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Emergency Department Observation Units and the Older Patient

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Synopsis

An increasing number of emergency departments (EDs) are providing extended care and monitoring of patients in ED observation units (EDOUs). EDOUs can be particularly useful for older adults both as an alternative to hospitalization in appropriately selected patients and as a means to risk-stratify older adults with unclear presentations. They can also provide a period of therapeutic intervention and reassessment for older patients in whom the appropriateness and safety of immediate outpatient care is unclear. They offer the opportunity for more comprehensive evaluation of many characteristics of particular importance to the care of older adults which cannot be accomplished during a short ED stay. The manuscript first discusses the general characteristics of EDOUs. Next, it reviews appropriate entry and exclusion criteria for older adults in EDOU including specific focus on several of the most common observation unit protocols, focusing on their relevance to older adults. Finally, it briefly discusses regulatory implications of observation status for patients with Medicare.

Keywords

geriatric; observation; emergency department; elderly

Introduction

An increasing number of emergency departments (EDs) are providing extended care and monitoring for patients in ED observation units (EDOUs) (1). Reasons for the expansion of ED based observation services are multi-factorial and include both benefits to ED operational efficiency and a response to insurer policies regarding readmissions. These units provide a period of time (generally 24 hours) to complete diagnostic studies and initial therapeutic interventions for a large variety of conditions (2). EDOUs can be particularly useful for older adults both as an alternative to hospitalization in appropriately selected patients and as a means to risk-stratify older adults with unclear presentations. They can also provide a period of therapeutic intervention and reassessment for older patients in whom the

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appropriateness and safety of immediate outpatient care is unclear (3;4). In this manuscript we will first discuss the general characteristics of EDOUs. Next, we will discuss appropriate entry and exclusion criteria for older adults in EDOUs. We will then review several of the most common observation unit protocols, focusing on their relevance to older adults. Finally, we will briefly review regulatory implications of observation status for patients with Medicare.

Development of emergency department observation units

EDOUs have been utilized for many years to extend and enhance the ability of the ED clinician to make more appropriate disposition and management decisions. The majority of such units began as an effort to more efficiently manage, risk stratify, and disposition patients with low acuity chest pain (5). Over time, interest developed in managing a larger number of conditions to help alleviate diagnostic or severity of illness uncertainty in clinical care for patients that were too sick for ED discharge but not clearly sick enough to be admitted to the hospital. The literature surrounding EDOUs has consistently demonstrated their value to patient management and to both ED and hospital operations including decreases in ED length of stay and admission rate from the ED (6–8). A number of studies have shown cost effectiveness and equivalent clinical outcomes of EDOUs in comparison to inpatient care (8–12). Studies have demonstrated positive benefits to ED patient satisfaction (13;14), low rates of ED recidivism, and improved continuity of care (15;16).

As a result of these benefits, several organizations have advocated for the creation of more EDOUs. In June of 2006, the Institute of Medicine released its report on the “The Future of Emergency Care: Hospital-Based Emergency Care at the Breaking Point” which specifically cited the benefits of EDOUs (17). In 2008, the American College of Emergency Physicians made similar recommendations for implementation of ED based observation units (18). The result has been a nationwide increase in the availability of observation services for ED patients, although adoption is still not universal, even for common conditions such as chest pain (2;19).. Currently, over 2.3 million ED patients each year are placed in observation units, almost one-third of whom are over 65 years of age (4;19;19).

Characteristics of emergency department observation units

Currently 34% of hospitals have an observation unit, 56% of which are classified as EDOUs and another 36% of which are housed within the hospital itself (2;19). In the majority of cases observation units are under the direction and clinical responsibility of the ED (2). Most commonly, patients must be evaluated in the ED prior to placement in the observation unit (2). Although the focus of this manuscript is on EDOUs, they share many characteristics with the hospital-based units (20). As a result, the manuscript’s conclusions can generally be applied to both types of units.

