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Document

Consumer Sharing Economy.pdf

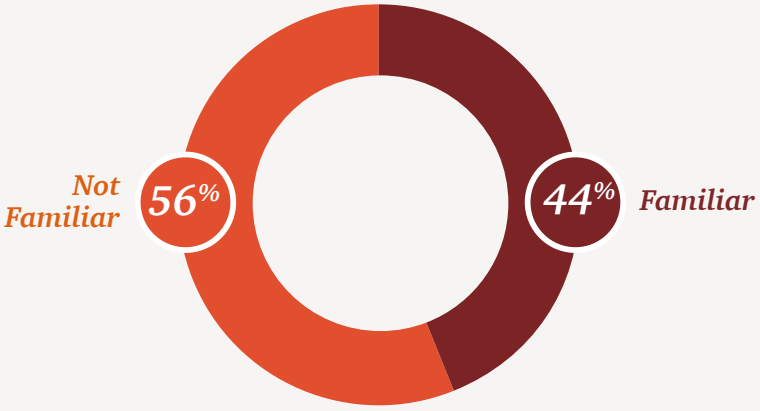
The Survey:

We sampled US consumers who have some familiarity with the sharing economy. This sample cut across age, income, region and gender.

- 25 minute online survey to consumer panelists
- Total sample: n=1000
- Incentive: Panel points
- Fielding dates: Dec. 17, 2014 – Dec. 22, 2014

The bulk of our questions were asked of the 44% of respondents who are familiar with the sharing economy.

Total US Adult Population:



In our survey, we defined the sharing economy as follows:

Sharing economies allow individuals and groups to make money from underused assets. In this way, physical assets are shared as services. For example, a car owner may allow someone to rent out her vehicle while she is not using it, or a condo owner may rent out his condo while he's on vacation.

Some examples of the sharing economy include:

- *Hospitality and Dining: CouchSurfing, Airbnb, Feastly, LeftoverSwap*
- *Automotive and Transportation: RelayRides, Hitch, Uber, Lyft, Getaround, Sidecar*
- *Retail and Consumer Goods: Neighborgoods, SnapGoods, Poshmark, Tradesy*
- *Media and Entertainment: Amazon Family Library, Wix, Spotify, SoundCloud, Earbits*

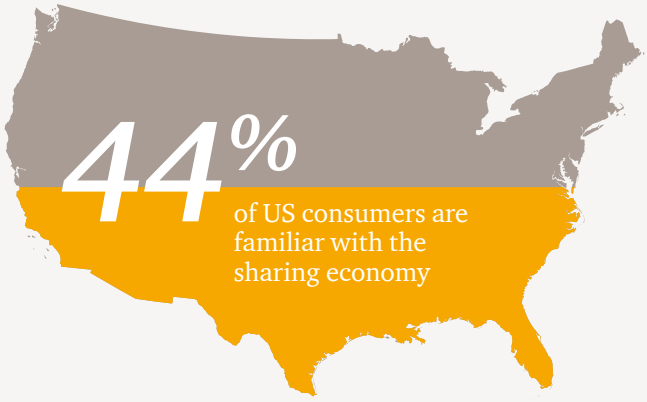
Collaboration with PwC's Digital Services group:

To brainstorm the sharing economy future and the implications it could have on both enterprise and society, we sat down with PwC's Digital Services group.

In this session, we focused our discussions around the following key questions:

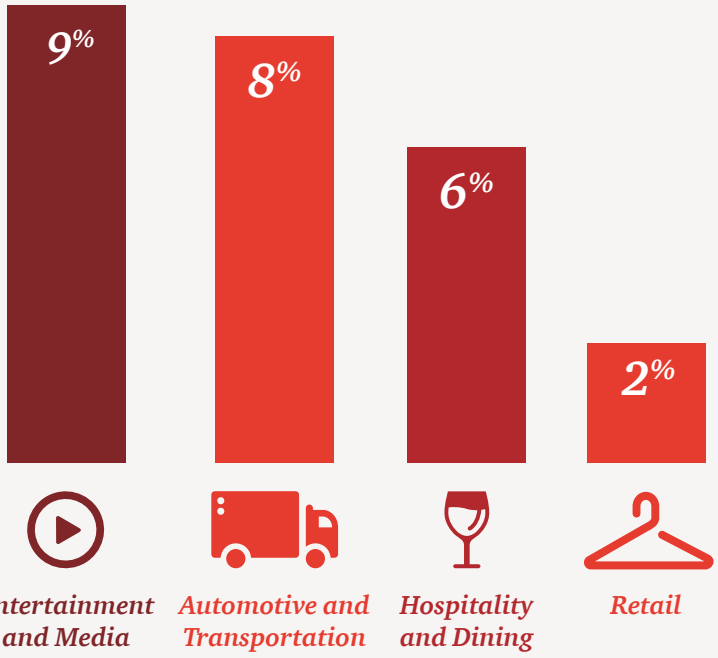
- What are the keys to unlocking a better user experience through the sharing economy?
- What are the risks? For mature industries? For incumbent disruptors? For challengers?
- What ingredients are key to success in this business model?
- What are the uncertainties this industry faces—and what are the opportunities?
- How might sharing economy concepts be applied to existing business models across industries?

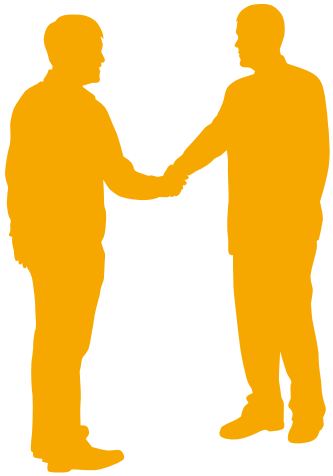
Trust, convenience and a sense of community are all factors in pushing adoption of the sharing economy forward. Thanks to consumer willingness to try mobile apps, there are lower barriers to entry when it comes to building brands and scaling up quickly—the innovation clock is now set to fast-pace, and will get even faster as consumers become more trusting of relationships tied to social sentiment and communities of users.



19% of the total US adult population has engaged in a sharing economy transaction

Percentage of US adults who have engaged in a sharing economy transaction





Of those consumers who have tried the sharing economy

57% agree "I am intrigued by companies in the sharing economy but have some concerns about them"

72% agree "I could see myself being a consumer in the sharing economy in the next two years"

Who is most excited about the sharing economy once they have tried it?

18 to 24 year olds

Households with income between $50k and $75k

Those with kids in the house under age 18

What we did and who we talked to

Around the world, a new wave of peer-to-peer, access-driven businesses is shaking up established categories. Whether borrowing goods, renting homes, or serving up micro-skills in exchange for access or money, consumers are showing a robust appetite for the sharing-based economy.

Consumers are showing a robust appetite for the sharing-based economy

We set out to explore how the sharing ethos will make its mark on the wider market—and to understand what incumbents and challengers must do to position themselves ahead of disruption and capitalize on new sources of revenue. By unlocking the sharing economy today, can companies transform today's threat into tomorrow's opportunity?

Can companies transform today's threat into tomorrow's opportunity?

To do this, we worked with BAV Consulting, a global leader in research and insights that is home to the largest and leading quantitative empirical study of brands and consumers, capturing decades of consumer perceptions.

Over the past four months, we've embarked on extensive research to comprehend consumer attitudes toward the sharing economy—surveying the general population, talking candidly with influencers, interviewing business executives and keeping a close ear tuned to the sharing economy chatter on social media. Collectively, this data gave us a holistic view of what's unfolding across both business and consumer landscapes.

Document

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A systemic antibiotic selected specifically for the infecting organism will temporarily result in sterile urine. Reinfection, often by a resistant organism, occurs in 30% to 50% of these cases if closed drainage catheterization is continued during therapy.[1,21] For this reason, it generally is recommended that systemic antimicrobial therapy be initiated after or just before catheter removal.[1,21] Because long-term catheterization is necessary in many patients and because bacteriuria is an inevitable consequence, it is often recommended that asymptomatic patients (such as J.W.) be left untreated to avoid the complications of recolonization and potential infection with resistant organisms.[1,8,21] Therapy must be started, however, if fever, flank pain, or other symptoms indicative of UTI develop.[1,21]

CASE 68-10, QUESTION 2: Is systemic antimicrobial prophylaxis useful for J.W.?

The benefits of systemic antibiotics in preventing catheter-induced UTI are not clear. Studies using closed drainage systems with diligent catheter care indicate that systemic antibiotics decrease the daily and overall incidence of infection in patients with sterile urines before catheterization.[36,37] The preventive effect of antimicrobials is greatest for short-term catheterizations or during the first 4 to 7 days of long-term catheterization.[36,37] Thereafter, the rate of infection increases. Although the overall infection rate remains lower than in untreated patients, the emergence of resistant organisms is significant. Therefore, in deciding to use systemic antimicrobials, it is important to consider the patient's underlying diseases, risk factors, probable duration of catheterization, and potential complications of drug toxicity or resistant organisms that can result from the chronic use of antimicrobials. Because long-term catheterization is anticipated for J.W., antimicrobial prophylaxis for J.W. is not recommended.[21]

CASE 68-10, QUESTION 3: J.W. eventually recovers urinary continence and the catheter is able to be removed. However, two days after removal of the catheter, she still has asymptomatic bacteriuria. How should she be treated?

Because asymptomatic bacteriuria in patients with urinary catheters is very common (~25% with short-term catheterization and virtually 100% long-term) but is associated with few complications, antibiotic therapy for asymptomatic bacteriuria is not recommended as long as the catheter remains in place.[21] However, antibiotic treatment may be considered in asymptomatic women with catheter-acquired bacteriuria that persists 48 hours after catheter removal.[8,21] Such patients may be treated with either a single large dose or a 3-day regimen of TMP-SMX, even if the patient is asymptomatic.[8,21,107] Older women (>65 years) probably should be treated with a 10-day course; however, the optimal duration in this age group is unknown. Whether these treatment regimens can be used in male patients requires further study.[21]

ASYMPTOMATIC BACTERIURIA

Antibiotic Treatment

CASE 68-11

QUESTION 1: A.K., an asymptomatic 6-year-old girl, is found to have significant bacteriuria on routine screening. Should she be treated with an antimicrobial agent?

The treatment of patients with asymptomatic bacteriuria depends on the clinical setting in which it is found. Asymptomatic bacteriuria occurs in a heterogeneous group of patients with different prognoses and risks. Therefore, recommendations for treatment of asymptomatic patients with significant bacteriuria (two consecutive voided urine specimens showing $\geq 10^5$ bacteria/mL of urine in women, or a single clean-catch voided specimen in men) are based on specific age, sex, and clinical characteristics.[1,8,10,108] These recommendations are based on the risk for development of acute UTI and subsequent long-term complications. Generally, patients who benefit most from antibiotic treatment are those with urinary tract structural abnormalities, immunosuppressive therapy, and procedures requiring urinary tract instrumentation or manipulation.[1,2,8] Short-course regimens (i.e., single-dose or 3-day) are usually recommended when treatment is desired,[2] although longer regimens have also been recommended.[8]

Urinary tract infections in infants and preschool children (predominantly girls) occasionally are associated with renal tissue damage.[109] Asymptomatic bacteriuria of childhood also is important because it may be a manifestation of an anatomic or mechanical defect in the urinary tract. Therefore, it should be evaluated fully. Because most cases of renal scarring as a result of bacteriuria occur within the first 5 years of life, it is controversial whether treatment should be limited to infants and preschool children or whether all children should be treated regardless of age. Screening for bacteriuria in children and treating those with positive cultures, regardless of their clinical presentation, seems reasonable and is frequently recommended.[109] Treatment of A.K., although still controversial, seems prudent because renal damage resulting from asymptomatic bacteriuria generally occurs during childhood. Should the decision be made to treat, principles of therapy are similar to those for symptomatic infections.

