

Chapter 21

Geriatric Models of Care



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Introduction

Models of care addressing the unique needs of older hospitalized patients can be traced to the comprehensive geriatric assessment (CGA) programs first developed in the 1970s [1]. CGA programs screen older patients at high risk for geriatric-specific problems, assess for modifiable risk factors, and implement evidence-based strategies consistent with the patient's treatment goals. Over the last 30 years changes in the health-care system, coupled with the increasing older adult population, has led to development of several geriatric models of care across all health-care settings. In general, the goals of these geriatric models of care in the hospital focus on (1) prevention of complications that occur more commonly in older adults and (2) address hospital factors that contribute to complications. This chapter provides a brief overview of complications that are more frequently found in older patients, care delivery issues that are addressed by geriatric models of care and a description of the most commonly employed hospital models.

Complications of Older Hospitalized Patients

Although patients aged 65 and over represent about 13% of the US population, they account for 40% of those undergoing surgical procedures in American hospitals [2]. In addition to the high proportion of older patients, the most troublesome finding is that older patients also represent a higher complication rate for certain conditions which subsequently lead to higher health-care costs. Age may be viewed as a proxy for multiple chronic diseases. Postoperative complications that are known determinants of short and long-term survival following major surgery such as

myocardial infarction and sepsis are associated with age due to the increased likelihood of co-morbidities such as cardiac disease [3].

Older adults are more likely to experience additional types of complications that, in addition to reducing survival, can result in loss of independence and lead to hospital readmission, increased usage of rehabilitation services, and new placement in a nursing home. Physical frailty and cognitive impairment [4–6] (either chronic dementia and/or delirium) can further compound an older person's vulnerability to complications during hospitalization [7, 8]. Frailty refers to "decreased reserves in multiple organ systems" [9] that is highly associated (after controlling for age, race, sex, and comorbid illness) with an increased risk for falls, cardiovascular disease, hypertension as well as reduced mobility, decreased functional status, institutionalization, and death (see Chap. 10) [10, 11].

Persons with dementia are more prone to negative outcomes related to disease management and hospitalization. Older patients with dementia hospitalized for exacerbation of a chronic disease have significantly longer lengths of hospital stays (LOS) as compared to older patients without dementia. For example, the LOS of older patient with COPD is 121 days/1,000 persons as compared to older patients with both COPD and dementia, who have a LOS of 361 days/1,000 persons [12]. For those who develop delirium (for both those with and without an underlying chronic dementia) during hospitalization, increased LOS and higher hospital costs is well documented [13]. The complex challenges of those adult patients with cognitive impairment are often not adequately addressed. Table 21.1 provides examples of common behaviors of cognitively impaired persons that can lead to complications.

Although geriatric models of care can improve the overall outcomes and experiences of hospitalization, in general, these programs are designed to target those adverse events that occur more commonly in older patients. Table 21.2 provides a summary of these complications and the clinical and cost outcomes associated with these complications. These complications are often referred to as "geriatric syndromes"

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TABLE 21.1 Behaviors of cognitively impaired patients contributing to high complication rate

Behaviors	Example	Potential complication
Inability to follow directions	Does not use call bell to ask for assistance and gets out of bed without needed assistance	Fall-related injury
Removal of treatments	Pulls out central lines	Hemorrhage Infection Physical restraints and associated complications
Not able to communicate needs	In pain but not able to verbally communicate this to nurse	Functional decline
Wandering	Leaves unit and exits hospital in gown	Hypothermia Other injuries Use of physical and chemical restraints that increase likelihood of delirium, falls, fall-related injury, nutritional problems
Misinterprets visual and auditory cues	Resists staff attempts to assist the patient to get out of bed which is perceived as an assault and then hits staff	Agitation-related injury Overuse of psychoactive medication that increase likelihood of delirium, falls, and fall-related injury
Decreases inhibition of inappropriate behaviors	Removes clothing and walk down hallway nude	Agitation-related injury Overuse of psychoactive medication that increases likelihood of delirium, falls, and fall-related injury

which refer to “clinical conditions in older persons that do not fit into discrete disease categories.” [14]

A US congressional mandate instituted on August 1, 2007 significantly changed the Inpatient Prospective Payment System that the Centers for Medicare & Medicaid Services (CMS) use to reimburse hospitals [15–17]. As of October 2008, hospitals will no longer receive payment for eight hospital-acquired conditions; three of these eight are complications that are known to occur most frequently in older inpatients and have been found to be reduced when geriatric models of care are employed [18]. These three complications (fall-related injury, pressure ulcer, and catheter-associated urinary tract infection) are among the six adverse events or complications specifically associated with hospitalization of older adults. Although there are other geriatric syndromes (e.g., incontinence) and other potential complications associated with older inpatients (e.g., sleep deprivation, inadequate pain management, dehydration, adverse drug effects), many of these syndromes and complications are either risk factors or outcomes of the following.

Functional Decline

Functional decline refers to the loss of the ability to perform basic activities of daily living (ADL). A systematic review of 30 studies examining correlates of functional decline found that between 15 and 76% of hospitalized elders experience diminished performance in at least one ADL at discharge [19]. Of those with decline at discharge, only half will recover function at 3 months postdischarge, and, for many, this decline will result

in permanent loss of independent living [20, 21]. Functional decline is considered a “profound marker of morbidity and mortality” [22, 23] resulting in longer lengths of stay, greater costs and increased rate of nursing home placement [24]. Among the ADLs, the ability to walk independently is considered the most critical in predicting health outcomes. Functional Mobility Decline, defined as new walking dependence, is associated with poor posthospitalization outcomes such as discharge to a nursing home, continued impaired mobility and higher mortality rates [25]. The incidence of functional mobility decline occurs in 15–59% of hospitalized elders [26]. For older hip fracture patients, especially those with cognitive and affective disorders, there is a greater risk of functional decline and new nursing home placement [27, 28].