The specific characteristics of an EDOU will vary by institution and are noted in Box 1. The sum total of these factors – admission procedures, staffing, protocols, and resources - dictates the inclusion or exclusion of individual patients from each EDOU. Some units only take low- to moderate-risk patients with very specific, pre-defined pathways. Others are more aggressive, taking more ill or more complex patients, or those with less well-defined conditions.

Admission procedure

In most cases, patients eligible for EDOU care are initially seen and evaluated in the ED (2). While some units allow for patients to come directly from outpatient clinics or doctors’ offices, initial triage to determine appropriateness of care and screening for exclusion

criteria is best accomplished in the ED under the auspices of the ED physician. For units with open admission policies, the referring physician should have a clear understanding of the capabilities and procedures of the unit. For example, it should be clear which physician is responsible for the care of the patient while in the unit.

Staffing patterns

Staffing of an EDOU may include various combinations of coverage by emergency physicians concurrently working in the ED, physicians with sole responsibility for the EDOU, and /or mid-level providers. Staffing patterns have implications for the types of patients cared for in the EDOU. Units staffed by physicians also concurrently staffing the ED will generally take very specific patients only. In units staffed by a full complement of dedicated physicians and mid-level providers there is greater ability to be aggressive in taking more complex and less well-defined patients. As a result, these units will generally be more aggressive in their acceptance criteria. Nurse staffing ratios must also be considered in patient selection.

Available protocols and resources

Most EDOUs limit their patient populations to specific predefined treatment protocols and pathways (Box 2) (2). There will be specific inclusion and exclusion criteria associated with each protocol that aid in the selection of appropriate patients. The goal is to choose patients who are likely to meet discharge criteria within 24 hours. In general, observation failure rates with subsequent admission from observation status of less than 30% are considered acceptable (4;19;21).

For simplicity EDOU patients can be classified into two groups: 1) diagnostic patients who have a chief compliant that requires monitoring and further diagnostic evaluation (e.g., chest pain, abdominal pain); and 2) therapeutic patients in whom the diagnosis is known, but whose severity of illness does not allow immediate safe discharge (for example asthma, cellulitis). The breadth of protocols in a specific EDOU depends on the resources available to that unit, including those that have been arranged with other hospital services. Availability of resources may also vary by day of the week and time of day. For example, most EDOUs have protocols to rule-out myocardial infarction, including stress testing while in the observation unit. However, this testing may be limited on weekends or holidays. The use of other protocols may depend on availability of imaging or consulting resources. Box 3 presents a partial list of the types of services available in EDOUs.

The role of EDOUs in caring for older adults

Older adults have been successfully cared for in EDOUs on a variety of protocols, generally demonstrating rates of admission equivalent to those of younger adults (3;4;16;21–24). One study showed a slightly increased rate of admission for older adults (26% versus 18%), but their admission rate was still below a predetermined cutoff of 30% (4). Advanced age also has not been associated with increased revisit rates after the EDOU stay compared to younger patients (3;4;16). Clearly, EDOUs can effectively care for older adults.

The EDOU provides an opportunity for further evaluation and management of the older patient beyond what is possible in the ED. Importantly, it provides time to obtain a number of services and assessments of particular concern to the older population such as social work consultation, physical therapy assessment, and medication review and reconciliation. Some EDOUs have incorporated into their EDOU care some form of comprehensive geriatric assessment which encompasses a multidisciplinary approach to the patient, for example by considering medical issues, functional status, and social issues, among other (25;26). In one study from Singapore this assessment included medical, social, and functional factors such

as fall history, timed-up-and-go test, continence assessment, mental status evaluation, visual acuity testing, nutrition assessment, and questioning on behavior and mood. Over 70% of older EDOU patients had at least one need identified. The program resulted in decreased ED revisit (adjusted incident rate ratio of 0.59) and hospitalization rates (ratio of 0.64) over the succeeding year (3).