Pregnant Patients, the Elderly, and Other Adult Populations

CASE 68-11, QUESTION 2: The decision to treat the asymptomatic bacteriuria of A.K. was based primarily on the increased probability of renal damage during childhood. What other population groups should be treated for asymptomatic bacteriuria?

Without urinary tract obstruction, UTI in adults rarely lead to progressive renal damage.[2,4] Therefore, asymptomatic bacteriuria does not require treatment in most adult patients who have no evidence of mechanical obstruction or renal insufficiency. Aggressive antimicrobial therapy is appropriate during pregnancy, however, because as many as 40% of pregnant women with asymptomatic bacteriuria later develop symptomatic UTI, particularly pyelonephritis.[8] In addition, studies have confirmed associations between acute pyelonephritis during pregnancy with increased rates of preterm labor, premature delivery, and lower birth-weight infants.[25] The treatment of asymptomatic bacteriuria in pregnancy is therefore justified to decrease the risk of associated complications.[8]

Treatment should be based on in vitro susceptibility testing or by selecting the least expensive, least toxic agent. Sulfonamides should be avoided in late pregnancy because they can contribute to kernicterus in the neonate. Fluoroquinolones should be avoided during pregnancy because of the risk of arthropathies to the fetus (see Case 68-7, Question 3).

Bacteriuria in the elderly is common; it is estimated that 20% of all women and 10% of all men age 65 years and older

control and decreasing neuropsychiatric symptoms through reduction in levodopa dosage, antipsychotics may be considered.

Older antipsychotic medications, such as haloperidol, perphenazine, and chlorpromazine, block striatal dopamine D_2 receptors and may exacerbate parkinsonian symptoms. Therefore, these agents are not recommended.[16] Newer atypical antipsychotics are more selective for limbic and cortical D_3, D_4, D_5 receptors; they have minimal activity at D_2 receptors and may control symptoms without worsening parkinsonism. Of these agents, clozapine has the best evidence of efficacy in patients with PD without adversely affecting motor function, and should be preferentially considered.[18,139] However, its use is complicated by the need for frequent monitoring of white blood cell counts because of the risk of agranulocytosis. Other newer agents, particularly quetiapine, appear promising and have controlled psychosis without worsening parkinsonism.[140,141] Risperidone and olanzapine have also been studied, but both worsened parkinsonism and were inferior to clozapine in patients with PD.[142,143] Aripiprazole, also a newer atypical antipsychotic, has been associated with worsening motor function in patients with PD, whereas experience with ziprasidone has yielded mixed results.[144]

AUTONOMIC DYSFUNCTION

Patients with PD frequently experience dysautonomia, including orthostasis, erectile dysfunction, constipation, nocturia, sensory disturbances, dysphagia, seborrhea, and thermoregulatory imbalances. Management of these symptoms is generally supportive, and appropriate medical interventions similar to those used in other geriatric patients can be used to treat these symptoms whenever encountered. In some cases, fludrocortisone or midodrine can be considered if orthostatic hypotension is severe, although they have been subject to little study in PD patients specifically.[124] Other possibly effective treatments for symptoms of autonomic dysfunction outlined in the American Academy of Neurology Practice Parameter include sildenafil for erectile dysfunction and polyethylene glycol for constipation.[124]

FALLS

Patients with PD and their caregivers should be counseled on the prevention of falls because they can result in serious morbidity and mortality. Falls generally result from one of several factors, including postural instability, freezing and festination, levodopa-induced dyskinesia, symptomatic orthostatic hypotension, coexisting neurologic or other medical disorders, and environmental factors.[16] Prevention remains the best strategy and includes environmental precautions, such as proper lighting, use of handrails, removing tripping hazards, and incorporating physical and occupational therapy. Reversible causes of postural or gait instability should be addressed whenever suspected.

SLEEP DISORDERS

Parasomnias often experienced by elderly persons are accentuated in PD patients.[16] Insomnia, sleep fragmentation owing to PD symptoms, restless leg syndrome, and REM sleep disorder (characterized by vivid dreams that are often acted out, especially if frightening) are common and a source of decreased quality of life. When sleep dysfunction can be directly attributed to PD symptoms, such as akinesia, tremor, dyskinesia, or nightmares, dosage adjustment of dopaminergic medications is indicated. Proper sleep hygiene should be encouraged. Short-acting benzodiazepines can be used if insomnia occurs; however, a longer-acting agent or controlled-release formulation may be preferred if the patient wakes early and is unable to return to sleep. If excessive daytime drowsiness occurs, modafinil may be considered.[124] Similar to dysautonomia, management of sleep disorders that are not directly attributable to PD symptoms can be managed supportively, as in other geriatric patients.

For a brief video summarizing the clinical features of a patient with PD, go to http://thepoint.lww.com/AT10e.

RESTLESS LEG SYNDROME AND PERIODIC LIMB MOVEMENTS OF SLEEP

Clinical Presentation

CASE 57-5

QUESTION 1: J.J., a 47-year-old woman, presents to her family physician complaining of daytime fatigue and difficulty sleeping at night because of "jumpy legs." She reports being able to sleep only 4 to 5 hours per night because of the leg restlessness, and feels unrefreshed after sleep. On further questioning, she describes the sensation in her legs as being like "bugs crawling under the skin." The sensation is not painful. She explains that the symptoms worsen in the evening and at night, and are partially relieved with walking. She recalls that her mother had similar symptoms. J.J.'s spouse notes that she often "kicks" him in her sleep. Review of her medical history shows an otherwise healthy postmenopausal woman. What signs and symptoms are suggestive of restless legs syndrome (RLS) in J.J.? What laboratory tests or diagnostic procedures should be performed in J.J. to evaluate her condition?

Restless legs syndrome, also known as Ekbom disease, is a disabling sensorimotor disorder estimated to affect approximately 2% of the adult population.[145] Although most patients with mild symptoms will not require treatment, RLS can be associated with adverse health outcomes, including sleep-onset insomnia, missed or late work, anxiety, depression, marital discord, and even suicide in severe cases.

Four essential criteria have been established by the International Restless Legs Syndrome Study Group to diagnose RLS (Table 57-7).[146] The pathognomonic trait of RLS is an almost irresistible urge to move the legs (akathisia), often associated

TABLE 57-7
Clinical Features of Restless Legs Syndrome

Essential Criteria
Urge to move legs, associated with paresthesias or dysesthesias
Relief of symptoms with movement
Onset or exacerbation of symptoms at rest
Onset or worsening of symptoms during nighttime
Supportive Clinical Features
Accompanying sleep disturbance (sleep-onset insomnia)
Periodic leg movements
Positive response to dopaminergic therapy
Positive family history of RLS
Otherwise normal physical examination

RLS, restless legs syndrome.

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characteristics but is not active against many strains of *S. pneumoniae.* Limited experience exists with TMP-SMX for the treatment of pneumococcal meningitis.[43,99]

PREVENTION OF MENINGITIS

CASE 62-2, QUESTION 5: Should A.L. have received pneumococcal vaccine? How effective is vaccination in preventing invasive pneumococcal disease?

The pneumococcal vaccine (Pneumovax 23, Pnu-Immune 23) provides protection against invasive pneumococcal disease.[94] The vaccine is composed of purified capsular polysaccharide antigens of 23 serotypes of *S. pneumoniae,* which are responsible for causing approximately 88% of the bacteremic pneumococcal disease in the United States.[86] Individuals such as A.L. who are at high risk for pneumococcal infection should be given the vaccine. Persons with chronic heart disease (except hypertension), chronic lung disease (including asthma and COPD), diabetes, alcoholism, cigarette smokers, chronic liver disease (including cirrhosis), CSF leaks, cochlear implants and asplenia (or splenic dysfunction), hemoglobinopathies (including sickle cell disease), and those older than 65 years of age should be vaccinated with the pneumococcal vaccine.[94] Immunocompromised patients, such as those with Hodgkin disease, lymphoma, multiple myeloma, or chronic renal failure, or patients who have undergone organ transplantation, and HIV-infected individuals also are at high risk for pneumococcal disease and should receive the vaccine.[94] Immunocompromised patients, however, often fail to mount a sufficient immune response to the vaccine to fully protect them against infection.[86] Patients with asymptomatic HIV disease respond more favorably to the vaccine than those with advanced acquired immunodeficiency syndrome.[100]

Thus, given his underlying medical condition (splenectomy) and history of alcoholism, A.L. should receive the pneumococcal vaccine. Revaccination (only once) after 5 years is recommended for persons with chronic renal failure or nephrotic syndrome, functional or anatomic asplenia, and for persons with immunocompromising conditions. For persons older than 65 years of age, one-time revaccination is recommended if they were vaccinated more than 5 years previously and were younger than 65 years of age at the time of primary vaccination.[94]

The antibody response in children younger than 2 years of age to polysaccharide vaccines is poor or absent, and the vaccine is not recommended for these young children.[86] Conjugate vaccines, however, are effective and have resulted in significant decreases in the incidence of invasive pneumococcal disease in children aged younger than 18 years. Routine vaccination with a 7-valent conjugate vaccine (PCV7, Prevnar) began in 2000. In 2010, a 13-valent conjugate vaccine (PCV13, Prevnar-13) was introduced to extend coverage to serotypes not covered by PCV7 (which now constitute the majority of cases of disease). As such, the ACIP now recommends routine vaccination for all children with PCV13.[101]

Gram-Negative Bacillary Meningitis

CASE 62-3

QUESTION 1: R.R., a 40-year-old, 80-kg man, is admitted to the hospital for a cervical laminectomy with vertebral fusion. His surgical procedure was complicated by a dural tear. On the third postoperative day, drainage at his surgical excision site was noted, and R.R. was febrile to 38.2°C. A Gram stain of the drainage revealed few gram-positive cocci and moderate gram-negative bacilli. Therapy with IV cefazolin 1 g every 8 hours was begun. The following morning, R.R. was oriented to person, place, and time, but he was slightly obtunded and had a temperature of 40°C. Neck stiffness could not be assessed because of his recent surgery. A magnetic resonance imaging (MRI) scan of the head and neck was negative, and lumbar puncture yielded the following CSF results:

WBC count, 3,000 cells/μL, with 95% PMN
Glucose, 20 mg/dL
Protein, 280 mg/dL

CSF Gram stain showed numerous gram-negative rods. What important clinical and laboratory features of gram-negative bacillary meningitis are manifested in R.R.?