Fall-Related Injury

Roughly 2–5% of older adults fall during hospitalization [29]. The number of falls per 1,000 patient days is highest in hospital units admitting mostly older adults such as geropsychiatry, rehabilitation, and geriatric medicine. Among hospitalized older adults, falls from bed account for approximately one-third of all falls. Almost one-third of all fall-related injuries occur among persons 85 years of age or older. Approximately 3–10% of falls happening in hospitals result in either serious or minor injuries [30]. Hip fractures, occurring in about 1–4% of hospital falls are particularly significant because older adults are more likely to suffer from a substantial decline in physical functioning and often require longer periods of active rehabilitation services as compared to younger persons [31].

Undernutrition/Malnutrition

Undernutrition and malnutrition are deficiency syndromes caused by inadequate intake or absorption of macronutrients. Malnutrition has long been associated with important adverse outcomes, such as increased morbidity and mortality and decreased quality of life. Weight loss and hypoalbuminemia are both strongly correlated with increased mortality in ill adults [32]. Body weight and body composition have important implications for physical functioning of older persons and the prevalence of malnutrition in older hospitalized patients has been estimated to be between 40 and 60% [33].

Pressure Ulcers

Pressure ulcers continue to present a major health problem for hospitalized adults with reported nosocomial incidence rates between 0.4 and 38% [34]. Pressure ulcers are highly correlated with age [35]. At least a fifth of pressure ulcers will progress to a more advanced stage of deterioration. Most ulcers develop in the sacrum and coccyx areas with rates higher in patients with mobility impairment. Pressure ulcers remain a major cause of morbidity and are associated with longer lengths of hospital stay. Nosocomial pressure ulcers and their progression in severity during hospitalization have been used as a quality care indicator [36].

Urinary Tract Infection

Approximately 4% of patients with urinary tract infection (UTIs) will develop bacteremia which is known to significantly increase in length of stay and is associated with higher mortality in older patients [37]. The major care-associated practice leading to UTI in older inpatients is the overuse of urinary catheters, defined as catheter use for longer than 2 days [38]. Catheter-associated urinary tract infection (CAUTI) is the most common nosocomial infection [39]. A study using a random sample of almost 36,000 Medicare patients undergoing major operations from 2,965 US hospitals reported that 86% had perioperative indwelling urinary catheters and among these 50% had catheters for longer than 2 days postoperatively. These patients' risk of developing a urinary tract infection was twice as likely compared to patients with catheterization [40]. Among another sample of approximately 39,000 Medicare patients undergoing major surgery who were discharged to a nursing home it was found that those patients discharged with catheters were at higher risk for rehospitalization for UTI and death within 30 days than patients who did not have catheters [41].

In addition to infection, catheter use is associated with immobility, delirium, and pain [42].

Delirium

Delirium, a transient state of cognitive impairment, may develop in both cognitively intact and impaired older adults. It is estimated that between 14 and 24% of older persons are admitted to the hospital with delirium, and an additional 6–56% of hospitalized elders will develop delirium during their hospitalization especially if they are admitted to an ICU [43]. Postoperative delirium is more likely to occur following hip fracture, cardiac, non-cardiac thoracic, aortic aneurysm, and abdominal surgery. Postoperative delirium is more likely in those deemed vulnerable. Patient vulnerability including presence of previous brain pathology, decreased ability to manage change, impaired sensory function, multiple co-morbidities and changes in pharmacodynamic responses to medications, are all suggested possible causes for delirium. In surgical patients both preoperative (use of narcotic analgesics, history of alcohol abuse and depression) and perioperative (greater intraoperative blood loss, more postoperative transfusions, postoperative hematocrit less than 30%, and severe postoperative pain) risk factors have been identified for delirium postoperatively [44]. Additionally, hospital practices that lead to iatrogenic events including use of physical restraints, malnutrition, more than three medications and urinary catheterization are also significantly associated with delirium [45]. There are no significant differences in incidence of postoperative delirium following general vs. epidural anesthesia.

Despite high incidence, most delirium goes undetected [46, 47] thus contributing to many negative consequences. Delirium is associated with poor hospital outcomes such as higher mortality rates, increased length of hospital stay, increased intensity of nursing care, greater health-care costs as well as increased risk of several adverse outcomes after discharge, including functional decline, persistent cognitive impairment, rehospitalization, and nursing home placement [48].

The occurrence of each of these complications leads to interventions that can often prolong the hospital stay. Following hospital discharge, they frequently contribute to death, institutionalization as well as disproportionately high rehospitalization rates, high emergency department usage, and increased need for rehabilitation therapy services. As illustrated in Table 21.2, the *interrelationships* among these various complications during hospitalization is obvious and also well documented [12]. The data supporting the importance of prevention, early detection, and treatment of these complications in older surgical patients is described in the ACOVE (Assessing Care of Vulnerable Elders) report, Quality Indicators for Hospitalization and Surgery in Vulnerable Elders [49].

