HT release
  - Blocks 5-HT<sub>2</sub> and 5-HT<sub>3</sub> receptors
  - Side effects: somnolence (60%), increased appetite, weight gain
3. Bupropion
  - Weak inhibitor of dopamine, modest effect on NE, no effect on 5-HT re-uptake
  - No anticholinergic effect
  - Little cardiac depressant effect
  - Nonsedating
  - No sexual effects
  - Side effects: appetite suppressant, agitation, insomnia
4. Venlafaxine
  - Inhibits re-uptake of NE and 5-HT, mild dopamine effect
  - As effective as SSRIs
  - Side effects: sweating, nausea, constipation, anorexia, vomiting, somnolence, tremor, impotence
5. Nefazodone
  - 5-HT<sub>2</sub> postsynaptic receptor antagonist and antagonist of presynaptic 5-HT reuptake
  - Little effect on alpha-2 or beta receptors
  - Orthostatic hypotension rare
  - Side effects: dizziness, dry mouth, constipation, tremor

- iv. Fluvoxamine: causes sedation
- v. Citalopram: lowest cost per dose
4. Monoamine oxidase inhibitors (MAOIs)
  - a. Mechanism of action
    - i. Inhibits MAO, an enzyme that metabolizes serotonin, epinephrine, and NE
    - ii. For best effect, reduce MAO activity by 80%
  - b. Adverse effects
    - i. MAOI + TYRAMINE = HYPERTENSIVE CRISIS
      - Problem foods: cheese, dried fish, sauerkraut, sausage, chocolate, avocados
      - Safe foods: cottage cheese, some wines
      - Signs: occipital headache, stiff neck, nausea and vomiting, chest pain, dilated pupils, nosebleed, elevated blood pressure
      - Treatment: stop medication, give phentolamine (alpha-blockage) or chlorpromazine (antipsychotic with hypotensive effects)

**D. Electroconvulsive Therapy (ECT)**

1. Common uses
  - a. Depression (80%)
  - b. Schizoaffective disorder (10%)
  - c. Bipolar disorder
2. Mechanism of action
  - a. Electricity is passed from the frontal cortex to the striatum.
  - b. 90% show some immediate improvement
  - c. Usually requires 5 to 10 treatments
  - d. Treats episodes, not for prophylaxis
  - e. Only contraindication is increased cranial pressure (e.g., tumor)
3. Side effects
  - a. Anesthesia eliminates fractures and anticipatory anxiety.
  - b. Memory loss and headache common, returns to normal in several weeks
  - c. Serious complications <1:1,000
4. Other issues
  - a. Although not usually first-line treatment, should be considered for:
    - i. Highly suicidal patients
    - ii. Depressed pregnant patients
  - b. Improvement associated with large increase in slow wave (delta) activity in the prefrontal area; greater increase = greater recovery



**E. Mood Stabilizers****1. Lithium**

- a. For long-term control and prophylaxis of bipolar disorder, migraine cluster headaches, chronic aggression; combined with tricyclics for resistant depression
- b. Works for 70% of cases
- c. Hypothesized mechanism: blocks inositol-1-phosphate (second messenger)
- d. Pharmacokinetics:
  - i. Quickly absorbed from the gastrointestinal tract, not protein bound or metabolized
  - ii. Requires reaching plasma levels very close to toxic levels for effect, which is reached in 10 to 14 days
  - iii. Must monitor blood levels
    - Therapeutic levels: 0.8–1.5 mEq/L
    - 1.4 mEq/L may be toxic
    - Frank toxicity at 2.0; above 2.5 = hemodialysis
  - iv. Good kidney function and adequate salt and fluid intake essential; 95% excreted in urine
  - v. Peak serum level: 1–3 hours
  - vi. Potassium-sparing diuretics have no effects; loop diuretics result in increased serum levels.
- e. Side effects
  - i. Narrow margin of safety, must monitor blood levels
  - ii. Tremor, thirst, anorexia, gastrointestinal distress commonly occur at therapeutic levels
  - iii. Seizures and coma
  - iv. Polyuria and polydipsia
  - v. Edema
  - vi. Acne
  - vii. Benign leukocytosis
  - viii. Hypothyroidism
- f. Long-term lithium use has adverse effects on renal function.
- g. Compliance often difficult, patient may value manic experiences
- h. Teratogenic, produces cardiac malformations (Ebstein anomaly tricuspid valve)

**2. Valproic acid**

- a. For acute mania, rapid cycling bipolar disorder, impulse control
- b. Mechanism of action: augmentation of GABA in CNS
- c. Monitor blood levels
- d. Hepatotoxic (liver function impaired)
- e. Side effects
  - i. Sedation
  - ii. Mild tremor
  - iii. Gastrointestinal distress
  - iv. Occasional agranulocytosis
- f. At toxic levels: confusion, coma, cardiac arrest