EPIDEMIOLOGY

R.R. has gram-negative meningitis as a complication of his recent neurosurgical procedure. Although gram-negative bacilli do not cause meningitis nearly as often as *H. influenzae, S. pneumoniae,* and *N. meningitidis,* they are important pathogens, particularly after neurosurgical procedures.[1,18,19,31,34,56] Of 493 episodes of meningitis occurring during a 27-year period (1962–1988) at the Massachusetts General Hospital, enteric gram-negative bacilli accounted for 33% of all nosocomial episodes and 3% of community-acquired cases.[1] Historically, mortality rates from gram-negative bacillary meningitis have been extremely high, ranging from 40% to 70%. With the availability of third-generation cephalosporins, fatalities have declined to less than 40%.[18,31,34,56] Increasing resistance among certain gram-negative bacilli, such as *Enterobacter* species and *P. aeruginosa,* presents a therapeutic dilemma in that mortality associated with these pathogens is high and therapeutic options are fewer.[32,33]

PREDISPOSING FACTORS

Individuals at greatest risk for gram-negative bacillary meningitis include neonates, the elderly, debilitated individuals, patients with open trauma to the head, and individuals such as R.R. undergoing neurosurgical procedures.[18–20,31,56] Although meningitis is a rare complication of clean neurosurgical procedures (e.g., craniotomy, laminectomy), the consequences can be devastating when it does happen.[1,20,102]

MICROBIOLOGY

E. coli and *K. pneumoniae* are the most common gram-negative bacteria causing meningitis, and they represent about two-thirds of all cases.[34,56,102] *E. coli* is the most common gram-negative cause of neonatal meningitis, whereas *K. pneumoniae* is isolated more often in the adult population.[22,34,56,102] The remaining one-third of cases are divided evenly among *Proteus, Serratia, Enterobacter,* and *Salmonella* species, *P. aeruginosa,* and other less common bacilli.[34,56,102]

CLINICAL FEATURES

In general, clinical laboratory features of gram-negative bacillary meningitis are similar to other types of bacterial meningitis.[22,37,56] Because of high virulence, gram-negative bacillary meningitis often is a fulminant, rapidly progressive disease. An exception to this rule is meningitis after neurosurgery.[20] As is evidenced by R.R.'s clinical presentation, postneurosurgical gram-negative bacillary meningitis can present in a more subtle fashion. In such patients, many of the symptoms of meningitis

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SECTION 19: GERIATRIC THERAPY

SECTION EDITOR: JUDITH L. BEIZER

Geriatric Drug Use

Jiwon Kim and May Mak

102

CORE PRINCIPLES

	CHAPTER CASES
AGE-RELATED PHYSIOLOGICAL, PHARMACOKINETIC, AND PHARMACODYNAMIC CHANGES	
1 Age-associated physiologic changes are associated with pharmacokinetic and pharmacodynamic alterations of drugs in older adults. Decline in drug metabolism and excretion and exaggerated response to drugs are important considerations in drug therapy of the elderly.	**Case 102-1 (Questions 1–4)**
2 Adverse drug events are one of the most important problems associated with drug use in older adults.	**Case 102-2 (Question 1)**
DISEASE-SPECIFIC GERIATRIC DRUG THERAPY	
1 Elderly patients have multiple chronic conditions and take numerous medications. They need to be educated on their disease states and be aware of potential adverse effects and drug interactions. Consulting with their physicians and pharmacists and behavioral modification are good places to start.	**Case 102-3 (Questions 1, 2)**
2 Pharmacologic treatments of heart failure in the elderly include a diuretic, β-blocker, an angiotensin-converting enzyme (ACE)-inhibitor or angiotensin receptor blocker (ARB), with or without digoxin and spironolactone. Benefits should be weighed against risks based on the patient's concurrent conditions.	**Case 102-3 (Questions 3–6)**
3 Elderly patients should be aggressively treated for elevated cholesterol to prevent coronary heart disease (CHD). The drug of choice for treating hyperlipidemia in the elderly is the class of statins. Combination with other classes of agents is considered only if necessary and based on concurrent disease states and potential adverse	**Case 102-3 (Questions 7, 8)**
4 First-line therapy for prevention of coronary artery disease (CAD) includes acetylsalicylic acid (ASA) and β-blockers. Other agents are considered based on concomitant diseases and relative indications.	**Case 102-3 (Question 9)**
5 Hypertension should be treated in the elderly according to the guidelines set forth for the general adult population. Monitoring is essential to prevent excessively low blood pressure, bradycardia, and orthostatic hypotension.	**Case 102-3 (Question 10)**
6 The glycosylated hemoglobin (Hgb A_{1c}) goal may be higher for elderly patients who have hypoglycemia. Pharmacologic therapies for diabetes are recommended based on level of hyperglycemia and relative contraindications.	**Case 102-3 (Question 11)**

continued

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TABLE 100-5

Antimicrobial Dosage Regimens for Neonates: Dosages and Intervals of Administration[2,91–93]

Drug	Weight < 1,200 g	Weight 1,200–2,000 g		Weight > 2,000 g	
	0–4 Weeks (mg/kg)[a]	0–7 Days (mg/kg)[a]	8–28 Days (mg/kg)[a]	0–7 Days (mg/kg)[a]	8–28 Days[a] (mg/kg)[a]
Amphotericin B					
Deoxycholate	1 every 24 hours	1 every 24 hours	1 every 24 hours	1 every 24 hours	1 every 24 hours
Lipid complex/ Liposomal	5 every 24 hours	5 every 24 hours	5 every 24 hours	5 every 24 hours	5 every 24 hours
Ampicillin					
Meningitis	100 every 12 hours	100 every 8 hours	75 every 6 hours	50 every 8 hours	75 every 6 hours
Other diseases	25 every 12 hours	25 every 12 hours	25 every 8 hours	25 every 8 hours	25 every 6 hours
Cefazolin	25 every 12 hours	25 every 12 hours	25 every 12 hours	25 every 12 hours	25 every 8 hours
Cefepime	30 every 12 hours	50 every 12 hours	30 every 12 hours[b]	50 every 12 hours	30 every 12 hours[b]
Cefotaxime[c]	50 every 12 hours	50 every 12 hours	50 every 8 hours	50 every 12 hours	50 every 8 hours
Ceftazidime[c]	50 every 12 hours	50 every 12 hours	50 every 8 hours	50 every 12 hours	50 every 8 hours
Ceftriaxone[c]	25 every 24 hours	50 every 24 hours	50 every 24 hours	50 every 24 hours	75 every 24 hours
Clindamycin	5 every 12 hours	5 every 12 hours	5 every 8 hours	5 every 8 hours	5 every 6 hours
Erythromycin	10 every 12 hours	10 every 12 hours	10 every 8 hours	10 every 12 hours	13.3 every 8 hours
Fluconazole	6 every 72 hours	12 every 48 hours	12 every 24 hours	12 every 48 hours	12 every 24 hours
Linezolid	10 every 12 hours	10 every 12 hours	10 every 8 hours	10 every 8 hours	10 every 8 hours
Meropenem[c]	20 every 12 hours	20 every 12 hours	20 every 8 hours	20 every 8 hours	30 every 8 hours
Metronidazole	7.5 every 48 hours	7.5 every 24 hours	7.5 every 12 hours	7.5 every 12 hours	15 every 12 hours
Oxacillin	25 every 12 hours	25 every 12 hours	25 every 8 hours	25 every 8 hours	37.5 every 6 hours
Nafcillin	25 every 12 hours	25 every 12 hours	25 every 8 hours	25 every 8 hours	37.5 every 6 hours
Penicillin G					
Meningitis	50,000 U every 12 hours	50,000 U every 12 hours	50,000 U every 8 hours	50,000 U every 12 hours	50,000 U every 8 hours
Other diseases	25,000 U every 12 hours	25,000 U every 12 hours	25,000 U every 8 hours	25,000 U every 12 hours	25,000 U every 8 hours
Piperacillin/tazobactam	50 every 12 hours	75 every 12 hours	75 every 8 hours	75 every 12 hours	75 every 8 hours
Ticarcillin or Ticarcillin/ clavulanate	75 every 12 hours	75 every 12 hours	75 every 8 hours	75 every 12 hours	75 every 8 hours
Vancomycin	15 every 24 hours[d]	15[e]	15[e]	15[e]	15[e]

[a] Postnatal age.
[b] Cefepime should be given at 30 mg/kg/dose every 12 hours for the first 2 weeks of life then increase to 50 mg/kg/dose every 12 hours (or 50 mg/kg/dose every 8 hours for *Pseudomonas* infections or meningitis).
[c] Higher dosage may be needed for meningitis.
[d] If weight <750 g and postnatal age <14 days, use 10–12.5 mg/kg every 24 hours.
[e] If ≤26 weeks' PCA, use every 18 hours; if 27–34 weeks' PCA, use every 12 hours; if >35 weeks' PCA, use every 8 hours.

resistance patterns within the neonatal ICU. Amikacin should be reserved for gram-negative organisms resistant to gentamicin and tobramycin. Aminoglycoside regimens need to be designed to achieve safe and therapeutic serum concentrations (traditional dosing regimens: gentamicin and tobramycin, peak 6–8 mcg/mL, trough <2 mcg/mL; amikacin peak 20–30 mcg/mL, trough <10 mcg/mL) and to aim for a peak concentration that is more than eight times greater than the minimum inhibitory concentration (MIC) of the organism being treated.[94] If extended-interval aminoglycoside dosing is used, peak gentamicin and tobramycin serum concentrations of 10 to 12 mcg/mL and trough concentrations of less than 1 mcg/mL may be reasonable, depending on the MIC.

Extended-interval aminoglycoside dosing (also known as once-daily dosing or single-daily dosing) has been widely used in the adult population. Aminoglycoside antibiotics display concentration-dependent killing of bacteria. Rationale for the use of extended-interval aminoglycoside dosing include (a) enhancement of bacterial killing by providing a higher peak serum concentration to MIC ratio, (b) provision of a prolonged postantibiotic effect, and (c) minimization of adaptive postexposure microbial resistance.[95]

Because of these beneficial effects, the use of extended-interval aminoglycoside dosing has been studied in the neonatal population. However, most of the studies, which included term and preterm infants, evaluated serum gentamicin concentrations and potential adverse effects but not clinical efficacy or cure rates.[95,96] Furthermore, most studies used extended-interval aminoglycoside dosing for short periods, for example, during the workup to rule out neonatal sepsis (i.e., 72-hour duration). Studies included only a limited number of neonates who received extended-interval aminoglycoside dosing to actually treat documented neonatal infections.