TABLE 21.2 Complications in the older surgical patient^a

Complication	Hospital factors ^b	Clinical outcome	Cost implications
Functional decline	<ul style="list-style-type: none"> • Immobility • Bed rest without medical/surgical indication • Physical restraint • Inappropriate medication prescribing • New psychoactive drug use • Obstacles in the hospital physical environment 	<ul style="list-style-type: none"> • Reduced/loss of independence in function (activities of daily living) • Reduced/loss of ambulation • Pain • Increased rate of pressure ulcers, falls, fall-related injuries, and development of contractures 	<ul style="list-style-type: none"> • Longer length of stay (LOS) • Increased rate of institutional or home-based rehabilitation • Nursing home placement
Fall-related injury	<ul style="list-style-type: none"> • Immobility • Physical restraint • Inappropriate medication prescribing • New psychoactive drug use • Obstacles in the hospital physical environment 	<ul style="list-style-type: none"> • Pain • Fracture requiring surgical intervention • Reduced/loss of independence in function (activities of daily living) • Reduced/loss of ambulation 	<ul style="list-style-type: none"> • Medicare will not pay for treatment^c • Surgery • Longer LOS • Institutional or home-based rehabilitation • Nursing home placement
Under/malnutrition	<ul style="list-style-type: none"> • Immobility • Inattention to oral care • Lack of feeding assistance for those with physical or cognitive impairments 	<ul style="list-style-type: none"> • Reduced wound healing • Discomfort due nasogastric tube placement • Percutaneous enteral access procedures (gastrostomy) • Delirium • Physical restraint to prevent tube removal • Aspiration • Functional decline 	<ul style="list-style-type: none"> • Longer LOS • Surgery • Institutional or home-based enteral nutrition therapy
Pressure ulcer	<ul style="list-style-type: none"> • Immobility • Physical restraint • Under/malnutrition • Dehydration 	<ul style="list-style-type: none"> • Immobility • Sleep deprivation • Pain • Sepsis • Septicemia • Surgical debridement • Surgical techniques (direct closure, flaps, and skin grafting) 	<ul style="list-style-type: none"> • Medicare will not pay for treatment^b • Longer LOS • Institutional or home-based skilled nursing treatment
Urinary tract infection (UTI: secondary to catheter use or CAUTI)	<ul style="list-style-type: none"> • Emergency room placement without indication • Incontinence treatment • No postsurgical monitoring of catheter use 	<ul style="list-style-type: none"> • Immobility • Pain • Delirium • Acute pyelonephritis • Bacteremia • Sepsis • Prosthetic joint infection • Higher risk for death 	<ul style="list-style-type: none"> • Medicare will not pay for treatment^b • Longer LOS • Rehospitalization
Delirium	<ul style="list-style-type: none"> • Physical restraint • Inappropriate medication prescribing • New psychoactive drugs • Urinary catheterization • CAUTI • Immobility • Under/malnutrition • Dehydration 	<ul style="list-style-type: none"> • Functional decline • Persistent cognitive impairment • Falls, injuries • Undetected infection • Sleep deprivation 	<ul style="list-style-type: none"> • Longer LOS • Rehospitalization • Nursing home placement • Death

^aGeriatric syndromes refer to “clinical conditions in older persons that do not fit into discrete disease categories.” This may also include other conditions highly associated with aging such as frailty, sleep disorders, self-neglect. For the purpose of this review, these syndromes and potential complications are more narrowly defined

^bHospital factors. There is a myriad of patient and hospital factors that contribute to each complication, however, this list provides examples of those specific hospital practices that place the older adults at high risk and which are the focus of geriatric care model interventions

^cAs of October 2008, hospitals will no longer receive payment for 8 hospital-acquired conditions; 3 of these 8 indicated in the table are complications that are known to occur most frequently in older inpatients and have been found to be reduced when geriatric models of care are employed (fall-related injury, pressure ulcer, and catheter-associated urinary track infection)

Although patient characteristics, especially multiple co-morbidities, frailty, and cognitive impairment, may increase vulnerability of older inpatient to negative consequences, the hospital environment plays an independent and significant role in determining staff practice and subsequent patient outcomes such as iatrogenic complications. This has led to the development of geriatric models to address these hospital-based or institutional factors that are likely to contribute to complications among older patients. Effective resolution of these negative consequences is dependent on geriatric models that target both patient and environmental (institutional) risk factors.

Geriatric Care Model Objectives

Although geriatric models of care differ in their approach to prevent complications and address care delivery problems that can contribute to complications, all share a common set of general objectives. Although these objectives could be applied to any patient regardless of age, it is how geriatric care models apply these that are age-specific. Table 21.3 provides examples of processes and interventions to meet these six general objectives.

The six general objectives of geriatric care models are as follows.