3. Carbamazepine: Second-line treatment
  - a. For acute mania, rapid cycling bipolar disorder, impulse control
  - b. Mechanism of action:
    - i. Blocks sodium channels in neurons with action potential
    - ii. Alters central GABA receptors
  - c. Monitors blood levels and signs of rash
  - d. Side effects
    - i. Similar to valproic acid, plus nausea, rash, mild leukopenia
    - ii. Occasional agranulocytosis
  - e. Toxic levels: atrioventricular block, respiratory depression, coma

#### F. Anxiolytics (Antianxiety)

1. Benzodiazepines
  - a. Used for anxiety, acute and chronic alcohol withdrawal, convulsions, insomnia, "restless legs," akathisia, panic disorder
  - b. Mechanism of action: depresses CNS at limbic system, RAS, and cortex
  - c. Binds to GABA-chloride receptors; facilitates action of GABA
  - d. Pharmacokinetics
    - i. All undergo hepatic microsomal oxidation, except for lorazepam, oxazepam, and temazepam, which undergo glucuronide conjugation
    - ii. Well-absorbed orally
  - e. Adverse effects
    - i. CNS depression (sedative effect)
    - ii. Paradoxical agitation
    - iii. Confusion and disorientation, especially in elderly
    - iv. Overdose: apnea and respiratory depression (not for use with patients with sleep apnea)
    - v. Withdrawal: insomnia, agitation, anxiety rebound, gastrointestinal distress; abrupt withdrawal can bring on seizures
  - f. Diminishes effectiveness of ECT
  - g. Lowers tolerance to alcohol
  - h. Crosses placenta and accumulates in fetus, withdrawal symptoms in newborn
  - i. Passed on in breast milk with observable effects
  - j. Oral contraceptives decrease metabolism of benzodiazepines

#### Note

#### Drugs to Highlight

1. Buspirone
  - For anxiety
  - No anticonvulsant or muscle-relaxing properties
  - Affects serotonin, not GABA
  - 7 days for effect
  - Some sedation
  - Low abuse potential
  - No withdrawal effects
  - Not potentiated by alcohol
2. Venlafaxine
  - Antidepressant, recently approved for generalized anxiety disorder
  - Inhibits re-uptake of NE and 5-HT, mild dopamine effect
  - 1–4 weeks for effect

**Table 14-4. Selected Benzodiazepines and Common Uses**

Generic Name	Common Uses
<i>Faster acting</i>	
Diazepam	Anxiety, insomnia
Flurazepam	Insomnia
Triazolam	Insomnia
<i>Longer acting</i>	
Alprazolam	Panic, anxiety
Chlordiazepoxide	Alcohol detoxification
Clonazepam	Panic, anxiety
Temazepam	Insomnia
Lorazepam	Anxiety, alcohol-related seizures
Oxazepam	Alcohol detoxification

**Chapter Summary**

Major neurotransmitters: acetylcholine, norepinephrine, dopamine, serotonin, glutamic acid, enkephalins, substance P, and gamma amino-butyric acid.

Antipsychotic drugs: uses, side effects, and management of side effects for commonly used typical and atypical agents are reviewed. Pay special attention to "Drugs to Highlight."

Antidepressant drugs: uses, side effects, and management of side effects for commonly used cyclics, SSRIs, and MAOIs are reviewed. Pay special attention to "Drugs to Highlight."

Electroconvulsant Therapy (ECT): used mainly to treat depression, consider strongly for depressed suicidal patients.

Mood Stabilizers: uses and cautions for lithium, valproic acid, and carbamazepine are reviewed.

Anxiolytics (antianxiety): uses, mechanisms of action, and side effects of the benzodiazepines and newer agents are reviewed. Pay special attention to "Drugs to Highlight."

### Review Questions

108. Following his arrest for disturbing the peace, a 35-year-old man is referred for psychiatric evaluation. During the initial interview, he talked rapidly and paced around the room. He reported that he had slept little in the past few days, but that he felt "great". "It's not always like this," he confided. "Sometimes I just feel so bad I can hardly move." During the most common subsequent treatment for this disorder, which of the following side effects would the patient be most likely to experience?
- (A) insomnia
  - (B) memory loss
  - (C) tardive dyskinesia
  - (D) acne
  - (E) retarded ejaculation
109. A 36-year-old woman is brought to see her physician by her family. The family reports that over the past year she has had trouble controlling her movements. Symptoms include frequent and discrete brisk movements that cause jerks of the pelvis and limbs as well as facial frowns, grimaces, and smirks. The most likely diagnosis for this patient would be
- (A) Pick disease
  - (B) Wilson disease
  - (C) Parkinson disease
  - (D) Huntington disease
  - (E) Creutzfeldt-Jakob disease
110. Over a 5-week period, a previously healthy 55-year-old female has developed headaches, progressively severe word-finding difficulty, and confusion. She speaks incoherently and is unable to follow commands, repeat phrases, or name objects. What is the most likely site of the lesion?
- (A) frontal lobe
  - (B) temporal lobe
  - (C) occipital lobe
  - (D) parietal lobe
  - (E) cerebellum
111. Following an automobile accident, a 46-year-old male is brought to the hospital suffering from head trauma. Over the next week, his medical record notes the appearance of auditory hallucinations, delusions, thought disorders, and poor verbal comprehension. These symptoms are most consistent with a lesion in the
- (A) frontal lobe
  - (B) dominant parietal lobe
  - (C) nondominant parietal lobe
  - (D) dominant temporal lobe
  - (E) nondominant temporal lobe