Contraindications to observation unit care for older adults

Prior to placing a patient in an EDOU, physicians must consider appropriateness both in light of specific inclusion/exclusion criteria and CMS rules regarding observation care (discussed below). Older adults may present unique challenges to the observation unit and several factors must be considered as potential contraindications to placement (Box 4). In addition to this list, there may be specific contraindications for individual protocols (also discussed below). Specific inclusion and exclusion criteria are set by each EDOU.

Unstable vital signs

Patients with unstable vital signs are generally not appropriate for observation care due to their increased resource needs and severity of illness. One exception could be a hypertensive urgency protocol which would accept patients with severe elevation in blood pressure but without evidence of end-organ damage. However, one study found that older adults with systolic blood pressures ≥180mmHg were more likely to be admitted (22).

Altered mental status

Altered mental status, including delirium and other alterations of consciousness, is often an exclusion criterion in EDOUs. These patients may have a greater likelihood of failing to improve within 24 hours. Also, EDOUs may not have nurse staffing ratios adequate to handle altered patients. In some cases such as mild alterations in mental status in the setting of urinary tract infection, placement in the EDOU may be considered.

Likely need for placement in a skilled facility

Patients who are expected to require placement in a skilled nursing or rehabilitation facility are also poor EDOU candidates. CMS rules require a 3-day hospital stay for before such placement (27). Furthermore, the resources required to affect rapid placement in such facilities are generally not available in the EDOU. It is rare that such placement could be arranged within 24 hours.

Failure to thrive

The diagnosis of “failure to thrive” covers a broad array of etiologies and symptoms (28;29). Usually, these require substantial investigation and often require skilled nursing placement. Such evaluations are generally not easily accomplished in the EDOU. These patients have often failed outpatient therapies for their conditions or could be considered unsafe discharges, both of which are considered indications for admission by CMS.

Exacerbations of chronic problems

Ongoing treatment of chronic problems is rarely appropriate for the EDOU. Such patients have usually failed adequate outpatient therapy and will not improve within 24 hours, requiring admission. In other cases, the problem is more appropriately treated in the outpatient setting. However, EDOUs are appropriate for acute exacerbations of many chronic conditions such as asthma or congestive heart failure. The general rule should be to place patients in the EDOU who require specific diagnostic or therapeutic interventions likely to change management or improve symptoms within 24 hours.

Expected to require >24 hours of care

Patients expected to require greater than 24 hours to complete their care should be admitted rather than placed in an EDOU. Examples include patients with congestive heart failure (CHF) severe enough likely to require >24 hours of diuresis or with severe skin and soft tissue infection (SSTI) likely to require >24 hours of intravenous antibiotics

Inability to ambulate

Inability to ambulate is a relative contraindication depending on the likelihood of improvement and ability for a safe discharge within 24 hours. Patients who will obviously require placement or obviously do not have the resources at home to aid in their care should be admitted. In some cases, EDOU placement is appropriate to obtain a physical therapy evaluation and/or arrange for additional home resources such as family support, care providers, or outpatient physical therapy.

Relationship of specific observation unit protocols to the care of older adults

A summary Table of evidence for each of these protocols is available in Table 1.

Chest pain

Chest pain is the most common EDOU admitting symptom (5;30–32). Most EDOU chest pain patients will, within a 24 hour period, receive telemetry monitoring, serial cardiac enzymes, serial EKGs, and noninvasive cardiac testing (33). Cardiology consultation is also available if necessary. Chest pain is also the most common EDOU diagnosis for older patients (4). Although older adults with chest pain are more likely to be admitted from the EDOU than younger patients, rates are within acceptable levels (<30%) (21;34). The increased rates are likely related to the increased prevalence of coronary artery disease in older adults, a known risk factor for positive stress testing and admission (34). Older adults without known coronary artery disease are no more likely to be admitted then younger patients (21).

An important component of patient selection for EDOU chest pain protocols is risk-stratification. Patients with unstable angina or non-ST elevation MI require admission for both severity of illness and intensity of service considerations. EDOUs are clearly safe and cost effective for the evaluation of low-risk chest pain (for example those with low-risk TIMI risk scores, see Box 5) (5;35). In addition, several recent studies have shown that intermediate-risk patients, including those with known coronary artery disease, can be safely evaluated in an EDOU setting (34–36).