As expected, the use of extended-interval aminoglycoside dosing resulted in higher peak and lower trough serum concentrations in these neonates compared with traditional multiple-daily dosing. Two meta-analyses reported clinical efficacy of extended-interval aminoglycoside dosing compared with conventional dosing in neonates.[95] In one review, only one of nine trials reported treatment failure in two neonates; no differences in ototoxicity or nephrotoxicity were found between the two dosing methods. In the second meta-analysis, which included six studies in neonates, there was no difference in efficacy or toxicity between the two dosing methods of aminoglycoside in neonates. However, currently there are no neonatal studies evaluating optimal regimens to achieve the best peak serum concentration to MIC ratio. In addition, other neonatal-specific factors, such as the neonate's immature immune function and a potential decreased postantibiotic effect, have not been adequately addressed. Therefore, large, well-designed studies evaluating the clinical efficacy and safety of extended-interval aminoglycoside dosing for the treatment of gram-negative infections in neonates are required before

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CHAPTER CASES

MAJOR DEPRESSIVE DISORDER *CONTINUED*

9	The selection of antidepressants in patients with concomitant cardiac disease can be difficult given the wide spectrum of cardiac effects associated with antidepressants. Tricyclic antidepressants should be avoided in patients with cardiac conduction abnormalities. Plasma levels of tricyclic antidepressants may be helpful in monitoring adherence and toxicity.	**Case 83-4 (Questions 1–4)**
10	The relationship between diabetes and depression is bidirectional in that patients with depression are at increased risk for development of diabetes and patients with diabetes are also likely to suffer from depression. Management of both illnesses is critical for prevention of long-term complications from both diseases.	**Case 83-5 (Question 1)**
11	Patients with atypical features of depression are often treatment-resistant and tend to respond to monoamine oxidase inhibitors. Generally, monoamine oxidase inhibitors are reserved as last-line therapies and patients' ability to adhere to dietary restrictions must be considered prior to recommending these agents. Potentially fatal drug interactions can also occur with these drugs and must be carefully monitored.	**Case 83-9 (Questions 1–6)**
12	Psychotic depression is associated with increased morbidity and mortality more than other forms of depression and is often refractory to antidepressant monotherapy. Atypical antipsychotics may be effective in this population and somatic treatments such as electroconvulsive therapy have also been shown to be quite effective.	**Case 83-10 (Questions 1, 2)**

INTRODUCTION

Depression is a common, chronic, and potentially debilitating illness that has tempered the human condition since the beginning of recorded history. The ancient Egyptians, for instance, wrote about depression more than 3,000 years ago. In the First Book of Samuel (dated about 700 BC), Saul, the King of Israel, is overcome by an "evil spirit" that causes him to feel "incapacitated, guilt-ridden and hopeless," leading ultimately to his suicide.[1]

Cultures throughout history have speculated on the origin of depression. The ancient Greeks believed that depression was caused by an excess of bile. Hippocrates thoroughly described the condition as a somatic illness and is believed to have coined the term "melancholia," which literally translates to "black bile." During the Middle Ages, depression and other psychiatric illnesses were considered to be punishment or afflictions from a vengeful God rather than actual illness. At that time, the church and society believed depression to be the result of being weak minded or sinful. Even today, many people suffering from a depressive episode carry the stigma of "having a nervous breakdown," and medications may be viewed as a "crutch" to help cope with daily life. Throughout history, depression has affected the lives of many famous people, including Ludwig Van Beethoven, Meriwether Lewis, Abraham Lincoln, Charles Dickens, Winston Churchill, Ernest Hemingway, and Marilyn Monroe.[1]

Although many people experience "the blues" on occasion, the term "depression" is reserved in psychiatry to define a specific medical condition with distinctive biological and pharmacologic implications. Similarly, the term "clinical depression" is liberally applied in popular culture to a condition that approximates the psychiatric diagnosis of major depression. In general, depressive disorders are enormous health concerns that are often misdiagnosed or undertreated. The physical and social dysfunction associated with depression is profound and is believed to outweigh many other chronic medical conditions, including hypertension, diabetes, and arthritis.[2] The Medical Outcomes Study, for instance, determined that the degree of impairment in depressed individuals is comparable to that seen in patients with chronic heart disease.[3] The financial ramifications of depression are tremendous and place an overwhelming burden on our society. In 2000, the estimated cost of depression in the United States was $83.1 billion annually, with most of these costs ($51.5 billion) attributed to lost productivity and absenteeism in the workplace.[4]

Epidemiology

Since World War II, the lifetime incidence of depression has been rising steadily in studied populations. A recent investigation concluded that the annual incidence of mood disorders is approximately 10% in the adult population, and 1 in 15 adults (6.7%) will suffer from an episode of major depression during any 12-month period.[5] Various studies from Europe and the United States have estimated the lifetime prevalence to be 5% to 12% in men and 9% to 26% in women.[6] Although the incidence of depression is remarkably similar across various races and ethnic groups, the illness may be slightly more common in lower socioeconomic classes.[7]

The onset of depression occurs most commonly in the late 20s, but there is a wide range, and the first episode may actually present at any age. One prevailing misconception is that depression is more common among elderly individuals.[8] Epidemiologic evidence suggests that the incidence is slightly lower in older persons than in the general population, but certain subtypes may be more common (e.g., melancholia, depression with psychotic features), and new-onset depression that initially presents during geriatric years may carry a worse prognosis.

Genetic factors appear to play a major role in the cause of depression. The offspring of depressed individuals are 2.7 times more likely to have depression if one parent is afflicted, and 3.0 times more likely if both parents suffer from depression.[9] Concordance rates for monozygotic (identical) twins range from 54% to 65%, whereas the corresponding rates in dizygotic (fraternal)

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HOSPITAL-ACQUIRED, VENTILATOR-ASSOCIATED, AND HEALTH CARE–ASSOCIATED PNEUMONIA

CHAPTER CASES

1	Hospital-acquired pneumonia (HAP) is defined as pneumonia that occurs at least 48 hours after hospitalization not incubating at the time of admission. Ventilator-associated pneumonia (VAP) refers to pneumonia that arises 48 to 72 hours after endotracheal intubation. Health care–associated pneumonia (HCAP) includes any patient who has been hospitalized in an acute-care hospital for 2 or more days within 90 days of infection; resided in a nursing home or long-term care facility; received intravenous antibiotic therapy, chemotherapy, or wound care within the past 30 days of the current infection; lived in close contact with a person with a multidrug-resistant (MDR) pathogen; or attended a hospital or hemodialysis clinic.	**Case 64-5 (Question 1)**
2	The major difference in the bacteriology between CAP and HAP/HCAP/VAP is a shift to gram-negative pathogens, MDR pathogens, and methicillin-resistant *Staphylococcus aureus* (MRSA) in HAP/HCAP/VAP.	**Case 64-5 (Question 2)**
3	Risk factors for pneumonia caused by MDR pathogens include antimicrobial therapy in the previous 90 days, current hospitalization of 5 days or more, immunosuppressive disease or therapy, or any risk factor for HCAP.	**Case 64-5 (Question 2)**
4	Patients with early-onset pneumonia (<5 days) and no MDR risk factors can be treated with a single agent, including nonantipseudomonal third-generation cephalosporins or ertapenem, ampicillin/sulbactam, or an antipneumococcal fluoroquinolone. Empiric therapy in those with late-onset (≥5 days) or MDR risk factors should include a combination of antibiotics active against *Pseudomonas aeruginosa*. This regimen usually includes an antipseudomonal β-lactam, plus either an aminoglycoside or ciprofloxacin/levofloxacin. Vancomycin or linezolid should be added if MRSA risk factors are present or there is a high incidence at the health care facility.	**Case 64-6 (Question 2)**

ACUTE BRONCHITIS

Definition and Incidence

Acute bronchitis (AB) is defined as an acute, self-limiting respiratory illness of the upper bronchi accompanied by cough for more than 5 days that can last up to 3 weeks.[1–3] AB can be associated with or without purulent sputum production, and fever is rare.[1] During the first few days of symptoms, AB is frequently indistinguishable from other upper respiratory illnesses including the "common cold."[1,3] AB is one of the most common conditions encountered in clinical practice as 5% of the adult population are diagnosed annually in the United States, and it ranks as the ninth most common illness among outpatients.[1,4–6] Most cases of AB (>90%) are caused by viruses.[7,8] AB accounts for greater than 10 million office visits per year and is associated with frequent antibiotic overuse.[2,3,8–17]

It is important to delineate the differences between an acute exacerbation of chronic bronchitis associated with chronic obstructive pulmonary disease (COPD) and AB. Chronic bronchitis (CB) is defined as having daily symptoms of sputum production on most days for more than 3 or more consecutive months for greater than 2 successive years.[18] Exacerbations of CB (discussed separately in this chapter) associated with COPD differ from AB in pathogenesis, microbiology, and treatment.

Pathophysiology and Epidemiology

AB is characterized by the inflammatory response to infection in the epithelium of the bronchi. Further progression of this inflammation leads to thickening of the tracheal mucosa.[19] Sloughing of cells from the tracheobronchial epithelium and inflammatory mediators leads to bronchospasm and reduced forced expiratory volume in 1 second (FEV_1) that usually improves after 5 weeks. Spread of pathogen and inflammatory response correlate with patient symptoms. Although bacteria can be isolated from sputum, bacterial invasion of the bronchial tree rarely occurs and the role of bacterial pathogens in AB is limited.[15]

Clinical Presentation

Cough lasting for more than 5 days is the hallmark sign of AB. Although the illness is self-limited, cough can last for up to 3 weeks (typical duration 10–20 days). Sputum production occurs in up to 50% of cases, but does not indicate bacterial infection.[2] Fever is unusual in most cases, but when present should lead to investigation for influenza during appropriate seasons or pneumonia if other clinical signs are present.

Overview of Drug Therapy

Although the available trials are associated with some flaws, antimicrobials do not significantly reduce symptoms of AB. However, antimicrobial use increases adverse drug events and antimicrobial resistence.[8,10,20–22] Expert guidelines in the United States and abroad recommended against the use of antimicrobial agents for the treatment of AB.[2,3,11,17] Despite the evidence refuting use, greater than two-thirds of AB cases are treated with antibiotics in the United States. Furthermore, the agents used for AB are increasingly broad-spectrum drugs, further exacerbating bacterial resistance pressure.[11–14,23] Nonantimicrobial treatment considerations include bronchodilators or antitussives depending on

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Some drugs (e.g., radiocontrast media and protamine) cause pseudoallergic reactions via both complement activation and direct-histamine release mechanisms. Furthermore, some drugs (e.g., vancomycin, quaternary ammonium muscle relaxants, and ciprofloxacin) can cause both true allergic reactions and pseudoallergic reactions.[30]

CASE 3-6, QUESTION 3: How should C.C.'s pseudoallergic reaction be treated? Does treatment of pseudoallergic reactions differ from that of true allergic reactions?

The first step in treating C.C.'s reaction is to eliminate the underlying cause. Thus, his vancomycin infusion should be held until the reaction resolves. Because the reaction is histamine-mediated, administration of an antihistamine such as diphenhydramine 50 mg IV is warranted. Observation of his BP and heart rate is mandatory. Intravenous fluids should be administered if his BP continues to fall or fails to stabilize. Patients with allergic reactions should be treated based on their clinical signs and symptoms, regardless of the mechanism behind the reaction. Thus, for all intents and purposes, pseudoallergic reactions are treated in the same manner as true allergic reactions.

CASE 3-6, QUESTION 4: Can C.C. continue to receive vancomycin? How can future reactions be prevented?

It is not necessary to discontinue vancomycin therapy in C.C. This reaction can be prevented by administering smaller doses of the drug more frequently (e.g., 1,000 mg every 8 hours rather than 1,500 mg every 12 hours) or infusing the dose for a longer interval, typically 2 hours. Alternatively, pretreatment with an antihistamine 1 hour before vancomycin administration is effective. In addition, tachyphylaxis to vancomycin-induced red man syndrome is independent of pretreatment with antihistamine and is another characteristic that differentiates a pseudoallergic reaction from a true allergic reaction. Pretreatment regimens to prevent pseudoallergic reactions to various other drugs (e.g., radiocontrast media) also are well described and can be effective.

CASE 3-6, QUESTION 5: What other drugs are commonly associated with pseudoallergic reactions?

Many other agents have been associated with pseudoallergic reactions.[30] Some of the agents more commonly associated with pseudoallergic reactions are described next.