112. A 32-year-old male presents at the local clinic complaining of abdominal cramps, sweating, runny nose, vomiting, and muscle aches. Examination shows that his pulse is rapid and pupils are dilated. He states that he "feels just awful" and that he has had these symptoms for about 24 hours. The most likely pharmacologic treatment would be
- (A) none
  - (B) diazepam
  - (C) carbamazepine
  - (D) clonidine
  - (E) trazodone
113. A 58-year-old chronic alcoholic is evaluated and found to have difficulty with recall of recent events although long-term memories seem intact. The patient appears confused and insists that he has met the physician before, although this is not the case. These symptoms are the result of a syndrome that can result from neuronal damage to the
- (A) cerebellum
  - (B) hippocampus
  - (C) hypothalamus
  - (D) reticular activating system
  - (E) thalamus
114. A 32-year-old schizophrenic patient has been taking a standard course of neuroleptic medication for the past year. This medication has been very effective at controlling his delusions and hallucinations. However, during a regular check-up the patient was found to be suffering from dry mouth and constipation. The patient reports that it is hard to read because his vision is blurry, and then lapses into delirium. These symptoms are most likely produced by blockage of what receptors?
- (A) dopamine
  - (B) histamine
  - (C) muscarinic
  - (D) norepinephrine
  - (E) serotonin
115. A 24-year-old woman was recently diagnosed with undifferentiated schizophrenia and placed on a standard drug regimen. About 2 weeks into her treatment, she experiences disturbing extrapyramidal side effects. The most likely side effect to appear at this time would be
- (A) akathisia
  - (B) akinesia
  - (C) physical tremors
  - (D) Pisa syndrome
  - (E) tardive dyskinesia

116. Patients placed on which of the following medications most likely should have blood drawn and checked on a weekly basis?
- (A) clozapine
  - (B) haloperidol
  - (C) olanzapine
  - (D) risperidone
  - (E) thioridazine
117. A 46-year-old man who was being treated for depression is brought to the emergency department complaining of headache at the base of the skull, chest pains, and stiff neck. Physical exam shows that his nose is bleeding, his pupils are dilated, and his blood pressure is extremely high. He reports vomiting repeatedly in the past few hours. Based on this initial presentation, the physician suspects that the patient has recently eaten which of the following foods?
- (A) avocados
  - (B) cottage cheese
  - (C) hamburger
  - (D) raw eggs
  - (E) french fries
  - (F) fried chicken
  - (G) dried figs

**Answers**

108. **Answer: D.** Lithium has been associated with side effects leading to lethargy (hypothyroidism), edema (lithium is a salt), acne, and seizures.
109. **Answer: D.** Age of onset and description indicate the onset of Huntington chorea.
110. **Answer: B.** Temporal lobe is associated with language, memory, and emotional expression.
111. **Answer: D.** Lesions of the dominant temporal lobe result in euphoria, auditory hallucinations, thought disorder, and poor verbal comprehension.
112. **Answer: D.** The man is suffering from opiate withdrawal. The drug on the list to treat the withdrawal is clonidine.
113. **Answer: E.** The man most likely is suffering from Korsakoff syndrome in which chronic thiamin deficiency leads to neuronal damage in the thalamus as well as the frontal lobes.
114. **Answer: C.** The patient displays the symptoms of anticholinergic intoxication. This is the result of blockage of the muscarinic receptors.
115. **Answer: B.** Difficulty completing simple movements or common skills occurs relatively early in the course of treatment. Tremors and akathisia appear after about 1 to 2 months. Tardive dyskinesia rarely occurs before the patient is on the medication for at least 3 months.
116. **Answer: A.** Because of the risk of agranulocytosis with clozapine, blood must be monitored weekly.
117. **Answer: A.** The patient is suffering from a hypertensive crisis that is likely the result of consuming tyramine-containing food while on MAOIs for his depression. Tyramine can be acquired from cheese, dried fish, sauerkraut, sausage, chocolate, or avocados.





# Ethical and Legal Issues

# 15

## Selected Important Court Cases

### Karen Ann Quinlan: Substituted Judgment Standard

In the Quinlan case, Karen Ann was in a persistent vegetative state, being kept alive only by life support. Karen's father asked to have her life support terminated according to his understanding of what Karen Ann would want. The court found that "if Karen herself were miraculously lucid for an interval . . . and perceptive of her irreversible condition, she could effectively decide upon discontinuance of the life support apparatus, even if it meant the prospect of natural death."