A variety of noninvasive cardiac testing modalities are available in EDOUs including nuclear perfusion imaging, stress echocardiography, cardiac computed tomography (CT), and cardiac magnetic resonance imaging (MRI) (5;10;36;38–40). Testing will depend on provider preference, local availability, and patient characteristics. Choice of modality likely does not affect cost or outcomes in low-risk patients (12;38). Interestingly, there is some suggestion that in intermediate risk-patients cardiac MRI is safe and decreases long-term costs(10). With the advent of radial artery access strategies for cardiac catheterization, select patients in certain EDOUs may also be able to receive cardiac catheterization, with patients not requiring an intervention recovered and discharged from the EDOU (41). EDOUs have been shown to be successful in providing high quality and efficient care for older adults through rapid testing and evidence based care.

Syncope

Syncope is commonly managed in EDOUs, including in older adults. In the largest report of syncope care in the observation unit, mean age of the 323 participants was 66 years, indicating that older adults with syncope can be successfully managed in an EDOU (42). The evaluation usually involves cardiac monitoring, serial cardiac enzymes, and an evaluation for structural heart disease most commonly with transthoracic echocardiogram. It may also include stress testing.

Older adults are more likely to have many of the factors associated with poor outcome in patients with syncope including congestive heart failure, low hematocrit, abnormal EKG, or hypotension (43–45). As they have greater numbers of risk factors, these patients may require a more extensive workup than younger adults (42;43). The ability to accommodate the need for additional testing will depend on the individual EDOU. When making disposition decisions note that CMS guidelines based on the Interqual criteria suggest admission for patients with syncope and known coronary artery disease. However, inpatient stays based on that criterion have been one of the biggest targets for recovery Audit Contractor (RAC) audits and denials (46).

Congestive heart failure

Acute decompensated heart failure causes over 1 million hospital admissions annually, 75% of which originate in the ED (47;48). Compared with inpatient admissions, observation unit heart failure patients have no difference in outcomes and may have cost savings and more efficiently delivered care (49–51). As with other protocols, only those patients expected to complete their diagnostic and therapeutic evaluation within 24 hours are appropriate for care. This evaluation most commonly includes echocardiogram (if not recently completed), intravenous diuretics, appropriate adjustments to home medication regimens, and possible cardiology consultation to aid in management (48;52). General factors which may make a patient inappropriate for EODU care for heart failure include: need for large volume diuresis unlikely to be completed within 24 hours, presence of renal insufficiency or hypotension limiting volume or speed of diuresis, and presence of acute cardiac ischemia.

Older adults have been well represented in studies of heart failure protocols in EDOUs and advanced age has not been associated with increased admission rates. In a 2005 study in which mean age was 70 years, only a blood urea nitrogen value greater than 30 mg/dL was associated with admission(47). A 2006 evaluation of similar patients with mean age 61 years suggested that patients with a normal troponin and a systolic blood pressure greater than 160 are most appropriate for an EDOU (53). Prognosis may be particularly poor for older adults with heart failure in combination with other social and medical issues. The Multidimensional Prognostic Index identifies older adults at risk of mortality within 30 days after hospital admission based on activities of daily living, mental status, nutrition status, medications, and social support (54). Clearly, these additional factors should be taken into account when considering appropriateness for EDOU care.

Transient ischemic attack

Older adults with transient ischemic attack (TIA) are commonly cared for in EDOUs with an average age in the published studies of 70 years (55;56). EDOU TIA protocols have been shown to be safe and reduce length of stay compared to admissions (9;55;56). When compared to patients discharged from the ED for outpatient follow-up, TIA protocols increase completion rates for recommended imaging studies(9). A comprehensive EDOU TIA evaluation can generally be completed within 24 hours, faster and at less cost than in patients who are admitted (9;55;56). Readmission and 30-day stroke rates were similar between those managed in the EDOU and as inpatients (9;56).