Aspirin/Nonsteroidal Anti-Inflammatory Drugs

After penicillins, aspirin is the drug most commonly reported as causing "allergic" reactions. Reactions to aspirin can be divided into three broad categories: respiratory reactions, cutaneous manifestations, and anaphylaxis. None of these reactions has been consistently associated with IgE.[112]

RESPIRATORY

The prevalence of bronchospasm with rhinoconjunctivitis is 0% to 28% in children with aspirin sensitivity. In adult asthmatics, the prevalence of aspirin sensitivity ranges from 5% to 20%. The prevalence of aspirin sensitivity during aspirin challenge in adult asthmatics with a history of aspirin-induced respiratory reaction ranges from 66% to 97%.[113] Symptoms usually occur within 30 minutes to 3 hours of ingestion. The triad seen in many sensitive patients is aspirin sensitivity, nasal polyps, and asthma. All potent inhibitors of cyclo-oxygenase can cause respiratory symptoms in aspirin-sensitive patients. Thus, patients who react to aspirin should be considered sensitive to NSAIDs, and vice versa. Weak cyclo-oxygenase inhibitors, such as acetaminophen, choline magnesium salicylate, salicylamide, salsalate, and sodium salicylate, are generally well tolerated in patients with aspirin sensitivity.[112]

CUTANEOUS

The prevalence of cutaneous reactions to aspirin depends on the type of reaction and the population studied. For example, urticaria-angioedema occurs in 0.5% of children, 3.8% of the general adult population, and in 21% to 30% of patients with a history of chronic urticaria. Disease activity at the time of aspirin challenge plays an important role in those with a history of chronic urticaria. In one study, 70% of patients whose urticaria was active at the time of challenge reacted to aspirin, compared with only 6.6% of patients whose urticaria was not active at the time of challenge. Furthermore, aspirin or NSAID may aggravate pre-existing urticaria.[112–114] Other dermatologic reactions to aspirin occur with less frequency; for example, eczema, purpura, and erythema multiforme occur in 2.4%, 1.5%, and 1% of the population, respectively.

ANAPHYLAXIS

The true prevalence of aspirin-induced or NSAID-induced anaphylaxis is unknown, but may range from 0.07% of the general population to 10% of patients with anaphylactic symptoms. Although IgE is not consistently associated with aspirin-related or NSAID-related reactions (including anaphylaxis), aspirin-induced or NSAID-induced anaphylaxis shares three characteristics with immune-mediated anaphylaxis that point to IgE as a cause. First, the reaction occurs after two or more exposures to the offending agent, suggesting that preformed IgE antibodies are responsible. Second, patients do not have underlying nasal polyposis, asthma, or urticaria. Third, the patient who reacts to aspirin or a single NSAID can tolerate a chemically unrelated NSAID, suggesting that a drug-specific IgE antibody has been formed.[112,115]

The NSAIDs that selectively inhibit cyclo-oxygenase-2 (COX-2) while sparing cyclo-oxygenase-1 (COX-1) include celecoxib, rofecoxib, and valdecoxib, among others. Celecoxib is the only COX-2 inhibitor currently marketed in the United States. Selective inhibition of COX-2 provides anti-inflammatory effects while minimizing the renal effects, GI toxicity, and antiplatelet effects seen with inhibition of COX-1. Aspirin and older NSAIDs are nonselective inhibitors of cyclo-oxygenase, inhibiting both COX-1 and COX-2. Anaphylactoid or hypersensitivity reactions have been reported with celecoxib and it appears that the rate of hypersensitivity is comparable to that of traditional NSAIDs.[115] Notably, celecoxib prescribing information states that, as with any NSAID, use is contraindicated in patients who have experienced asthma, urticaria, or allergic-type reactions after taking aspirin or other NSAIDs. Several reports, however, describe successful administration of celecoxib and other COX-2 selective agents to patients with aspirin-sensitive asthma or a history of hypersensitivity reactions to traditional NSAIDs, and evidence suggests that inhibition of COX-1 rather than COX-2 is key to initiating these events.[115–119] Nevertheless, COX-2 selective agents can still elicit allergic responses by other means (e.g., IgE-mediated hypersensitivity). Thus, appropriate precautions and monitoring should be followed when initiating therapy in any patient with a history of allergic reactions to aspirin or other NSAIDs.

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TABLE 52-6
Clinical and Laboratory Findings of Hyperthyroidism

Symptoms
Heat intolerance
Weight loss common, or weight gain caused by ↑ appetite
Palpitations
Pedal edema
Diarrhea/frequent bowel movements
Amenorrhea/light menses
Tremor
Weakness, fatigue
Nervousness, irritability, insomnia
Physical Findings
Thinning of hair (fine)
Proptosis, lid lag, lid retraction, stare, chemosis, conjunctivitis, periorbital edema, loss of extraocular movements
Diffusely enlarged goiter, bruits, thrills
Wide pulse pressure
Pretibial myxedema
Plummer nails[a]
Flushed, moist skin
Palmar erythema
Brisk DTRs
Laboratory Findings
↑ TT_4
↑ TT_3
↑ FT_4I/FT_4
↑ FT_3I/FT_3
Suppressed TSH
TSI present
TgAb present
TPA present
RAIU >50%
↓ Cholesterol
↑ Alkaline phosphatase
↑ Calcium
↑ AST

[a] The fingernail separates from its matrix, but only one or two nails are generally affected.
AST, aspartate aminotransferase; DTRs, deep tendon reflexes; FT_4, free thyroxine; FT_4I, free thyroxine index; FT_3, free triiodothyronine; FT_3I, free triiodothyronine index; RAIU, radioactive iodine uptake; TgAb, thyroglobulin autoantibodies; TPA, thyroid peroxidase antibody; TSI, thyroid-stimulating immunoglobulin; TSH, thyroid-stimulating hormone; TT_3, total triiodothyronine; TT_4, total thyroxine.

β-blockers or iodides is often required for symptomatic relief. Methimazole is considered the thioamide of choice because propylthiouracil (PTU) has been associated with severe hepatitis that has resulted in fatalities. PTU should be reserved for use during the first trimester of pregnancy, in thyroid storm, and in those experiencing adverse reactions to methimazole (other than agranulocytosis or hepatitis). The onset of action of PTU is more rapid than methimazole in thyroid storm because PTU can also inhibit the peripheral conversion of T_4 to T_3. PTU is also preferred during the first trimester of pregnancy because congenital defects have been reported with methimazole. Although both drugs are secreted in breast milk, no adverse effects have been reported in the exposed infants. Additionally, methimazole can enhance adherence because it can be administered once daily, whereas PTU must be given two or three times daily. The duration of treatment is empiric, and thioamides typically are prescribed for 12 to 18 months in hopes of long-term spontaneous remission once the drug is discontinued. Although thioamides maintain euthyroidism, they do not change the natural course of the disease, and the likelihood of spontaneous remission, once treatment is discontinued, is about 60%. The expectation that the combination of thioamide and T_4 therapy might increase the likelihood of remission has been disappointing and is no longer recommended. The major adverse effects from thioamides include skin rash, gastrointestinal (GI) complaints (e.g., nausea, upset stomach, and metallic taste), agranulocytosis, and hepatitis. Cross-sensitivity between the thioamides is not complete, and the alternative drug can be used if rash or GI complaints do not resolve. This is not true for agranulocytosis and hepatitis, and the alternative agent is not recommended.

Nodular goiters, both multinodular and uninodular, are common thyroid problems. The estimated prevalence is 4% to 5% of the adult population. The origin of thyroid nodules is unknown, although TSH stimulation, iodine deficiency, goitrogens (e.g., iodides, lithium, amiodarone), and radiation exposure are contributory. The nodular goiter is usually found on routine physical examination in asymptomatic and euthyroid patients. However, patients can present with hyperthyroidism caused by autonomous functioning "hot" nodules, overt hypothyroidism, or obstructive symptoms of dysphagia and respiratory difficulty. Thyroid function tests, including TSH and FT_4 levels, and antibodies should be obtained. Additional information can be obtained from radioactive iodine uptake (RAIU), ultrasound, fine-needle aspiration (FNA), or magnetic resonance imaging.

Treatment options include surgery, RAI, or thyroid replacement therapy if necessary to correct hypothyroidism. All goitrogens should be removed if possible. L-Thyroxine suppression therapy is no longer recommended because the dangers from supraphysiologic dosages of T_4 (e.g., osteoporosis and the potential for cardiac arrhythmias) outweigh the benefits.

Malignancy must be considered if there is recent growth in a "cold" single or dominant nodule, a firm nodule clinically suspicious for cancer on a physical examination, a history of thyroid irradiation, or a strong family history of medullary thyroid carcinoma. An FNA of the thyroid nodule can document an underlying malignancy. The risk of malignancy in a toxic multinodular goiter is small, and definitive treatment with RAI is usually required to manage any hyperthyroid symptoms. Surgery is indicated if malignancy is suspected or if any obstructive or respiratory symptoms are present.

After a total thyroidectomy for thyroid cancer, RAI ablation is usually given to remove any remaining thyroid tissue. This dosage is higher than the dosage required for treatment of Graves disease. A yearly evaluation for detection of recurrence of some thyroid cancers requires the patient to be off T_4 for 4 to 6 weeks so that a repeat radioactive uptake and scan can be completed. An elevated TSH level is also necessary to allow thyroglobulin levels, a tumor marker, to rise if any malignant tissue is present. Recurrence of the thyroid cancer is likely if there are positive findings on the scan or an elevation in thyroglobulin levels. The administration of recombinant human TSH may improve quality of life because comparable elevations in TSH occur without stopping L-thyroxine therapy, reducing the duration of hypothyroidism.

THYROID FUNCTION TESTS

The principal laboratory tests recommended in the initial evaluation of thyroid disorders are the TSH and the FT_4 levels.[7,12,35] The relationship between laboratory tests and thyroid disorders is summarized in Figure 52-2. The presence of thyroid antibodies indicates an autoimmune thyroid etiology. Adjuncts to the previous tests include the total T_3 (TT_3), FT_3 or FT_3 index (FT_3I), RAIU and scan, TRAb, ultrasound, and FNA biopsy (Table 52-7).

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those with prior HPV infections benefit from immunization as well.

Two vaccines are available for the prevention of HPV infection: a quadravalent product (Gardasil) and a bivalent product (Cervarix). The quadravalent product is active against HPV strains 6, 11, 16, and 18 and is indicated for males and females ages 9 to 26 years of age, whereas the bivalent product is active against only HPV strains 16 and 18 and is indicated only for females ages 10 to 25 years old.[68] Gardasil is indicated for males for the purpose of prevention of genital warts.[68]

Routine vaccination with either HPV vaccine is recommended for female patients at 11 to 12 years of age.[68] Vaccination at this age attempts to achieve an immune response before the sexual debut[61] and involves a three-dose series administered at intervals of 0, 2, and 6 months.[68] Immunization against HPV is 90% effective in reducing persistent HPV infections and 100% effective in preventing HPV-related diseases such as genital warts or lesions.[65,68] The quadravalent vaccine may be given to males aged 9 to 26 years of age, although routine vaccination is not recommended for males.[68]

The mandatory requirement for immunization of adolescent girls against HPV is controversial and debated in many state legislatures because of ethical and social concerns. The CDC and AAP recommend immunization for adolescent girls, regardless of current sexual activity, to decrease the lifetime risk of cervical cancer and to protect against infection when the time comes that an individual chooses to become sexually active. Additionally, routine vaccination of males is not recommended by the CDC as the cost-effectiveness of vaccination in males is not as favorable as the cost-effectiveness of vaccination in females. The CDC currently suggests that improving vaccination rates in girls 11 to 12 years old may be more cost effective than adding vaccination requirements for males.[68] Based on the current recommendations, J.S. should receive the HPV vaccine.