The court therefore allowed termination of life support, not because the father asked, but because it held that the father's request was most likely the expression of Karen Ann's own wishes.

**Substituted judgment** begins with the premise that decisions belong to the competent patient by virtue of the rights of autonomy and privacy. In this case, however, the patient is unable to decide, and a decision-maker who is the best representative of the patient's wishes must be substituted. In legal terms, the patient has the right to decide but is incompetent to do so. Therefore, the decision is made for the patient on the basis of the best estimate of his or her subjective wishes.

Note the key here is *not* who is the closest next of kin, but who is most likely to represent the patient's own wishes.

### Brother Fox (*Eichner vs Dillon*): Best Interest Standard

The New York Court of Appeals, in its decision of *Eichner vs Dillon*, held that trying to determine what a never-competent patient would have decided is practically impossible. Obviously, it is difficult to ascertain the actual (subjective) wishes of incompetents.

Therefore, if the patient has always been incompetent, or no one knows the patient well enough to render substituted judgment, the use of substituted judgment standard is questionable, at best.

Under these circumstances, decisions are made for the patient using the **best interest standard**. The object of the standard is to decide what a hypothetical "reasonable person" would decide to do after weighing the benefits and burdens of each course of action.

Note here the issue of who makes the decision is less important. All persons applying the best interest standard should come to the same conclusions.

**Selected Important Court Cases (continued)**

**Infant Doe: Foregoing Lifesaving Surgery, Parents Withholding Treatment**

As a general rule, parents cannot withhold life- or limb-saving treatment from their children. Yet, in this exceptional case they did.

Baby Boy Doe was born with Down syndrome (trisomy 21) and with a tracheoesophageal fistula. The infant's parents were informed that surgery to correct his fistula would have "an even chance of success." Left untreated, the fistula would soon lead to the infant's death from starvation or pneumonia. The parents, who also had two healthy children, chose to withhold food and treatment and "let nature take its course."

Court action to remove the infant from his parents' custody (and permit the surgery) was sought by the county prosecutor. The court denied such action, and the Indiana Supreme Court declined to review the lower court's ruling. Infant Doe died at 6 days of age, as Indiana authorities were seeking intervention from the U.S. Supreme Court.

Note that this case is simply an application of the best interest standard. The court agreed with the parents that the burdens of treatment far outweighed any expected benefits.

**Roe vs Wade (1973): The Patient Decides**

Known to most people as the "abortion legalizing decision," the importance of this case is not limited to its impact on abortion.

Faced with a conflict between the rights of the mother versus the rights of the putative unborn child, the court held that in the first trimester, the mother's rights are certainly paramount, and that states may, if they wish, have the mother's rights remain paramount for the full term of the pregnancy.

Because the mother gets to decide, even in the face of threats to the fetus, by extension, all patients get to decide about their own bodies and the health care they receive. In the United States, the locus for decision-making about health care resides with the patient, not the physician.

Note that courts have held that a pregnant woman has the right to refuse care (e.g., blood transfusions) even if it places her unborn child at risk.

**Tarasoff Decision: Duty to Warn and Duty to Protect**

A student visiting a counselor at a counseling center in California states that he is going to kill someone. When he leaves, the counselor is concerned enough to call the police but takes no further action. The student subsequently kills the person he threatened. The court found the counselor and the center liable because they did not go far enough to warn and protect the potential victim.

The counselor should have called the police and then should also have tried in every way possible to notify the potential victim of the potential danger.

In similar situations, first try to detain the person making the threat, next call the police, and finally notify and warn the potential victim. All three actions should be taken, or at least attempted.

### A. Legal Issues Related to Medical Practice

This section lays out a set of rules that constitute the general consensus of legal opinion. Apply these rules to individual situations as they arise.

**Rule #1: Competent patients have the right to refuse medical treatment.**

1. Incompetent patients have the same rights, but must be exercised differently (via a surrogate).
2. Limitations on patients' rights often suggested are:
  - a. Preserve life
  - b. Prevent "the moral equivalent" of suicide
  - c. Protect third parties
  - d. Protect the ethical standard of the health professional
3. In practice, court gives little weight to any of these four arguments. Patients have an almost absolute right to refuse. Patients have almost absolute control over their own bodies. The sicker the patient, the lesser the chance of recovery, the greater the right to refuse treatment.

**Rule #2: Assume that the patient is competent unless clear behavioral evidence indicates otherwise.**

1. Competence is a legal, not a medical issue.
2. Only courts can decide competence.
3. A diagnosis, by itself, tells you little about a patient's competence.
4. Clear behavioral evidence would be:
  - a. Patient attempts suicide
  - b. Patient is grossly psychotic and dysfunctional
  - c. Patient's physical or mental state prevents simple communication
5. If you are unsure, assume the patient is competent. The patient does not have to prove to you that he is competent. You have to have clear evidence to assume that he is not.