TABLE 21.3 Geriatric care models: objectives, processes and interventions

Objective	Examples of processes	Examples of interventions
Educate health-care providers in core geriatric principles	<ul style="list-style-type: none"> Resident training includes required geriatric rotation <i>or</i> mandatory geriatric rotation for residents Institutional continuing education includes geriatric-specific training <i>or</i> Geriatric-specific interdisciplinary continuing education programs Geriatric specialist responsible for geriatric training initiatives 	<ul style="list-style-type: none"> Hospital intranet includes geriatric programming Journal club includes geriatric journals and/or articles focusing on geriatric outcomes Medical, surgical, nursing, and interdisciplinary rounds includes geriatric case studies
Target risk factors for complications	<ul style="list-style-type: none"> Policies, protocols, and documentation system includes assessment tools and practices that identify older adults at risk for complications Assessment tools prompt providers to consult geriatric specialists for evaluation of high-risk problems Geriatric specialist provides individual evaluation of risk factors 	<ul style="list-style-type: none"> Electronic medical record (EMR) provides alerts for medications prescribed that are known to increase fall risk EMR prompts providers to document daily cognitive testing results Hospital policy for daily cognitive assessment of at-risk patients Cognitive assessment indicates delirium that leads to geriatric specialist consultation
Incorporate patient (family) choices and treatment goals	<ul style="list-style-type: none"> Policies and protocols support and documentation system includes forms that elicit patient choices as well as family involvement in care Geriatric nurses are prepared to coordinate an interdisciplinary evaluation and promote development of <i>informed</i> patient/family treatment goals and plan of care Palliative care is consulted and provides informed choices to patients/families in situations of life-threatening illness 	<ul style="list-style-type: none"> Admission history includes evaluation of patient's preferences for postdischarge rehabilitation Unlimited visiting hours and bedside recliners encourage family participation in recovery Patient and family preferences for type and degree of family involvement is documented Patient with Alzheimer's disease who is unable to verbally indicate needs is evaluated by palliative care specialist for pain evaluation/treatment
Employ evidence-based interventions	<ul style="list-style-type: none"> Policies and protocols integrate geriatric specific implications Education and training for all clinicians include core geriatric content 	<ul style="list-style-type: none"> Hospital protocol for urinary catheter removal within 2 days postsurgery Unit-based mobility program Physical environment reduces injury risk for nonambulatory patients with dementia such as low-height beds and bedside mats
Promote interdisciplinary communication	<ul style="list-style-type: none"> Medical record facilitates patient information across disciplines Processes in place to encourage face-to-face interaction among disciplines Unit-based and hospital-wide committee includes geriatric specialist representation 	<ul style="list-style-type: none"> Interdisciplinary team rounds held bi-weekly Programmatic initiatives include all applicable disciplines, e.g., physical and occupational therapy in unit-based mobility program Co-manage patients across specialties such as geriatric oncology Collaborate with other programs such as palliative care in providing symptom management
Emphasize discharge planning or transitional care	<ul style="list-style-type: none"> Documentation system provides comprehensive hospital course information to primary care provider and other postdischarge providers (home care, nursing home, etc.) as well as elicits pertinent information <i>from</i> other providers 	<ul style="list-style-type: none"> Patient and caregiver receive comprehensive documentation of hospital treatment, changes in treatment plan, and postdischarge instructions Understanding of instructions is evaluated before discharge Phone follow-up postdischarge to evaluate patient condition and needs

Educate Health-Care Providers in Core Geriatric Principles

The complications most frequently encountered among older patients are often due to system-level problems. These include inadequate educational preparation of health-care providers to recognize age-specific factors that increase risk of complications. All geriatric care models require a coordinator or clinician with advanced geriatric education; however, the implementation of any model depends on direct care staff with the knowledge and competencies to deliver safe and evidence-based care to older patients. Thus, the coordinator or other geriatric clinician role includes teaching of other staff through rounds, journal clubs, conferences, and other internal institutional educational venues.

Target Risk Factors for Complications

Given the disproportion of certain complications or geriatric syndromes among hospitalized older adults, the clinical focus of all geriatric models is prevention via risk factor reduction and early detection of these problems. Some models may focus on a particular syndrome; however, the interrelationship of these complications and their shared risk factors often result in a reduction of the other geriatric syndromes. Targeting risk factors requires standardized assessment tools known to be valid and reliable for older adults. See the Hartford Institute's Try This and How to Try This series for examples of assessment instruments (<http://www.hartfordign.org/trythis>). Implementation of geriatric care models often include institutionalizing these practices such as incorporating these tools in the medical record as well as hospital policies, procedures, and protocols.

Incorporate Patient (Family) Choices and Treatment Goals

All health-care decisions should be guided by the patient's choices. Choices range from decisions about activity level and medication use to more complex issues including advance directives.

Decisions regarding life-sustaining treatment are often influenced by quality of life considerations balanced by the potential length of life. For family members acting in the best interests of patients who can no longer participate in decision-making, this can be a complicated dilemma. Life-sustaining treatments are often employed with very old

patients who die in the course of hospitalization although most prefer comfort care. Geriatric models are meant to address this lack of congruence by supporting efforts to provide care that is more consistent with patients' preferences [50]. For this reason, many geriatric models work collaboratively or in conjunction with palliative care programs.

Employ Evidence-Based Interventions

Given that most physicians, nurses, and other health providers have received minimal content in their training regarding geriatrics, it is not surprising that there is a higher complication rate for older hospitalized patients. Advances in geriatric science, similar to other research-based approaches, are not readily employed in hospital care. Problems with polypharmacy, inappropriate medications (e.g., overuse of psychoactive), overuse of restraints, inadequate detection of delirium, depression, and undermanagement of pain are some of the many hospital factors that can contribute to poor outcomes. Thus, geriatric models promote the use of standardized evidence-based protocols.

Promote Interdisciplinary Communication

Since geriatric syndromes are not just medical problems but represent a complex interaction of medical, functional, psychological, and social issues, other disciplines such as nursing, pharmacy, social work, physical and occupational therapy are needed. Geriatric care models all include interdisciplinary teams, i.e., an approach that facilitates communication among disciplines.

Emphasize Discharge Planning (or Transitional Care)

Many older patients will require rehabilitation or skilled nursing services following hospitalization. Almost a quarter of older hospital patients are discharged to another institution such as a rehabilitation hospital or nursing home and more than 10% are discharged with home care [51]. Older adults are more likely to experience problems associated with discharge planning that can lead to delays in discharge and greater use of emergency service use and hospital readmission. Hospital readmission for older patients is most likely associated with medical errors in medication continuity [52, 53], diagnostic workup, or test follow-up [54]. These

poor outcomes are attributed to a lack of coordination among health-care providers that can result in unresolved medical issues [55] and deficient preparation of patients and their caregivers to carry out discharge instructions [56]. One study found wide variations among providers in discharge planning effectiveness; the providers cited their lack of knowledge and experience when not making appropriate home-care referrals [57]. Thus, geriatric models not only focus on the inpatient experience but also the post-hospital care environment and the care transition following hospital discharge. Two of the six models consider the care transition a primary focus of their programs.