Pneumococcus

CASE 11-12

QUESTION 1: M.T. is a 5-year-old boy with a history of asthma. His pediatrician recommends that he receive the pneumonia vaccine. What is the evidence behind this recommendation?

Streptococcus pneumoniae (pneumococcus) infection can cause meningitis, pneumonia, sinusitis, and otitis media, and is a major source of illness and death among children and adults.[69,70] Infants, young children, and older patients are at highest risk for exhibiting pneumococcal infections.[69] The risk for disseminated pneumococcal infections is increased by underlying medical conditions (heart failure, chronic obstructive pulmonary diseases), chronic liver disease (e.g., cirrhosis), functional or anatomic asplenia (e.g., sickle cell disease, splenectomy), and acquired or inherited immunosuppressive conditions (e.g., HIV, cancer, immunosuppressive therapy). *S. pneumoniae* is a common pathogen in children with HIV, often presenting as one of the first manifestations of HIV infection.[71]

Three pneumococcal vaccines are available: the original polysaccharide vaccine (Pneumovax) and two conjugate-pneumococcal vaccines (PCV 7 and PCV 13 [Prevnar]).[69,70] Pneumovax contains 23 of the most prevalent or invasive purified capsular-polysaccharide antigens types of *S. pneumoniae.* Antibody response to Pneumovax is inconsistent in children younger than 2 years of age partially because the antigens included in Pneumovax protect against strains that typically cause adult disease, but not childhood disease. In contrast, the conjugate pneumococcal vaccines (Prevnar 7 and Prevnar 13) improve immunogenicity and efficacy in infants and toddlers.[70] The PCV 7 vaccine provides protection against the seven pneumococcal strains that cause 80% of all pneumococcal invasive disease in children younger than 6 years of age, whereas PCV 13 protects against 13 (90%) of infectious serotypes.[72] ACIP recommends giving the conjugate 13 vaccine (PCV 13) to all children aged 2 to 59 months and children aged 60 to 71 months with underlying medical conditions that place them at high risk for experiencing pneumococcal disease or its complications.[70] Because M.T. has already passed the recommended age for vaccination and has asthma, he should receive the PCV 13 vaccine today.

Immunocompromised patients typically have an unreliable response to vaccines, but because of the potential benefits the pneumococcal vaccines should be administered. Some studies have found transient elevation of plasma HIV levels after pneumococcal vaccination, although this has not been associated with decreased patient survival.[73,74] To maintain immunity, revaccination with the 23-valent polysaccharide vaccine is recommended after 3 years in high-risk children younger than 10 years of age and after 5 years in older patients.

CASE 11-12, QUESTION 2: M.T.'s grandfather is a 68-year old who is a previous smoker and has cardiovascular disease. Should M.T.'s grandfather receive pneumococcal vaccine?

The adult population recommended to receive the 23-valent pneumococcal polysaccharide vaccine (Pneumovax) include patients age 65 years of age and older, and patients aged 19 to 64 with certain underlying medical conditions.[69] These underlying medical conditions include immunocompetent patients with chronic heart disease, chronic lung disease, diabetes mellitus, cerebrospinal fluid leaks, cochlear implants, alcoholism, chronic liver disease, and cigarette smoking. Specifically, adult patients with asthma and those who are cigarette smokers are proven to benefit from the pneumococcal vaccine. Patients with functional or anatomical asplenia and those adults who are immunocompromised are also recommended to receive the pneumococcal polysaccharide vaccine.[69] A second dose of the vaccine should be administered 5 years after the first dose in patients who received the initial pneumococcal vaccine prior to 65 years of age.[69] Patients who receive their primary vaccination at age 65 years or later in life should only receive one dose of the pneumococcal vaccine.[69] If a patient is uncertain as to the currency of their vaccination, or when they received it, they should not receive revaccination because of lack of clinical evidence regarding the benefit of revaccination safety and benefit.[69] M.T.'s grandfather (a previously unvaccinated 68-year-old man) should receive one dose of the 23-valent pneumococcal polysaccharide vaccine.

Influenza

Annual influenza vaccination is the most effective method for preventing influenza viral infections and its complications and sequelae.[75] Recommendations for influenza vaccination were recently expanded to include anyone older than 6 months of age who does not have a contraindication.[75] This wide age range for routine vaccination is supported by the AAP and clinical evidence confirms that annual influenza vaccination is a safe and effective preventative health measure with potential benefit for all ages of the population.[75,76] When vaccine supply is limited, priority for vaccination should be given to people who are[75]:

- 6 months old to 4 years old
- 50 or more years of age
- Residents of chronic care facilities
- Immunosuppressed via medication or human immunodeficiency virus

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ages 65 to 74 years, 10.9% of men and 24.2% of women have TC greater than 240 mg/dL. For those 75 years of age or older, 9.6% of men and 18.6% of women have TC greater than 240 mg/dL. Overall, 81% of elderly people who die of CHD are age 65 or older. Although male sex is an independent risk factor for CHD, more women than men die from heart attacks within a few weeks because these events occur in women at an older age.[75] The significantly higher rate of hypercholesterolemia in women seems also to predict a higher CHD risk than for men later in life. Therefore, it is important to treat dyslipidemia aggressively in all elderly patients, and not necessarily relax the treatment goals for women. With the 60 to 79-year-old age group, women begin to have an equivalent cardiovascular risk level as their male counterparts. For the 80+ year-old age group, the percentage of women with cardiovascular disease (86.7%) actually surpasses that of men (80.1%).[75]

T.M. is a 78-year-old with history of MI (positive CHD event), diabetes (CHD risk equivalent), and hypertension (HTN), dyslipidemia, and albuminuria (additional risk factors). All together these risk factors confer a 10-year CHD risk greater than 20%.[76]

CASE 102-3, QUESTION 8: What is an optimal therapeutic plan for management of T.M.'s hyperlipidemia?

T.M.'s treatment plan should begin with lifestyle and dietary modifications. Based on a high CHD risk level, she should be started with aggressive lipid-lowering therapy with an LDL goal of less than 100 mg/dL (optimal <70 mg/dL)[76] and a TG goal of less than 150 mg/dL for diabetic patients.[77] Statins are the drugs of choice. An adequate dose is able to lower LDL up to 60% and the TG up to 35%.[77] However, the relative benefits of statin therapy should be weighed against the potential risk of adverse reactions. Liver transaminases should be monitored on a regular basis. Although rare, myopathy with increased levels of muscle enzymes (creatine kinase >10× upper limit of normal) or rhabdomyolysis (myopathy and serum creatinine elevation) warrant discontinuation of these agents.[78] The hydrophilic statins pravastatin, rosuvastatin, and pitavastatin are not metabolized significantly by the cytochrome P-450 system and may present fewer side effects and lower potential of drug interactions.[78] If combination therapy is indicated, ezetimibe can be added to further reduce the levels of LDL and TG without escalating the dose and potential side effects of a statin.[79] Combination of a statin with niacin is less preferred owing to intolerable side effects of flushing and a slightly higher chance of myopathy and hyperglycemia when effective dosages are used.[80] The addition of fibrates to statins has become controversial in patients with diabetes, as shown recently in the ACCORD lipid trial. The addition of fenofibrate to simvastatin in patients with diabetes did not reduce the rate of fatal CHD events, nonfatal MI, or nonfatal stroke compared with those who received only simvastatin.[81] A statin titrated properly should bring the LDL and TG levels to target levels in T.M. In case combination therapy is necessary, then ezetimibe is preferred over niacin and fibrates in this patient. Finally, because alcohol can increase triglycerides as much as 50%, abstinence is strongly recommended.[82]

CASE 102-3, QUESTION 9: What other interventions should be implemented to optimize management of T.M.'s CAD?

Any strategy to optimize her CAD management should take into consideration the patient's functional status, comorbidities, and risks versus benefits. T.M. is still experiencing anginal pain on her current regimen, possibly caused by more advanced disease or inability to adhere to the four-times-daily regimen of ISDN. She should be evaluated for coronary vessel disease and appropriate antiplatelet therapy initiated if necessary. A once-daily long-acting nitrate preparation (isosorbide mononitrate [ISMN]) may be better suited for her, with sublingual NTG available as needed. T.M. should be maintained on first-line CAD therapy of aspirin and β-blockers because aspirin is indicated for MI prevention and β-blockers may also be beneficial for HF. To prevent further endothelial injury from the atherosclerosis that leads to plaque rupture, statins are indicated as described previously. ACE inhibitors (ramipril) have been shown to reduce mortality and to provide secondary prevention in CAD, particularly among those 65 years or older, and thus should be part of the regimen because ACE inhibitors also have benefits for T.M.'s HF and HTN, as well as diabetic nephropathy.[83] Although calcium-channel blockers are indicated in CAD, they have not been proven beneficial for HF; therefore, verapamil may be held at this time while the other agents are being optimized.

HYPERTENSION

CASE 102-3, QUESTION 10: T.M. has uncontrolled hypertension. How should this be managed in light of her advanced age?

T.M.'s blood pressure is well above the goal of less than 130/80 mm Hg for diabetic patients as set forth by the American Diabetes Association (ADA) and the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VII).[77,84] (See Chapter 14, Essential Hypertension.) Hypertension is present in more than two-thirds of individuals older than 65 years of age.[75] Despite having the highest prevalence of hypertension, only a small percentage of this population is controlled or adequately treated for their blood pressure.[84] Treatment of elderly patients should be based on the guidelines for the general adult population. T.M. is also a patient with compelling indications as defined by JNC VII, such as diabetes mellitus (DM), HF, and CAD. In such a patient, the use of a diuretic, ACE inhibitor or ARB, or β-blocker in appropriate combination may improve morbidity and mortality outcomes.[85] The HYVET study has shown that a mean reduction of blood pressure from a baseline of 173/91 mm Hg by 15/6 mm Hg in patients 80 years or older resulted in a 30% reduction in stroke, a 39% reduction in rate of death from stroke, a 23% reduction in the rate of death from cardiovascular causes, and a 64% reduction in the rate of heart failure.[86] Although adequate dosing and combination therapy may be essential in achieving blood pressure control in the elderly population, close monitoring is also necessary to avoid systolic blood pressure (SBP) less than 120 mm Hg based on the recent findings from the ACCORD BP trial. Intensive target of SBP less than 120 mm Hg did not reduce fatal and nonfatal major cardiovascular events but increased the incidence of adverse effects.[87] Serious side effects of aggressive BP lowering include hypotension, bradycardia, hypokalemia, and elevated SCr, and these effects must be diligently monitored. For T.M. it is recommended that adequate doses of furosemide, and ramipril or losartan with close monitoring, be the main therapeutic approach for her HTN. Extended- or controlled-release formulations of metoprolol or carvedilol should be considered as it has been deemed beneficial for HF. Verapamil in sustained-release formulation is only beneficial for CAD and HTN, and should not be used based on T.M.'s unstable HF.[84]

Diabetes in the Elderly

CASE 102-3, QUESTION 11: T.M. reports that she frequently feels lightheaded and shaky after she takes the

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TABLE 86-1
American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders,* Criteria for Substance Dependence and Substance Abuse[1]