Patients with persistent, severe neurologic deficits are not candidates for EDOU TIA protocols. Those whose deficits have resolved and, in some EDOUs, those with minor deficits (e.g., paresthesias, subjective weakness) remain candidates. The primary advantage of the TIA protocol is that patients are able to rapidly complete the suggested diagnostic evaluation which may include MRI of the brain, transthoracic echocardiogram with bubble study to rule out embolic sources, and assessment of neck and cerebral vasculature through carotid dopplers, magnetic resonance angiogram, or CT angiography (9). In most units, a neurologist is available and either evaluates all TIA patients or is consulted as needed. With confirmation of the diagnosis of TIA, EDOU physicians can initiate guideline concordant secondary prevention therapies (57). Patients with acute CVA or other identified pathology identified can be admitted for further care.

Vertigo

Vertigo is another condition amenable to care in EDOUs for older adults. Due to their higher incidence of central vertigo, the EDOU is an appropriate venue to obtain diagnostic imaging including brain MRI and MRA for evaluation of the posterior circulation to rule acute stroke (58–60). As importantly, the EDOU stay provides the treating physician time to determine the patient's response to therapy and safety for discharge home (61). The physician can gauge not only the control of symptoms but also the effect on gait and balance of the centrally-acting medication regimens such as meclizine and/or diazepam which are used for treatment (62). This can include bedside evaluation by physical therapy if necessary to ensure that the patient can be safely discharged. Those who are unable to ambulate safely whether due to vertigo symptoms or side effects of the treatment medications can be appropriately admitted.

Skin and soft tissue infection (SSTI)

Most EDOUs treat patients with SSTI (4;19). Patients with infections of moderate severity who are expected to show improvement within 24 hours can be placed in the EDOU for a period of IV antibiotics and serial assessments. Older age has not been associated with increased observation failure rates (24;63). Key elements in considering appropriateness of EDOU care for an older adult with SSTI include: infection type, size, comorbid conditions, and effect on functional status. Those with deeper infections or with multiple comorbidities may benefit from more prolonged courses of intravenous antibiotics and may require admission. The EDOU also provides an opportunity to rule out certain complications of SSTI such as osteomyelitis or septic arthritis with appropriate imaging and diagnostic studies.

Urinary tract Infection

Older adults with urinary tract infection, both cystitis and pyelonephritis, may also benefit from EDOU care (64). The unique challenges surrounding diagnosis and presentation of UTI in older adults can make EDOUs particularly attractive. Older adults diagnosed with UTI are less likely than younger patients to have classic symptoms such as dysuria or fever (65). They are more likely to present with weakness, confusion, or other vague symptoms (65–68). Accurate diagnosis is complicated by the frequent presence of asymptomatic bacteriuria, even in community-dwelling older adults (69;70). As a result, the initial diagnosis of UTI in an older adult may be unclear and uncertain, particularly when cultures are still pending.

The EDOU stay provides the ability to clarify the diagnosis both by awaiting results of a urine culture and by noting the patient's response to antibiotic therapy. For moderately ill patients, it allows a trial of antibiotics, usually given intravenously then transitioned to oral, prior to discharge. This is particularly important given the prevalence of drug resistant

organisms in older adults with UTI (71–73). Patients who fail to respond to initial therapy can be admitted for further diagnostic studies or administration of alternative antibiotics. Finally, as UTIs can cause issues with mentation and balance in older adults, an EDOU stay allows sufficient time to confirm that the patient can safely continue treatment in the outpatient home setting (65;74;75).

Trauma and minor head injury

Observation units have been shown to be appropriate for the care of patients after traumatic injury (76–80). The majority of patients in these studies were younger adults with median age in the thirties (76;77;80). However, in one study with mean age 60 years, patients with blunt thoracic trauma were safely managed in an EDOU (79). It is likely that carefully selected older trauma patients can be managed in the EDOU, but further study is needed.