**Rule #3: Avoid going to court.** Decision-making should occur in the clinical setting if possible.

1. Consider going to court only if (often resolved without court action):
  - a. There is intractable disagreement about a patient's competence, who should be the surrogate, or make the decision on life support
  - b. You perceive a serious conflict of interest between surrogate and patient's interests
2. Court approval of decision to terminate life support is, therefore, rarely required.

**Rule #4: When surrogates make decisions for a patient, they should use the following criteria and in this order:**

1. Subjective standard
  - a. Actual intent, advance directive
  - b. What did the patient say in the past?
2. Substituted judgment
  - a. Who best represents the patient?
  - b. What would patient say if he or she could?

### Note

**The USMLE Requires You to Know:**

- The best response to presented ethical and legal dilemmas
- These questions must be answered by applying the standards of ideal ethical professional conduct.
- This section is not intended to provide legal advice, but merely to guide you in answering questions on the exam.

3. Best interests standard
  - a. Burdens versus benefits
  - b. Interests of patient, not preferences of the decision-maker

Rule #5: If patient is incompetent, physician may rely on advance directives.

1. Advance directives can be oral.
2. Living will: written document expressing wishes
  - a. Care facilities must provide information at time of admission
  - b. Responsibility of the institution, not the physician
3. Health power of attorney: designating the surrogate decision-maker
  - a. "Speaks with the patient's voice"
  - b. Beats all other decision rules

Rule #6: Feeding tube is a medical treatment and can be withdrawn at the patient's request.

1. Very controversial. See Cruzan case, 1990.
2. A competent person can refuse even lifesaving hydration and nutrition.

Rule #7: Do nothing to actively assist the patient to die sooner.

1. Active euthanasia and assisted suicide are on difficult ground.
  - a. Passive, i.e., allowing to die = OK
  - b. Active, i.e., killing = NOT OK
2. On the other hand, do all you can to reduce the patient's suffering (e.g., giving pain medication).

Rule #8: The physician decides when the patient is dead.

1. If there are no more treatment options (the patient is cortically dead), and the family insists on treatment? If there are no options, there is nothing the physician can do; treatment must stop.
2. If the physician thinks continued treatment is futile (the patient has shown no improvement), but the surrogate insists on continued treatment? Of course, the treatment should continue. See Wangle case, 1989.

Rule #9: Never abandon a patient.

1. Lack of financial resources or lack of results are never reasons to stop treatment of a patient.
2. An annoying or difficult patient is still your patient.

Rule #10: Always obtain informed consent.

1. Full, informed consent requires that the patient has received and understood five pieces of information:
  - a. Nature of procedure
  - b. Purpose or rationale
  - c. Benefits
  - d. Risks
  - e. Availability of alternatives

2. Four exceptions to informed consent:
  - a. Emergency
  - b. Waiver by patient
  - c. Patient is incompetent
  - d. Therapeutic privilege (unconscious, confused, physician deprives patient of autonomy in interest of health)
3. Gag clauses that prohibit a physician from discussing treatment options that are not approved violate informed consent and are illegal.
4. Consent can be oral.
5. A signed paper the patient has not read or does not understand does NOT constitute informed consent.
6. Written consent can be revoked orally at any time.

Rule #11: Special rules apply with children.

1. Children younger than 18 years are minors and are legally incompetent.
2. Exceptions: emancipated minors
  - a. If older than 13 years and taking care of self, i.e., living alone, treat as an adult.
  - b. Marriage makes a child emancipated as does serving in the military.
  - c. Pregnancy or having a child, in most cases, does not.
3. Partial emancipation
  - a. Many states have special ages of consent: generally age 16 and older
  - b. For certain issues only:
    - i. Substance drug treatment
    - ii. Prenatal care
    - iii. Sexually transmitted disease treatment
    - iv. Birth control

Rule #12: Parents cannot withhold life- or limb-saving treatment from their children.

1. If parents refuse permission to treat child:
  - a. If immediate emergency, go ahead and treat.
  - b. If not immediate, but still critical (e.g., juvenile diabetes), generally the child is declared a ward of the court and the court grants permission.
  - c. If not life- or limb-threatening (e.g., child needs minor stitches), listen to the parents
2. Note that the child cannot give permission. A child's refusal of treatment is irrelevant.

Rule #13: For the purposes of the USMLE, issues governed by laws that vary widely across states cannot be tested. This includes elective abortions (minor and spousal rights differ by locality) and legal age for drinking alcohol (vary by state).

Rule #14: Good Samaritan Laws limit liability in nonmedical settings.

1. Not required to stop to help
2. If help offered, shielded from liability provided:
  - a. Actions are within physician's competence
  - b. Only accepted procedures are performed.