Criteria for Substance[a] Dependence
A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

1. Tolerance, as defined by either of the following:
   a. A need for markedly increased amounts of the substance to achieve intoxication or desired effect
   b. Markedly diminished effect with continued use of the same amount of substance
2. Withdrawal, as manifested by either of the following:
   a. The characteristic withdrawal syndrome for the substance
   b. The same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms
3. The substance is often taken in larger amounts or over a longer period than was intended
4. There is a persistent desire or unsuccessful efforts to cut down or control substance use
5. A great deal of time is spent in activities to obtain the substance, use of the substance, or recovery from its effects
6. Important social, occupational, or recreational activities are given up or reduced because of substance use
7. The substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., continued drinking despite recognition that an ulcer was made worse by alcohol consumption)

Criteria for Substance Abuse
A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring at any time in the same 12-month period:

1. Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, home
2. Recurrent substance use in situations in which it is physically hazardous
3. Recurrent substance-related legal problems
4. Continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance

[a] Substance is defined as any drug, including alcohol.
Source: American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders.* 4th ed., Text Revision (DSM-IV-TR). Washington, DC: American Psychiatric Publishing; 2000.

white powder refined heroin from Asia or South America.[6] The purity of available heroin enables a new, younger user population, who can smoke or snort this high-purity heroin and avoid the stigma and hazards associated with needle use. As the addiction progresses and the user's "habit" (amount used daily) increases, however, the user will often begin injecting the drug. The DEA estimates there are roughly 800,000 heroin addicts in the United States. The 2008 National Survey on Drug Use and Health, which does not survey institutionalized populations, and may therefore actually underestimate the true incidence, found the number of current heroin users in the United States was 213,000 in 2008.[2]

Heroin is often sold in glassine bags referred to as "dime" ($10) or "quarter" ($25) bags. A dime bag contains 40 to 50 mg of heroin.[6] Mexican tar, which looks and feels like sticky black roofing tar, is sold as a gummy, pasty chunk, the size of a matchhead, which is enough for two to five doses. The cost of a chunk of Mexican tar this size is $20 to $25. The cost of heroin dependence can range from $20 to $200/day, depending on the level of use. Some prescription opioid abusers will eventually switch to using heroin, as it is less expensive.

Heroin Addiction

CASE 86-2, QUESTION 2: D.J. developed a "big habit" (tolerance developed, and his daily requirement of drug to maintain euphoria had increased). He could not "hustle" (obtain by any means) any more cash on a daily basis. When he tried "kicking" (abrupt cessation of drug use) the drug "cold turkey" (without any therapy for withdrawal symptoms), he became "dope sick" (typical heroin withdrawal symptoms), which was extremely unpleasant. He has been "chipping" (using only occasionally) since his withdrawal. Is D.J. "hooked" (addicted)?

Abstinence precipitated a withdrawal syndrome in D.J.; therefore, he is by definition physically addicted to heroin. The powerful ability of the drug to rapidly alleviate withdrawal symptoms results in reinforcement to continue using the drug. D.J.'s ongoing desire to continue using heroin despite his inability to afford it and his all-day hustling constitutes a psychological dependence on heroin.

Noticeable opioid physical dependence is highly variable, but it is assumed that the potential for an abstinence syndrome exists after repeated administration for only a few days.[7]

OPIOID WITHDRAWAL

CASE 86-2, QUESTION 3: D.J. arrives at the detoxification clinic 10 hours after his last dose of heroin. He is sweating and shaking and keeps yawning. His pulse is 92 and his blood pressure is 130/86 mm Hg. Should he be treated for opioid withdrawal?

Six to 12 hours after the last dose of morphine or heroin (diacetylmorphine), patients addicted to heroin will typically experience symptoms of anxiety, hyperactivity, restlessness, and insomnia with yawning, sialorrhea, rhinorrhea, and lacrimation. There may also be profuse diaphoresis with concurrent shaking chills and pilomotor activity resulting in waves of gooseflesh of the skin (thus, the term *cold turkey*). Anorexia, nausea, vomiting, abdominal cramps, and diarrhea may occur. Severe back pain may accompany muscle spasms that cause kicking movements ("kicking the habit"). These symptoms are most severe 48 to 72 hours after the last opioid dose. D.J. is exhibiting typical heroin withdrawal symptoms, and supportive therapy would be appropriate.

During withdrawal, the heart rate and blood pressure may be elevated. Inadequate nutrition and hydration, combined with vomiting, sweating, and diarrhea, can result in marked weight loss, dehydration, ketosis, and acid–base imbalance. Rarely, cardiovascular collapse has occurred during the peak phase of opiate withdrawal.

renal damage but is also a powerful predictor of cardiovascular morbidity and mortality. For most patients, eGFR begins to decline once proteinuria is established. Because of this association, annual testing for the presence of microalbuminuria is indicated in patients who have had type 1 diabetes for more than 5 years and in all patients with type 2 diabetes starting at diagnosis.[85] The presence of albuminuria indicates irreversible kidney damage. G.B. has likely reached the point at which such damage is inevitable because her urinary protein exceeds ranges normally observed at the earlier stages of kidney disease. G.B.'s current laboratory data suggest that she has substantial kidney disease and has developed associated complications of the disease. Although progression to ESRD is generally beyond prevention at this stage, appropriate intervention can slow the progression to ESRD for G.B. Progressive diabetic nephropathy consists of proteinuria of varying severity occasionally leading to nephrotic syndrome with hypoalbuminemia, edema, and an increase in circulating LDL cholesterol as well as progressive azotemia.

Management

CASE 31-1, QUESTION 4: How should G.B.'s kidney disease be managed?

Because reversal of G.B.'s kidney disease is not possible, the primary goals are to delay the need for dialysis therapy as long as possible and to manage complications. The three main risk factors for the progression of incipient nephropathy to clinical diabetic nephropathy are poor glycemic control, systemic hypertension, and high dietary protein intake (>1.5 g/kg/day). G.B.'s current random blood glucose concentration of 289 mg/dL, history of elevated glucose on prior visits, and elevated hemoglobin A_{1c} indicate poorly controlled diabetes, which will accelerate the progression of diabetic nephropathy and time to ESRD. Thus, her blood glucose concentrations should be maintained within target goals while avoiding hypoglycemia. G.B.'s elevated BP is likely the result of kidney disease and changes in intravascular volume; reduction of BP may prevent further damage to functioning nephrons and slow the progression to ESRD. Similarly, reductions in dietary protein intake (dietary protein intake of approximately 0.8 g/kg body weight per day) should be initiated in an attempt to reduce the rate of further progression, although this needs to be evaluated in the context of her overall nutritional status.

INTENSIVE GLUCOSE CONTROL

Strict glycemic control is clearly indicated to improve diabetic management, reduce proteinuria, and slow the rate of decline in eGFR.[78] The Diabetes Control and Complications Trial (DCCT), a randomized clinical trial of type 1 diabetic patients (n = 1,441), demonstrated that maintaining fasting blood glucose concentrations between 70 and 120 mg/dL, with postprandial blood glucose concentrations less than 180 mg/dL, delayed the onset and progression of microvascular diseases such as diabetic nephropathy and reduced the risk of CKD. Patients were randomly assigned to receive either conventional insulin treatment (one to two insulin doses a day) or intensive treatment (three or more insulin doses a day). After a mean follow-up of 6.5 years, the intensive insulin regimen reduced the overall risk of microalbuminuria (defined as urine albumin ≥40 mg/24 hours) by 39% and albuminuria (defined as urine albumin ≥300 mg/24 hours) by 54%. Unfortunately, stricter glycemic control was associated with an increased incidence of hypoglycemic episodes.[86]

The UK Prospective Diabetes Study (UKPDS) demonstrated the beneficial effects of intensive glycemic control in patients with type 2 diabetes (n = 3,867). During a 10-year treatment period, intensive glucose control (fasting glucose <108 mg/dL) with either insulin or an oral sulfonylurea reduced microvascular complications (e.g., retinopathy and nephropathy), including albuminuria by 33%, when compared with conventional dietary therapy (fasting glucose <270 mg/dL). Similar to the DCCT, intensive treatment groups in the UKPDS experienced more hypoglycemic reactions.[87]

Newer diabetes trials such as Action to Control Cardiovascular Risk in Diabetes (ACCORD) and Action in Diabetes and Vascular Disease: Preterax and Diamicron MR Controlled Evaluation (ADVANCE) evaluated the macrovascular and microvascular outcomes associated with intensive glucose control in type 2 diabetics. The ACCORD trial was stopped early because of deaths in the intensive treatment arm. Results at the time of study discontinuation did not show a significant reduction in macrovascular or microvascular events.[88] In the ADVANCE trial there was a 21% reduction in kidney disease and 30% reduction in the development of macroalbuminuria. Similar to other studies, severe hypoglycemia, although uncommon, was more common in the intensive-control group.[89]

On the basis of this information and the need to minimize risk of hypoglycemia, the recommended goals in the adult diabetic population are a preprandial plasma glucose of 90 to 130 mg/dL, peak postprandial plasma glucose of less than 180 mg/dL, and a hemoglobin A_{1c} less than 7%.[85] G.B. will benefit from intensive oral therapy and achievement of these goals despite her advanced kidney disease. G.B. should be counseled on appropriate techniques for home glucose monitoring, particularly given her history of noncompliance. Compliance with this regimen will require motivation as well as encouragement from G.B.'s family and health care providers. (See Chapter 53, Diabetes Mellitus, for a more complete discussion of intensive insulin therapy and counseling.)

ANTIHYPERTENSIVE THERAPY

Systemic hypertension usually occurs with the development of microalbuminuria in patients with type 1 diabetes. It is also present in about one-third of patients at the time of diagnosis of type 2 diabetes, and hastens the progression of kidney disease in both groups. The coexistence of these disorders further increases the risk of cardiovascular events. Hypertension may be a result of underlying diabetic nephropathy and increased plasma volume or increased peripheral vascular resistance. Regardless of the etiology, virtually any level of untreated hypertension (either systemic or intraglomerular) is associated with a reduction in eGFR. As such, the control of systemic and intraglomerular BP is perhaps the single most important factor for retarding the progression of kidney disease and has been shown to increase life expectancy in patients with type 1 diabetes.[41]

Patients with diabetes and hypertension exhibit elevated systemic vascular resistance and increased vasoconstriction from angiotensin II, which are in large part responsible for the glomerular damage characteristic of diabetic nephropathy. Although the management of hypertension with virtually any agent can attenuate the progression of kidney disease, ACE inhibitors, which inhibit the synthesis of angiotensin II, and ARB, which block angiotensin II AT_1 receptors, are preferred owing, in part, to the effects of these agents on renal hemodynamics (Fig. 31-1). Reductions in proteinuria and a decreased rate of decline in eGFR have been observed with ACE inhibitors and ARB in patients with type 1 and type 2 diabetes (see also the Prevention section in the Progressive Kidney Disease section).[35,49,56,57] As a result of these and other studies, ACE inhibitors or ARB should be considered for all patients with diabetes and microalbuminuria, even if their BP is normal.[78] Data comparing these two classes of agents are few. The ONTARGET (n = 25,620) trial compared the

school, and she has used a variety of medications intermittently (clemastine, fexofenadine, beclomethasone nasal, ketotifen ophthalmic) over the years. C.L. is a competitive runner but has been unable to run as far or as often as usual due to bothersome symptoms. She is also reluctant to use medications as they may be prohibited by her race sponsors. A running partner mentioned that she could control her allergy symptoms with diet, exercise, and herbal remedies purchased at a local nutritional supplement shop. What, if any, alternative treatments have been shown to be efficacious in allergic rhinitis?