EDOUs may be particularly appropriate for older adults with falls and minor closed head injury (GCS 14 or 15) who are receiving anticoagulation. The subset of older adults who are anticoagulated may be at risk of delayed intracranial hemorrhage after even minor head trauma such as falls from standing (81–83). As a result, current European guidelines recommend repeat head CT approximately 24 hours after a normal head CT in anticoagulated patients (84;85). This approach is controversial as rates of delayed hemorrhage may be lower than previously thought (78;86–88). Recent evidence from a multicenter US study of 1,064 anticoagulated patients (warfarin or clopidogrel) with minor head injury and mean age 75 years, showed very low rates of delayed hemorrhage (0.6%, 95% CI 0.2% to 1.5%) (86). As a result, the need for observation of these patients has been questioned. If observation is considered, recent EDOU studies have validated the safety of either observation alone or observation with repeat head CT scans in 24 hours in older adults receiving anticoagulation (78;82).

Abdominal pain

Abdominal pain is another common and high-risk clinical presentation in older adults due to high rates of surgical and medical emergencies (89–91). Two types of older adults with abdominal pain may be appropriately managed in the EDOU. First, in patients with an initially negative or equivocal diagnostic workup, the EDOU can provide the benefit of serial exams, repeat laboratory studies, and possibly further imaging studies to help clarify the clinical picture (91;92). Importantly, the EDOU must not replace a thorough initial evaluation as delays in diagnosis of many conditions such as mesenteric ischemia can be catastrophic(93). Second, older adults in whom significant pathology is clearly ruled out or only minor pathology found might be placed in the EDOU for a period of therapeutic intervention prior to discharge. For example, patients with mild diverticulitis, most importantly those without evidence of perforation (94;95), could receive initial doses of antibiotics and repeat exams to ensure clinical improvement. Patients with gastroenteritis might receive intravenous fluids and antiemetics until adequate oral intake could be resumed. Patients with more severe pathology or with chronic symptoms unlikely to improve within 24 hours are more appropriately managed in the inpatient setting.

Medicare implications of observation status

An understanding of the definition of “observation status” is important and necessary for appropriate placement of patients in the EDOU. In the regulatory definition, observation status is a billing status of the patient which may occur in an EDOU or on the floor in the hospital. HCFA (the precursor organization for the Centers for Medicare and Medicaid or CMS) published the rules for appropriate use of observation status in the September 1996 Medicare Hospital Manual, Publication 10:

> The purpose of observation is to determine the need for further treatment or for inpatient admission. Thus, a patient in observation may improve and be released, or be admitted as an inpatient…

Increasing attention to placing the patient in the right status of care after initial ED evaluation has created a paradox for many established EDOUs. Historically, patient selection was accomplished by inclusion and exclusion criteria based on a pre-determined care pathway. This was independent of the patient's billing status and was a clinical decision made by the ED care provider. Increasingly, CMS beneficiary patients are now screened based on standardized evidence-based clinical decision support criteria such as InterQual or Milliman to determine medical necessity of services and patient appropriateness for inpatient admission (96). Other factors may also play into the determination of appropriate level of care such as failure of outpatient management. Thus, otherwise appropriately selected patients for EDOU management may meet inpatient criteria. Conversely patients selected for "inpatient admission" based on perception of not meeting EDOU inclusion criteria may only qualify for observation status. As a result of this paradox, hospitals have been forced to prospectively screen eligible beneficiaries in the ED to determine appropriate level of care. Seemingly in this system the care setting becomes an after-thought and the patient's billing status supreme.

Acute care hospitals have a financial incentive to certify and place patients in the inpatient setting rather than in observation status due to the differential compensation for inpatient admission. In addition, for Medicare beneficiaries, co-payments are significantly higher for outpatient services (97), providing a patient preference for inpatient admission due to lower out of pocket costs and currently the basis of a class action lawsuit challenging the legality of observation status (1). With this noted, the CMS Recovery Audit Contractor program has commandeered many back payments and substantial penalties from hospitals based on their determination of inappropriate level of care determinations. One of their areas of closest scrutiny is that of one and even two day hospital stays. From CMS perspective, they advocate that such patients should have been in observation status. These complexities highlight the challenges inherent to the current system.