- c. Physician remains at scene after starting therapy until relieved by competent personnel
- d. No compensation changes hands

**Rule #15: Confidentiality is absolute.**

1. Physicians cannot tell anyone anything about their patient without the patient's permission.
2. Getting a consultation is permitted, as the consultant is bound by confidentiality, too. However, watch the location of the consultation. Be careful not to be overheard (e.g., not elevator or cafeteria).
3. If you receive a court subpoena, show up in court but do not divulge information about your patient.
4. If patient is a threat to self or other, the physician **MUST** break confidentiality
  - a. Duty to warn and duty to protect (Tarasoff case)
  - b. A specific threat to a specific person
  - c. Suicide, homicide, and abuse are obvious threats.
  - d. Infectious disease should generally be treated as a threat, but be careful. Here issue is usually getting the patient to work with you to tell the person who is at risk
  - e. In the case of an STD, the issue is not really whether to inform a sexual partner, but how they should be told. Best advice: Have patient and partner come to your office.

**Rule #16: Patients should be given the chance to state DNR (Do Not Resuscitate) orders, and physicians should follow them.**

1. DNR refers only to cardiopulmonary resuscitation.
2. Continue with on-going treatments.
3. Most physicians are unaware of DNR orders.
4. DNR decisions are made by the patient or surrogate.

**Rule #17: Committed mentally ill patients retain their rights.**

1. Committed mentally ill adults legally are entitled to the following:
  - a. They must have treatment available.
  - b. They can refuse treatment.
  - c. They can command a jury trial to determine "sanity".
2. They lose only the civil liberty to come and go.
3. They retain their competence for conducting business transactions, marriage, divorce, voting, driving
4. The words "sanity" and "competence" are legal, not psychiatric, terms. They refer to prediction of dangerousness, and medicopsychological studies show that health care professionals cannot reliably and validly predict such dangerousness.

**Rule #18: Detain patients to protect them or others.**

1. Emergency detention can be effected by a physician and/or a law enforcement person for 48 hours, pending a hearing.
2. A physician can detain, only a judge can commit.

3. With children, special rules exist. Children can be committed only if:
  - a. They are in imminent danger to self and/or others.
  - b. They are unable to care for their own daily needs.
  - c. The parents have absolutely no control over the child, and the child is in danger (e.g., fire setter), but not because the parents are unwilling to discipline a child.

Rule #19: Remove from patient contact health care professionals who pose risk to patients.

1. Types of risks
  - a. Infectious disease (TB)
  - b. Substance abuse
  - c. Depression (or other psychological issues)
  - d. Incompetence
2. Actions
  - a. Insist that they take time off
  - b. Contact their supervisors if necessary
3. The patient, not professional solidarity, comes first.

Rule #20: Focus on what is the best ethical conduct, not simply the letter of the law.  
The best answers are those that are both legal and ethical.

**Practice Questions**

- Should physicians answer questions from insurance companies or employers? (Not without a release from the patient)
- Should physicians answer questions from the patient's family without the patient's explicit permission? (No)
- What information can the physician withhold from the patient? (Nothing. If patient may react negatively, figure out how to tell patient to mitigate negative outcome)
- What if the family requests that certain information be kept from the patient? (Tell the patient, but first find out why they don't want the patient told)
- Who owns the medical record? (Health care provider, but patient must be given access or copy upon request)

**What should the physician do in each of these situations?**

- Patient refuses lifesaving treatment on religious grounds? (Don't treat)
- Wife refuses to consent to emergency lifesaving treatment for unconscious husband citing religious grounds? (Treat, no time to assess substituted judgment)
- Wife produces card stating unconscious husband's wish to not be treated on religious grounds? (Don't treat)
- Mother refuses to consent to emergency lifesaving treatment for her daughter on religious grounds? (Treat)
- What if the child's life is at risk, but the risk is not immediate? (Court takes guardianship)
- From whom do you get permission to treat a girl who is 17 years old? (Her guardian)

**From whom does the physician obtain consent in each case?**

- A 17-year-old girl's parents are out of the country and the girl is staying with a baby-sitter? (If a threat to health, the physician can treat under doctrine of *in locum parentis*)
- A 17-year-old girl who has been living on her own and taking care of herself? (The girl herself)
- A 17-year-old girl who is married? (The girl herself)
- A 17-year-old girl who is pregnant? (Her guardian)
- A 16-year-old daughter refuses medication but her mother consents, do you write the prescription? (Yes)
- The 16-year-old daughter consents, but the mother refuses? (No)
- The mother of a minor consents, but the father refuses? (Yes, only one permission needed)
- When should the physician provide informed consent? (Always)
- Must informed consent be written? (No)
- Can written consent be revoked orally? (Yes)
- Can you get informed consent from a schizophrenic man? (Yes, unless there is clear behavioral evidence that he is incompetent)
- Must you get informed consent from a prisoner if the police bring in the prisoner for examination? (Yes)



### Chapter Summary

Important court cases relevant to medical practice in the US: Karen Ann Quinlin, Eichner v. Dillon, Infant Doe, Roe v. Wade, and the Tarasoff decision.