Geriatric Models

There are several types of geriatric models that are currently employed in hospitals throughout the USA. In addition to incorporating the original tenets central to comprehensive geriatric assessment (screen for those at high risk for geriatric-specific problems, assess for modifiable risk factors, and implement strategies consistent with the patients' treatment goals), all strive to deliver quality care for older adults in a cost-effective manner. Comprehensive geriatric assessment assumes that the systematic evaluation of a frail older person by a multidisciplinary health-care team will uncover actual or potential health problems. The considerable advances in geriatric health-care science over the last 30 years can then be applied to treating or preventing these conditions and thus result in better health outcomes.

Although the specific mode of intervening may differ among the models, they all address both common health problems and care delivery issues. The geriatric model may consider all geriatric syndromes or target specific ones such as delirium or functional decline. Similarly, the geriatric model may be employed as a hospital-wide approach, unit-based intervention, or focus on specific processes of hospitalization such as admission screening or discharge planning. Regardless of the structure of the geriatric model, all facilitate the general objectives listed in Table 21.3. Table 21.4 provides a summary of the clinical foci, unique features, coordination, and interventions for each of the six most commonly employed geriatric models of care.

Geriatric Consultation Service

Geriatric Consultation Service provides a geriatrician, a gero-psychiatrist, a geriatric clinical nurse specialist or an interdisciplinary team of geriatric health-care providers to conduct a comprehensive geriatric assessment or evaluate a

specific condition (delirium), symptom (patient dislodges or removes treatment), or situation (adequacy of family support for discharge back to community setting). The consultation may be requested by another primary service for an individual patient or may be initiated by a hospital policy for all patients that are screened at high risk for geriatric-related complications or are admitted from a home-bound program or a nursing home [58].

Outside of academic medical centers, few hospitals have geriatric departments that can provide geriatricians or a geriatric consultation team. Although geriatric nurse specialists may be more prevalent in hospitals than geriatricians, many function without the benefit of a geriatric team or a geriatrician. Similar to geriatricians, it is difficult to evaluate their effectiveness when their practice is limited to a consultative role in which recommendations may not be followed or institutional resources are not adequately available for staff to implement [59].

Acute Care for the Elderly Units

Acute Care for the Elderly (ACE) Units are discrete geriatric care-focused units. Originally developed in the 1970s within Veterans Administration Hospitals, Geriatric Evaluation and Management (GEM) Units were meant to provide comprehensive geriatric assessment delivered by a multidisciplinary team with a focus on the rehabilitative needs of older patients. Multidisciplinary team rounds and patient-centered team conferences are considered the hallmarks of care. The core team includes a geriatrician, clinical nurse specialist, social worker as well as specialists from other disciplines providing consultation: occupational and physical therapy, nutrition, pharmacy, audiology, and psychology. GEM units usually have been redesigned to facilitate care of the older patient, which, in contrast to geriatric consultation services, have direct control over the implementation of team recommendations. Research conducted in the 1980s and 1990s have documented significant reductions in functional decline and suboptimal medication use as well as return to home postdischarge and, more recently, decreased rate of nursing home placement [60] among hospitalized veterans on GEMUs compared to general medical units.

Beginning in the 1990s, Acute Care of Elders (ACE) Units have been implemented in non-VA hospitals although they generally focus on more acutely ill patients than GEM units. These units utilize staff with geriatric expertise working collaboratively in an interdisciplinary team (fostered by care processes such as team rounds and family conferences) in a physical environment with adaptations to address age-related changes (e.g., flooring to reduce glare and low-height