In summary, observation status is a level of care determination and billing status that is part of outpatient management. It is not a not a geographic location in the hospital. It is governed by complex regulatory rules that have made the landscape of patient selection for the EDOU much more complex. This is particularly true for older adults; many of whom are Medicare beneficiaries. In general, older adults placed in an EDOU should meet both clinical criteria for the unit and regulatory requirements for observation status. Patients not meeting clinical criteria for the EDOU should be placed in an inpatient unit location under either observation or inpatient status depending on billing rules.

Conclusion

In conclusion, EDOUs can provide a number of benefits to appropriately selected older adults. They offer the opportunity for more comprehensive evaluation of many characteristics of particular importance to the care of older adults which cannot be accomplished during a short ED stay. The EDOU can provide both diagnostic and therapeutic services to ensure the older adult is safe for outpatient care. Older adults have been successfully managed on many EDOU protocols. Knowledge of local EDOU capabilities and polices will aid the clinician in appropriately managing their older adult patients

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Key Points

1. Older adults can successfully be cared for in emergency department observation units (EDOUs) on a variety of clinical protocols.
2. EDOUs provide distinct advantage for the care of older adults such as ability to further assess functional status, response to therapy, home environment, and stability for discharge.
3. There are specific EDOU inclusion and exclusion criteria which vary among individual EDOUs and by type of protocol the patient is to be placed on.
4. Protocols amenable to caring for older adults include chest pain, syncope, congestive heart failure, transient ischemic attack, vertigo, skin infection, urinary tract infection, trauma, and abdominal pain, among other.
5. Placement in an EDOU is affected by both clinical and regulatory concerns.

Box 1

Characteristics varying between individual emergency department observation units which may affect patient selection

1. Admission procedure:
   - Closed admission (only by emergency department physician after evaluation in the ED)
   - Open admission (other physicians may place patients in unit; ED evaluation may or may not be required)
2. Staffing patterns:
   - Physician coverage (type, availability, and other responsibilities)
   - Mid-level provider coverage
   - Nursing ratios
   - Variation in coverage by time of day/day of the week
3. Protocol availability:
   - Types of conditions cared for in the unit
   - Important inclusion/exclusion criteria
   - Variation by day of the week
4. Available resources:
   - Ability to complete specific diagnostic tests, provide specific therapeutic interventions, and obtain specific specialty consultation

Box 2

Potential emergency department observation unit protocols applicable to older adults

Cardiac

Chest pain

Syncope

Hypertensive urgency

Congestive heart failure

Neurologic

Transient ischemic attack

Vertigo

Headache

Infectious disease

Skin and soft tissue infection

Urinary tract infection

Pneumonia

Other

Trauma

Allergic reaction

Abdominal Pain

Dehydration

Nausea/vomiting

Low back pain

Adverse medication reaction

Nephrolithiasis

Asthma exacerbation

Box 3

Sample of diagnostic modalities and therapies which may be available in an emergency department observation unit

Diagnostics

Serial clinical exams

Telemetry monitoring

Computed tomography (CT) scan

Magnetic resonance imaging

Magnetic resonance angiography

Vascular ultrasound (e.g. extremity, carotids)

Stress testing (multiple modalities)

Transthoracic echocardiogram

Ultrasound

HIDA scan

Therapeutics

Intravenous hydration

Intravenous antibiotics

Anti-emetics

Acute pain control

Specialty Consultations

Select medical and surgical subspecialties

Physical/occupational therapy

Social work/case management

Respiratory therapy

Pharmacy/medication review

Box 4

Factors excluding older adults from observation unit care

1. Unstable vital signs
2. Altered mental status
3. Likely need for placement
4. Failure to thrive
5. Exacerbations of chronic problems
6. Expected to take greater than 24 hours for significant improvement.
7. Inability to ambulate