Alternative treatments are common among adults with rhinitis and should be taken into account by health care providers. A survey of 300 adults indicated that herbal agents, caffeine-containing products, homeopathy, acupuncture, aromatherapy, reflexology, and massage were common alternative treatments for respiratory conditions.[127] Still, because allergic rhinitis is largely a self-managed disease, it is likely that reported use of these agents is underestimated. For these reasons, patients should always be questioned specifically about the use of alternative therapies during the patient interview. Although some alternative approaches have been deemed to be safe, efficacy for many modalities has not been clearly established.[23,40] In addition, some complementary therapies have been associated with side effects and potential drug interactions.[128–130] Because of C.L's reluctance to use medications, other strategies are appropriate to consider to help her manage her rhinitis symptoms.

LIFESTYLE CHANGES

Some reports have indicated that patients with allergic rhinitis may benefit from hydration and a diet low in sodium, omega-6 fatty acids, and transfatty acids, but high in omega-3 fatty acids (e.g., fish, almonds, walnuts, pumpkin, and flax seeds), and at least five servings of fruits and vegetables per day.[131] These recommendations are not without merit, because they may be beneficial for the population at large, but insufficient evidence exists to support specific value for allergic rhinitis symptoms.

PHYSICAL TECHNIQUES

For the motivated patient, mind–body interventions, such as yoga, hypnosis, and biofeedback-assisted relaxation and breathing exercises, are beneficial for stress reduction in general which may improve the quality of life associated with rhinitis symptoms and treatment.[128] Acupuncture has been shown to have an attributive effect in inflammatory diseases such as rhinitis; however, data are not sufficient to recommend this therapy at this time.[132]

Menthol-delivered rubs have been shown to have an ameliorating effect on nasal congestion; however, the effects are short-lived.[133] Other forms of aromatherapy suggested to relieve nasal congestion include massaging the essential oils of lavender and niaouli around the sinuses, or inhaling eucalyptus and peppermint oils.[134] Data are also lacking about the efficacy of these treatments.

Phototherapy for allergic rhinitis has been investigated with positive results[135] but simpler methods are needed for this to be useful outside of the research arena.[23] Saline nasal irrigation (e.g., neti pot) is simple, inexpensive and has been shown to have some efficacy.[23,61]

HERBAL MEDICINES

It has been suggested that herbs that support improved immune function could also help to ease symptoms of allergy.[136] With this in mind, echinacea has become one of the top-selling herbal products in the United States. Echinacea, however, is closely related to sunflowers, daisies, and ragweed—all members of the Compositae (Asteraceae) family.[137] The possibility that cross-sensitivity between echinacea and other environmental allergens may trigger allergic reactions is supported by an Australian review of all adverse drug reports, including cases of anaphylaxis, associated with echinacea.[137] Patients with known allergy to these plants should be cautioned regarding the use of echinacea products.

A few herbal therapies, including butterbur[138–140] and spirulina,[141] potentially hold some promise but more investigation is needed before they can be included in recommended treatment algorithms.[23] No good clinical data are available on the efficacy of supplements containing vitamin C, grapeseed extract, bee pollen and honey, probiotics, burdock, ginger, freeze-dried stinging nettle leaves, or quercetin (a bioflavonoid found in apples, buckwheat, grapes, red onions, red wine, and white grapefruit).[40]

OTHER

Reports regarding the use of intranasal zinc for upper respiratory symptoms, particularly those associated with the common cold, have been conflicting. Although zinc gels and sprays are popular OTC products, they have been shown to be ineffective in a double-blind, placebo-controlled clinical trial[142] and have been associated in zinc-induced anosmia syndrome, particularly when the products are sniffed deeply.[143] Some products have been removed from the market because of this problem.

Some studies have shown that patients with allergic rhinitis who received homeopathic dilutions of allergens had significantly better nasal air flow than those in the placebo group, but overall no difference was seen in subjective measurement on a visual analog scale.[144] Further investigation is needed before homeopathy can be recommended for allergic rhinitis.

Although a variety of alternative remedies are widely available and used frequently in self-treatment, based on evaluation of these data, there is no firm recommendation for C.L. regarding the use of alternative therapies in allergic rhinitis.[40,130] C.L. should be advised to consult with the specific regulating agency that governs her sporting activities (e.g., the World Anti-Doping Agency for Olympic events) to gain a clear understanding of medicines that are banned in all cases as compared to those that may be used with medical exemptions or used outside of the competitive window. This may allow her to use many conventional treatments (e.g., intransal steroids) with confidence. Saline irrigation would also be a safe, noncontroversial option that may offer some efficacy.

Immunotherapy

EFFICACY

CASE 25-6

QUESTION 1: R.C. is a 25-year-old schoolteacher who has experienced allergic symptoms since childhood, but noticed a worsening after she graduated from college and moved to a new area of the country. Although she has mild symptoms year-round, she has severe exacerbations during April through June and August through October each year. During these periods, she feels that exposure to cut grass and weeds provoke profound nasal symptoms. She also notes that when she spends more time outdoors in spring and early fall, her regular therapy, fluticasone nasal spray (2 sprays per nostril once daily), is less effective. She has added loratadine (10 mg daily) during this time, but is frustrated by having to take so many medications while continuing to experience symptoms. R.C. asks your opinion about allergy shots, remarking that she started them as

transmission to persons consuming food prepared or served by workers infected with hepatitis A, the routine administration of immunoglobulin in this setting is not recommended.[17,22,23]

When immunoglobulin is required for infants or pregnant women, preparations free of thimerosal should be used.[22] Although immunoglobulin does not impede the immune response to inactivated vaccines, oral poliovirus vaccine, or yellow fever vaccine, it may interfere with the response to live attenuated vaccines such as measles, mumps, rubella (MMR) vaccine and varicella vaccine. Therefore, MMR and varicella vaccine should be delayed for at least 3 months after administration of immunoglobulin for HAV prophylaxis. Immunoglobulin should not be given within 2 weeks after the administration of MMR or varicella vaccine. Finally, if immunoglobulin is administered within 2 weeks of MMR, the person requires revaccination, but not sooner than 3 months after the immunoglobulin administration for MMR. Serologic tests for varicella vaccination should be performed 3 months after immunoglobulin administration to determine whether revaccination is required.

HEPATITIS B VIRUS

Virology

HBV is a partially double-stranded DNA virus that is a member of the Hepadnaviridae family of viruses (Table 77-2).[2,3,56–59] Unlike HAV, HBV is antigenically complex, and results in an acute illness with or without a chronic disease state.

For an illustration of HBV and a schematic of the HBV genome structure and mRNA transcripts, go to http://thepoint.lww.com/AT10e.

The life cycle of HBV is described in Figure 77-2. Elucidation of the HBV life cycle has resulted in opportunities for drug development. Of special importance, the HBV polymerase functions as both a reverse transcriptase (RT) for synthesis of the negative DNA strand from genomic RNA and as an endogenous DNA polymerase. Because the HBV polymerase is remotely related to the RT enzymes of retroviruses (e.g., HIV), some inhibitors of HIV polymerase or RT also have activity against the HBV polymerase. Thus, several RT inhibitors have been evaluated for treating and preventing HBV; however, rapid emergence of resistance occurs with many of these agents.

Epidemiology

Approximately 5% of the world's population is infected with HBV.[1–3,56,60–62] It is estimated that more than 1.25 million carriers (defined as persons positive for HBsAg for >6 months) occur in the United States, many of whom are immigrants from endemic areas and Alaskan natives (6.4%).[1–3,56,60–62] The incidence of acute HBV infection has declined in the United States.[1–3,56,60–62] This reduction has occurred in all age, racial, ethnic, and high-risk groups, but particularly in children and health care workers, groups with the highest rate of vaccination. Less high-risk behavior also has led to decreased transmission of infection. High-risk groups in the United States for acquiring HBV infection include certain ethnic groups (Alaskan natives, Pacific Islanders), first-generation immigrants from regions of high endemicity (Southeast Asia), injection drug users, gay men, black Americans (compared with white Americans), and males (more than females).[1–3,56,60–62] The most prominent risk factors associated with acute HBV infection include heterosexual contact (42%), men having sex with men (15%), and injection drug use (21%).[1–3,56,60–62] HBV vaccination opportunities include clinics for sexually transmitted disease (STD) (and contacts) and in prisons and holding centers for incarceration.

The epidemiology of chronic HBV infection is less well known; 0.2% of the US population is HBsAg positive.[1–3,56,60–62] Blacks are more likely to be HBsAg positive than whites, but the highest reported rates of HBsAg symptoms are among Asian Americans, especially those from China and Southeast Asia. In population-based surveys, HBV is responsible for 1% to 14%

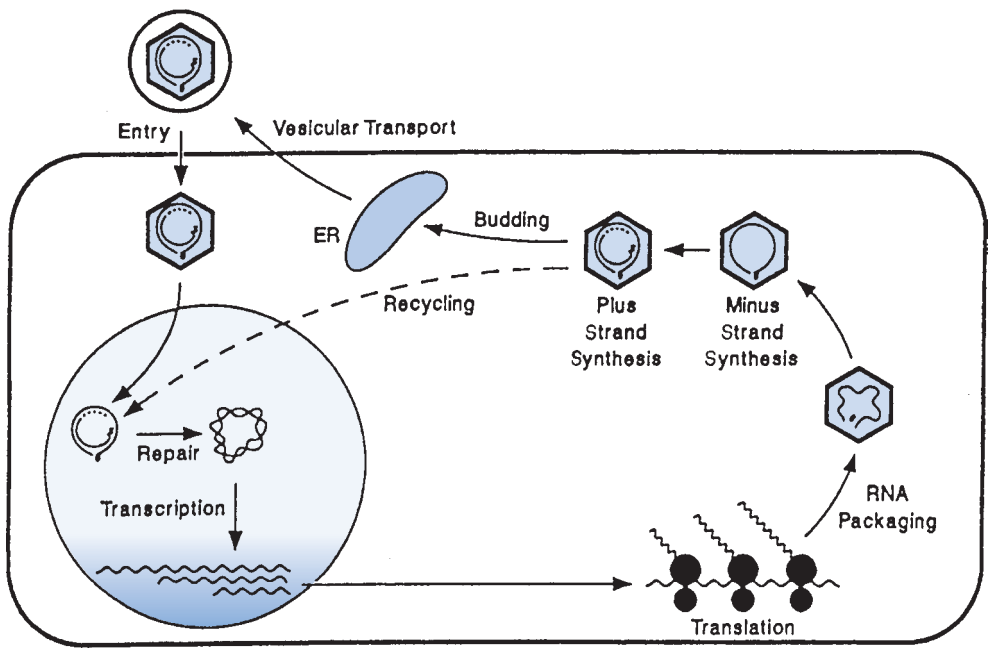

FIGURE 77-2 Life cycle of hepatitis B virus. ER, endoplasmic reticulum. (Reprinted with permission from Ganem D. Hepadnaviridae: the viruses and their replication. In: Fields BN, ed. *Fundamental Virology*. 3rd ed. Philadelphia, PA: Lippincott-Raven; 1996:1199.)

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