Rules drawn from consensus of legal opinion for proper physician behavior on USMLE questions:

1. Competent patients have the right to refuse treatment.
2. Assume the patient is competent unless clear indication otherwise.
3. Avoid going to court.
4. Surrogates must make decisions using clear rules:
  - a. Subjective standard
  - b. Substituted judgment
  - c. Best interest standard
5. If the patient is incompetent, physicians may rely on advance directives
6. Feeding tube is a treatment and can be withdrawn if patient requests it.
7. Do nothing to actively assist the patient to die sooner.
8. The physician decides when the patient is dead.
9. Never abandon a patient.
10. Always obtain informed consent.
11. Special rules apply to children.
12. Parents cannot withhold life- or limb-saving treatments from their children.
13. Laws that vary widely across states cannot be tested.
14. Good Samaritan Laws limit liability in nonmedical settings.
15. Confidentiality is absolute, unless threat to self or others.
16. Patients should be given the chance to state DNR and physicians should follow it.
17. Committed mentally ill patients retain their rights.
18. Detain patients to protect them or others.
19. Remove from patient contact health care professional who poses a risk to patients.
20. Focus on what is the best ethical conduct, not simply the letter of the law.

### Review Questions

118. A 7-year-old girl is brought to the hospital by a woman who has been entrusted with her care while the girl's parents are in Mexico for vacation. The girl has sustained a non-life-threatening but serious injury during play that has almost completely severed one of her fingers from her left hand. The consensus of the physicians is that with prompt action the finger can be reattached with minimal permanent loss of movement for the child. Without prompt action, the use of the finger is likely to be lost. However, the attending physician is concerned about proceeding without the permission of the parents. The best course of action would be to
- (A) try to contact the parents to get their permission to perform the procedure
  - (B) seek a legal injunction allowing the operation
  - (C) operate at once, citing the doctrine of therapeutic privilege
  - (D) seek the consent for the operation from the woman in whose care the girl was left
  - (E) seek further confirmation from additional specialists in this type of surgery
119. During the second year of residency training, you discover that the chief resident on your rotation is using amphetamines on a regular basis in order to stay alert when on call. When you mention your concern to the resident, he tells you, "Mind your own business. I'm not one of your patients." At this point, your best action would be to
- (A) monitor the chief resident over the next few weeks to be sure that there is no danger to patient care
  - (B) talk with other residents and see if they share your concern
  - (C) contact the hospital ethics committee for advice and guidance
  - (D) contact the American Medical Association
  - (E) seek legal counsel
  - (F) schedule a meeting to speak with the residency program director
  - (G) lodge a complaint with the state licensing board
  - (H) ask the nursing staff if they have noticed anything unusual about the chief resident
120. While riding the hospital elevator to visit one of his patients, an internal medicine physician overhears two residents discussing a surgical case. The case involves a 45-year-old male who received a lymph node biopsy. The biopsy was negative. However, during the procedure, the resident performing the surgery nicked the large intestine. The mistake was noticed and quickly corrected. The resident was overheard to say, "It's all taken care of. We didn't think we needed to worry the patient by mentioning this little glitch." After overhearing this conversation, what action should the physician take?
- (A) ask the nurse for the patient's chart to confirm that the mistake was benign
  - (B) file a formal complaint with the hospital ethics committee
  - (C) file a formal complaint with the state licensing board
  - (D) look up the patient and check on how he is doing
  - (E) reprimand the residents on the spot and demand to speak with their supervisor
  - (F) no harm was done, the physician need do nothing
  - (G) speak with the chairman of internal medicine
  - (H) speak with the chairman of surgery
  - (I) tell the residents that they need to inform the patient and suggest the best method to have the discussion