Box 5

TIMI risk score for unstable angina and non-ST-elevation myocardial infarction with fourteen-day risk for cardiac events(37)

a) TIMI score	
	Points
Age ≥ 65 years?	1
Known CAD (stenosis ≥ 50%)?	1
ASA Use in Past 7d?	1
Severe angina (≥ 2 episodes w/in 24 hrs)?	1
ST changes ≥ 0.5mm?	1
+ Cardiac Marker?	1

b) Fourteen Day Risk of Cardiac Events (%)		
Risk Score	**Death/MI**	**Death/MI/urgent revascularization**
0/1	3	5
2	3	8
3	5	13
4	7	20
5	12	26
6/7	19	41

Table 1

Summary of selected evidence for specific EDOU protocols

Protocol	Study	Number of patients	Mean/median age (if reported)	Outcomes
Chest pain	Holly 2012	552	49 years	EDOU admission rate for intermediate risk chest pain patients was 16% No unanticipated adverse events at 30 days
	Miller 2012	120		Physician selected cardiac testing cost-effective vs. pre-specified testing ($1686 vs. $2005)
	Miller 2011	109	56 years	EDOU-CMR decreased costs over 1 year compared to inpatient care ($3101 vs. $742) Major cardiac events similar between groups (6% vs. 9%)
	Jagminas 2005	1413	Not reported	Compared EDOU to inpatient OU. EDOU had decreased admission rates (7.9% vs. 19.2%) and decreased cost ($889 versus $1039)
	Goodacre 2004		972	Decreased admissions from 54% to 37% Follow-up costs reduced
Syncope	Anderson 2012	323	66 years	In EDOU patients with syncope and normal ECG, 0/235 had structural cardiac abnormality identified
Congestive heart failure	Diercks 2006	538	61 years	27% of ED patients with heart failure meet criteria to be managed in an EDOU
	Storrow 2005	64	58 years	Decreased cost, LOS and no difference in outcomes in EDOU vs. admission.
TIA	Ross 2007	149	68 years	Compared to inpatient, EDOU patients had: • Lower median length of stay)25 versus 61 hours) • Lower 90-day costs ($890 versus $1547 • Greater rates of imaging (97% versus 91% for carotids; 97% vs. 73% for echocardiography)
	Nahab 2011	142	68 years	79% discharged Median length of stay decreased from 47 hours (inpatients) to 26 hours (EDOU patients) Lower median costs (cost difference $1643 versus inpatients)
SSTI	Schrock 2008	179	41 years	38% failed EDOU care and required admission Advanced age was not associated with failure of EDOU care
UTI	Schrock 2009	633	32 years	29% of EDOU patients ultimately admitted
Trauma	Holly 2011	259	35 years	No deaths, intubations, or other advers events One missed injury which did not affect outcome Admission rate from EDOU 10%
	Kendall 2011	1169	31 years	6% of EDOU patients with blunt abdominal trauma admitted EDOU median LOS 9.5 hours Low risk patients less likely to receive Ct scans
	Menditto 2011	240	55 years	Decreased rates fo ED revisit in patients with thoracic trauma from 12% withotu EDOU to 4% with EDOU LOS decreased from mean 94 horus to 65 hours after EDOU in place No change in oper patient cost

Protocol	Study	Number of patients	Mean/median age (if reported)	Outcomes
	Madsen 2009	364	35 years	No adverse events or significant missed injuries among selected trauma patients placed in an EDOU Average LOS 12.75 hours; 12% admission rate
	Menditto 2012	97	51 years	EDOU decreased ED revisit rates (4% vs. 12% in patients with thoracic trauma Hospitalization rates also decreased from 49% to 24% with an EDOU

a) TIMI score	
	Points
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Known CAD (stenosis ≥ 50%)?	1
ASA Use in Past 7d?	1
Severe angina (≥ 2 episodes w/in 24 hrs)?	1
ST changes ≥ 0.5mm?	1
+ Cardiac Marker?	1

b) Fourteen Day Risk of Cardiac Events (%)		
Risk Score	**Death/MI**	**Death/MI/urgent revascularization**
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