TABLE 21.4 Core components of six geriatric care models

Model type	Clinical outcome focus ^a	Unique features	Program/team coordination	Interventions ^b
Geriatric Consultation	<ul style="list-style-type: none"> Primary focus can vary depending on composition of consult team & may be specific to a surgical specialty or procedure 	<ul style="list-style-type: none"> Employed by primary provider request 	<ul style="list-style-type: none"> Individual consultant (geriatrician, geropsychiatrist or geriatric nurse specialist) <i>or</i> Interdisciplinary team that is coordinated by geriatric medicine or psychiatry fellow, geriatric nurse specialist or an administrative director 	<ul style="list-style-type: none"> Comprehensive geriatric assessment: medical, psychiatric, functional, and social Recommends interventions based on consultant discipline (medicine, psychiatry, or team that includes nurses, social workers, and others) Primary provider chooses which recommendation to employ
Acute Care for the Elderly (ACE)	<ul style="list-style-type: none"> Functional decline 	<ul style="list-style-type: none"> Dedicated unit with explicit admission criteria Requires interdisciplinary team Redesign of physical environment to accommodate physical and cognitive needs 	<ul style="list-style-type: none"> Unit directed and/or team coordinated by geriatrician, geriatric nurse specialist, administrator or co-managed by clinician-manager 	<ul style="list-style-type: none"> Physical environment to promote patient mobility, orientation and staff observation Interdisciplinary rounds facilitate care coordination and thus: <ul style="list-style-type: none"> Identify modifiable risk factors for geriatric syndromes and complications Prevent avoidable discharge delay Promote timely referrals to disciplines or specialists
NICHE: GRN/ACE	<ul style="list-style-type: none"> Nursing processes related to all geriatric syndromes and potential complications, such as avoiding restraint use, initiating urinary catheter removal 	<ul style="list-style-type: none"> Focus on improving nursing care of all geriatric syndromes Prepares staff nurses to take active part in geriatric care management including coordinating or facilitating other geriatric models of care 	<ul style="list-style-type: none"> Program implementation by NICHE Coordinator (usually a geriatric nurse specialist) Geriatric Resources Nurses (staff nurses with additional training) implement protocols Depending on availability, other clinicians (geriatrician, hospitalist, social worker, etc.) work as interdisciplinary team 	<ul style="list-style-type: none"> Nurse-initiated protocols: <ul style="list-style-type: none"> Restraint and psychoactive drug reduction Functional mobility Fall/injury prevention Pressure ulcer assessment/treatment Prevention of UTI – early catheter removal Delirium assessment/treatment Organizational strategies including measurement schema, performance improvement techniques, and management tools to promote implementation of above protocols
HELP	<ul style="list-style-type: none"> Delirium prevention and early management 	<ul style="list-style-type: none"> Requires use of volunteers 	<ul style="list-style-type: none"> Elder Life Nurse Specialist or Elder Life Specialists coordinates interdisciplinary team (geriatrician, recreation therapy, physical therapy, etc.) and trained volunteers 	<ul style="list-style-type: none"> Delirium risk factor protocols: <ul style="list-style-type: none"> Mental orientation Therapeutic activities Early mobilization Vision and hearing adaptations Hydration and feeding assistance Sleep enhancement
APN Transitional Care Model	<ul style="list-style-type: none"> Reducing complications specific during the transition from hospital to home 	<ul style="list-style-type: none"> Requires advanced practice nurse coordinator to follow patient in hospital and following discharge 	<ul style="list-style-type: none"> Advanced Practice Nurse (nurse practitioner or clinical nurse specialist) 	<ul style="list-style-type: none"> Protocols to assess/intervene with: <ul style="list-style-type: none"> Medication discrepancies and inappropriate medication usage Case management and APN surveillance across settings
The Care Transitions Intervention	<ul style="list-style-type: none"> Reducing complications specific during the transition from hospital to home, such as preventing post-hospital medication discrepancies, increase likelihood of patient/caregiver detection of worsening condition 	<ul style="list-style-type: none"> Requires nurse transitions coach to follow patient in hospital and following discharge 	<ul style="list-style-type: none"> Transition Coach (nurse or advanced practice nurse) empowers patient and caregiver 	<ul style="list-style-type: none"> Personal Health Record includes data elements essential to promote productive patient-provider encounters across settings Discharge Preparation Checklist to facilitate patient's knowledge of discharge instructions Medication Discrepancy Tool used by transition coach to identify medication issues

^aAll programs are meant to address geriatric syndromes and potential complications. Geriatric syndromes refer to “clinical conditions in older persons that do not fit into discrete disease categories.” This may also include other conditions highly associated with aging such as frailty, sleep disorders, self-neglect. For the purpose of this review, these syndromes and potential complications are more narrowly defined to 6 of the most common complications

^bInterventions are guided by the use of standardized assessment tools known to be valid and reliable for older adults. See the Hartford Institute’s Try This and How to Try This series for examples of assessment instruments (<http://www.hartfordign.org/trythis>)

beds to reduce fall-related injury), promote orientation (clocks and calendars) and facilitate staff observation (e.g., alarmed exit doors, windows inserted in walls and communal space for meals). The interdisciplinary team (led by geriatricians and/or geriatric nurse specialists) aims to facilitate care coordination and thus identify modifiable risk factors for geriatric syndromes and complications, prevent avoidable discharge delay, and promote timely referrals to disciplines/specialist.

Palmer et al. designed the first ACE unit at the University Hospitals of Cleveland [61]. A randomized controlled trial of Acute Care for Elders in an academic medical center reported improved functional status (ADL or activities of daily living, instrumental ADLs and ambulation) at discharge of patients hospitalized on the ACE unit compared to those on other units. Fewer patients from the ACE group were discharged to nursing homes. These beneficial effects were achieved without increasing in-hospital or postdischarge costs. There were no significant differences in mortality, length of stay, readmission, or hospital costs between the two groups [62]. In another randomized trial conducted in a community hospital, patients were randomly assigned to either ACE care or a regular care unit. Positive outcomes of the ACE intervention was demonstrated in several processes of care including a reduction in restraint use, days to discharge planning and use of high-risk medications. They also found benefit in a composite outcome of ADL improvement and nursing home placement but not in discharge ADL levels alone. There was no significant reduction in length of stay, hospital costs, or mortality in the ACE unit subjects compared to the regular unit subjects [63]. These savings are recognized in integrated health-care delivery systems such as the VA, Kaiser, and PACE (Program of All Inclusive Care of the Elderly); however, our current “silo-based” reimbursement system to individual hospitals does not provide incentives for postdischarge reductions in health services usage [64].

Since one unit cannot provide care for all older patients within a hospital, many hospitals use this unit for patients at highest risk for age-related complications. The unit is an excellent environment for training of all disciplines. ACE staff may also provide consultation throughout the hospital to export ACE principles throughout the health system.