121. A 42-year-old woman has an annual physical exam, including a mammogram. She announces with great excitement that she will be getting married in three months and invites her physician to attend the wedding. A week later, the results of the mammogram reveal a previously undetected mass. At this point, what action should the physician take?
- (A) call the patient immediately and inform her of the findings of the mammogram
  - (B) have a nurse with experience in this area call the patient and discuss the findings
  - (C) make an appointment to discuss the mammogram finding with the patient within a week of receiving the results
  - (D) postpone informing the patient of the findings until after the wedding so as not to upset her
  - (E) schedule the patient for a confirmatory mammogram after the wedding
  - (F) schedule an appointment to discuss the findings with the patient and her fiancé before the wedding
122. A 68-year-old male is seen by his physician for a monthly appointment to monitor his diabetes. The physician provides encouragement with his diet and adjusts his medication dosage. Several days later, the patient's wife telephones the physician and asks about her husband's condition and what she should do to keep him on his diet. What action should the physician take?
- (A) have the nursing staff call her back and explain the dietary regime
  - (B) give her an internet address where information about diabetes can be found
  - (C) obtain permission from her husband before discussing his diabetes with her
  - (D) schedule an appointment to discuss the issues she raises face-to-face
  - (E) ask her if her husband requested that she call
  - (F) offer her a referral to another physician so she can be checked for diabetes
123. A 75-year-old male is diagnosed with severe blockage in several cardiac arteries. The standard procedure for such cases is by-pass surgery that has a high rate of success. Pharmacological options are also available, but at best will merely maintain the patient and will not remove the life-threatening blockage. Life expectancy for the pharmacological intervention is substantially shorter than the surgical one. When presented with these available treatment options and the associated life expectancies, the patient declines the surgery and wants to be treated by pharmacological means. The physician strongly disagrees with the patient's decision. Faced with this decision, the physician's next course of action should be to
- (A) meet with the patient's family and try to convince them to change the patient's mind
  - (B) review the treatment options again with the patient and tell him to take a week to think it over
  - (C) schedule the patient for a consultation with a colleague and ask the colleague to advise the patient to choose the surgery
  - (D) schedule the patient for psychological evaluation
  - (E) start the pharmacological treatment
  - (F) tell the patient that you cannot agree with his choice, and cannot continue to be his physician if he insists on it
  - (G) tell the patient that you are required to select the treatment option with the best outcome and schedule him for surgery

124. A 54-year-old man, who makes his living as a bus driver, was sent by his company for a physical exam. The physical exam turns up nothing abnormal, although the man reports ongoing fatigue. When questioned in detail, the man professes no difficulty going to sleep. In fact, he often finds himself nodding off during the day. He also reports hallucinations as he is falling asleep and sometimes is unable to move when he wakes up in the morning. The physician suspects that the man suffers from a sleep disorder. When informed of this diagnosis, the patient requests that this information be kept confidential from his employer. At this point, the physician's best course of action is to
- (A) arrange for pharmacological treatment for the patient and maintain his confidentiality
  - (B) do not inform the employer, but negotiate with the patient to take time off from work on medical leave pending outcome of treatment
  - (C) inform his employer of his diagnosis and begin treatment
  - (D) refer him to a local sleep center for full evaluation and inform the employer based on the results of this workup
  - (E) try to obtain the patient's permission to inform the employer and schedule him for treatment
  - (F) schedule him for a psychiatric consult to rule out malingering
125. A 66-year-old man recently diagnosed as having prostate cancer is scheduled for an appointment to discuss his treatment options. The attending physician designates a second-year resident to meet with the patient and to obtain informed consent before proceeding with treatment. The resident meets with the patient and returns with signed informed consent forms, indicating that the patient has elected the radiation option to treat his cancer. Reviewing the conversation with the resident, the attending physician discovers that the resident did not mention a relatively new surgical procedure as a possible treatment option. At this point, what action should the attending physician take?
- (A) convene a seminar of all residents in this rotation and review the informed consent rules
  - (B) exclude the resident from obtaining informed consent from patients until he has reviewed the informed consent rules
  - (C) have all of the residents on the rotation accompany you while you visit the patient and demonstrate the right way to obtain informed consent
  - (D) informed consent has been obtained, but instruct the resident that in the future he should mention the surgical procedure as an option to the patient
  - (E) informed consent has been obtained; schedule the patient for the radiation treatment to which he has consented
  - (F) instruct the resident to go back and talk to the patient again, this time mentioning the new surgical procedure
  - (G) visit the patient personally and obtain informed consent again, this time mentioning the new surgical procedure

**Answers**

118. **Answer: C.** The physician may exercise therapeutic privilege and assume *in locum parentis* responsibility.
119. **Answer: F.** The program director is the one with the authority and responsibility to address the substance use issues.
120. **Answer: I.** The dual goals of training the residents and making sure the patient gets the information need to be met here. The issue is not to reprimand, but to teach the residents.
121. **Answer: C.** You need to deliver the bad news, in a timely manner, and in person.
122. **Answer: C.** Confidentiality is absolute. You are not to discuss the case with her without the husband's explicit permission.
123. **Answer: E.** The patient makes medical decisions, not the physician. The options and consequences have been explained and the patient has made his choice. Begin treatment. Note that the surgical option is still available should the patient change his mind.
124. **Answer: C.** The patient likely suffers from narcolepsy, which can be debilitating and certainly makes him dangerous behind the wheel of a bus. There is a clear risk, so confidentiality must be breached to prevent harm. This is not a negotiation with the patient. The physician is obligated to act.
125. **Answer: F.** Patients must be told about all available options for informed consent to be valid. The resident should complete the job he started and go back to talk to the patient again. Getting the attending physician involved complicates the relationship with the patient and undermines the resident's confidence for handling this and similar situations.



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