Nurses Improving the Care of Health System Elders

Nurses Improving the Care of Health System Elders (NICHE; <http://www.nicheprogram.org>) is a national program aimed at system improvement to achieve positive outcomes for hospitalized older adults. NICHE has two main goals: improving the quality of care to patients and improving nurse competence. This is accomplished by “modifying the nurse practice environment with the infusion of geriatric-

specific: (a) core values into the mission statement of the institution; (b) special equipment, supplies, and other resources; and (c) protocols and techniques that promote interdisciplinary collaboration.” [65] NICHE includes several approaches, each of which facilitates transfusion of evidence-based geriatric best practices into hospital care. A geriatric nurse specialist as the NICHE Coordinator functions in both a “primary care” role (evaluating and managing patients directly) and in a leadership role (teaching and mentoring others and changing systems of care).” [66] Foundational to NICHE is the Geriatric Resource Nurse Model (GRN) which is an educational intervention model that prepares staff nurses as the clinical resource person on geriatric issues to other nurses on their unit. The GRN model provides staff nurses, via education and modeling by a NICHE coordinator, with specific content for improved knowledge of care management for geriatric syndromes. Clinical protocols and organizational strategies provide necessary tools to apply evidence-based practice. For example, in one NICHE orthopedic unit, GRNs received intensive education on the prevention and detection of delirium in a unit where the primary diagnoses were joint replacement and hip fracture repair. Utilizing a combination of standardized assessment of cognition and focused interventions to prevent post-op delirium, the unit realized a significant reduction in the incidence of delirium. Other systemic interventions utilized by the GRNs include a revised nursing database and delirium-specific order sets [67]. An evaluation of responses of 9,802 direct-care registered nurses from 75 acute care hospitals participating in NICHE found that a positive geriatric nurse practice environment was associated with positive geriatric care delivery. The independent contribution of all three aspects of the geriatric nurse practice environment (resource availability, institutional values, and capacity for collaboration) influences care delivery for hospitalized older adult patients. The study findings demonstrate that a nurse practice environment that provides adequate geriatric-specific resources (continuing education, education, specialty services), promotes interdisciplinary collaboration, and fosters patient, family, and nurse involvement in treatment-related decision-making is associated with quality geriatric care [64]. In single site studies, NICHE hospitals demonstrate improved clinical outcomes, rate of compliance with geriatric institutional protocols; cost-related outcomes; and nurse knowledge. In a study of eight hospitals, nurses reported higher quality of geriatric care following NICHE implementation [68].

NICHE also promotes a unit-based ACE model. The ACE model within NICHE emphasizes: (1) implementation of nurse-driven protocols, (2) geriatric training of all nursing staff, and (3) utilization of geriatric-specific units within a health system’s overall geriatric care programming. Similar to other ACE studies, a NICHE-ACE unit in which the majority of the staff nurses were nationally certified in geriatric

nursing reported lower fall and pressure ulcer rates, and lower length of stay when compared to overall hospital [69].

Since NICHE is a system-level approach it provides a structure for nurses to collaborate with other disciplines and to actively participate or coordinate other geriatric care models. For example, in hospitals with a geriatric department or consultation service, GRNs screen for appropriate referrals to these services and can effectively implement geriatric service recommendations with support from the NICHE coordinator. The models enhance NICHE program effectiveness by expanding the scope of geriatric programming within a health system.

The Hospital Elder Life Program

The Hospital Elder Life Program (HELP; <http://elderlife.med.yale.edu/public/public-main.php>) is a program designed to implement protocols that target six delirium risk factors: mental orientation, therapeutic activities, early mobilization, vision and hearing adaptations, hydration and feeding assistance, and sleep enhancement. These protocols were tested in several well-designed clinical trials and demonstrated significant reduction in the incidence of new delirium. Further, among those who did develop delirium, these protocols are associated with a significant reduction of total number of episodes and days with delirium, functional decline, costs of hospital services, and reduction in use of long-term nursing home services [70, 71].

HELP employs geriatric specialists of various disciplines (geriatrician, geriatric nurse specialist, recreation therapy, and physical therapy) working together as an interdisciplinary team with trained volunteers. The program is coordinated by Elder Life Specialists, typically an Elder Life Nurse Specialist who has advanced geriatric nursing education and is responsible for implementing nursing-related assessments and tracking of delirium risk factor protocol adherence. The latter depends on the involvement of well-trained and supervised volunteers in patient-care interventions [72]. The research-tested protocol was made available to hospitals in 2000. Implementation in many hospitals has been adapted based on hospital resources. This has led to wide variations in adherence to the intervention protocol. Although higher levels of adherence have been associated with lower rates of delirium, these adapted protocols continue to provide positive results [73].

Transitional Care Models

An American Geriatric Society Position Statement defines transitional care as a set of actions designed to ensure the

coordination and continuity of health care as patients transfer between different locations or different levels of care within the same location [74]. Older adult patients with complex medical and social needs and their caregivers require assistance to effectively navigate the health-care system, including recovery from surgery and return to pre-morbid health and living arrangements. Two models have emerged that have demonstrated improved outcomes for older adults hospitalized for both medical and surgical interventions.

APN transitional care model utilizes advanced practice nurses (APNs) whose primary responsibility is to optimize the health of high-risk, cognitively intact older adults with a variety of medical and surgical conditions during hospitalization and for designing and overseeing the plan for follow-up care following discharge [75]. The APN work collaboratively with the older adult, family caregiver, physician, and other health team members and are guided by evidence-based protocols. The same nurse implements this plan after discharge by providing traditional home-care services and by phone availability 7 days a week. Three federally funded, randomized, controlled trials consistently demonstrated that this model of care improves older adults' satisfaction, reduces rehospitalizations, and decreases health-care costs [76–78].

Care transitions coaching or *care transitions intervention* (see <http://www.caretransitions.org/index.asp>) employs a nurse or “transitions coach” to encourage older patients and their family caregivers to assume more active roles during care transitions by facilitating self-management and direct communication between the patient/caregiver and primary care provider. The four content areas or “pillars” of the patient/caregiver intervention are as follows: (1) medication self-management, (2) a patient-centered record, (3) primary care and specialist follow-up, and (4) knowledge of “red flags” warning symptom or sign indicative of a worsening condition [79]. The Personal Health Record includes data elements essential to promote productive patient–provider encounters across settings such as an active health problem list; medications and allergies; a list of warning symptoms or signs that correspond to the patient's chronic illnesses; a checklist of activities that need to take place before and following discharge. This record is maintained by the patient and caregiver with assistance from the transition coach. The 4-week intervention begins in the hospital and continues through home visits and/or phone follow-up after discharge.

Several studies, including a randomized, controlled trial, found that patients who received this intervention had lower all-cause rehospitalization rates 30 and 90 days after discharge compared with control patients. Intervention patients also had lower rehospitalization rates for the same condition that they were admitted for in the index hospitalization at 90 and at 180 days than controls. Mean hospital costs were approximately \$500 less for patients in the intervention group compared with controls [80].

New Specialty Models

In some hospitals, multiple geriatric models are employed. For example, a hospital may begin with NICHE. The NICHE coordinator, a geriatric nurse specialist, will then become an Elder Life Specialist to implement HELP hospital wide or within a discrete ACE unit. Often the core geriatric interdisciplinary team of any geriatric program screens patients for other related services such as palliative care, rehabilitative services, or pain management programs. Some have developed dual-function units such as merging an ACE unit with a palliative care unit [66]. Others have developed programs that merge geriatrics with other specialties. Examples include hip fracture, trauma, and oncology.

The American Academy of Orthopedic Surgeons recommends coordination of care and communication by providers as important aspects of quality care for hip fracture patients [81]. In response, several hospital programs that incorporate geriatric co-management of hip fracture patients have been developed. The expectation is that involvement of geriatricians in care management will avoid iatrogenic problems. For example, one program focuses on minimizing time to surgery and employment of standardized orders and protocols [82]. These programs have been shown to reduce delirium by over one-third, reduce severe delirium by over one-half, decrease predicted length of stay, readmission rates, complication rates, and mortality [83]. Others have developed a geriatric trauma team that include a geriatrician and geriatric advanced practice nurse who evaluate older trauma patients and share recommendations in weekly multidisciplinary rounds and performance improvement meetings of the trauma service. Most (91%) geriatric recommendations were followed and included: advanced care planning, disposition decisions to promote function, decreased inappropriate medications, and pain management [84].

Similarly, oncology programs have either developed geriatric – oncology consultation team or have developed geriatric – oncology units, some of which are part of an existing ACE unit [85, 86]. These programs report that older oncology patients have more complex medical and social needs than adult oncology patients and thus require input from both perspectives [87].

Conclusion

Although these models use different strategies, all share common goals of treatment. Each hospital or health system chooses a model based on the unique needs of that hospital's patient population, the resources available (geriatric specialists, bed capacity to support separate unit, volunteers, etc.) and especially senior administrator's commitment to geriatric

programming. Since there is no direct reimbursement for many components of these models (interdisciplinary rounds, geriatric nurse specialist, volunteers, etc.) administrators seek external (grants, donor gifts) and internal funding (hospital foundation grants). They are motivated by the model's alignment to the hospital's strategic plan (e.g., excellence in senior care), the institution's mission, patient/family satisfaction, relationship with the community, and costs savings (i.e., reduction of complications). All of the models have demonstrated positive outcomes and each have been implemented in at least 50 hospitals; however, this still only represents a small proportion of American hospitals. Each model was originally developed with government and/or foundation support. Future survival of these models may depend on advancing the unique contributions of each within an integrated model that will enhance the hospital experience of the older patient.

Another problem influencing geriatric model implementation is availability of geriatric clinicians. Since significant geriatric medicine input is needed for many of these models, they generally are limited to academic medical centers, which only represent a small proportion of US hospitals. All of these models require providers with knowledge of core concepts in geriatrics; however, there is a significant shortage of fellowship-trained geriatricians, geriatric psychiatrists, master's prepared geriatric nurse specialists, as well as other disciplines [88]. In addition to efforts to increase the training of geriatric specialists, several initiatives are underway that involve specialty organizations, medical schools [89], and resident training programs [90, 91] to integrate principles of geriatric care into curriculums and practice. As more geriatrics is being integrated into undergraduate medical training and surgical resident training, knowledge of geriatric care principles and collaboration with geriatric models will enhance outcomes of the older surgical patients. The Council of the Section for Surgical and Related Medical Specialties in the American Geriatrics Society program provides the Geriatrics Syllabus for Specialists; a useful guide (lectures, PowerPoint presentations, etc.) geared toward providing vital information for surgeons caring for older patients as well as faculty leadership training to promote geriatric training and research within their disciplines. The initiative also enables surgical professional certifying bodies and societies to build the capacity of their members to provide better care of older adults [92].

Financial and administrative barriers deter the implementation of geriatric models. Medicare payment system focuses on provider-specific reimbursement and thus limits payment for organizational redesign, multidisciplinary teams or nurse-coordinators. The new CMS financial incentives that will not reimburse for nosocomial "never" events such as pressure ulcers, catheter-associated infections, and fall-related injury, may eventually encourage the use of these models [15]. A recent IOM report recommended that "payers should promote and reward the dissemination of those models of

care for older adults that have been shown to be effective and efficient.” [87] Incentives suggested included elimination of Medicare’s co-payment disparity for mental health and enhanced payments for services under these models.

Finally, most of the research documenting complications of the older patient are based on studies combining both medical and surgical patients, thus future research should address the risk factors of these complications specific to surgical patients. Further, with the exception of hip fracture and cardiac surgery, additional studies should also identify complications within specific types of surgical procedures. This may provide important data to tailor models to specific surgical populations.

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