American College of Emergency Physicians

State of the Art: Observation Units in the Emergency Department
Policy Resource and Education Paper

Background

Hospitals and emergency departments (EDs) face the challenges of escalating health care costs, mismatched resource utilization, concern over avoidable admissions, as well as hospital and ED overcrowding. One approach that has been used by hospitals to address these issues is the use of emergency department observation units (EDOU). Observation of patients following their initial ED visit has been described for over three decades, beginning shortly after the formal development of EDs in the 1960s.[1] Research in this setting has increased in recent years, leading to a better understanding the role of these units and their unique benefits.

A 2003 national survey estimated that ED observation units are present in 19% of U.S. hospitals, with 12% planning a unit.[2] A subsequent analysis of 2007 National Hospital Ambulatory Medical Care Survey data indicated that the percent of U.S. hospitals with an EDOU had increased to 36%, with more than half administratively managed by the ED.[3] Among academic centers with an Emergency Medicine residency program, 36% report having an EDOU, with another 45% planning a unit.[4] Internationally, emergency observation services have been reported in several countries, including Canada, Britain, throughout Europe, Australia, India, China, Singapore and South America.[5-12] In its discussion of "improving the efficiency of hospital-based emergency care," the 2006 Institute of Medicine report supports the use of the EDOU as a means of decreasing ED boarding, ambulance diversion, and avoidable hospitalizations.[13] From 2003 to 2007, the percentage of Medicare patients whose observation stays exceeds 48 hours has risen from 3% to over 7%, suggesting that care in a more efficient setting may be needed. With the expansion of information in this area and pressing health care issues, a more contemporary review of observation services is needed.

Concepts, Principles, and Definitions

The average ED length of stay for an admitted ED patient is 5.5 hours while the average length of stay of an inpatient is 5 days.[14] Hospitals are increasingly being scrutinized for inpatients whose length of stay is one day or less.[15] This length of stay defines a subset of patients whose clinical needs exceed what can realistically be achieved within the 6 hours of an ED visit, but if managed actively will require less than 24 hours of hospitalization. These "6-24 hour" patients are often eligible for a dedicated observation unit. Studies have shown that when these patients are mixed with inpatients throughout a hospital it results in length of stays that are well beyond 24 hours.[16-20]

The defining feature of ED observation services is the active management of patients following their initial ED care "to determine need for inpatient admission." Observation units are assigned various names based on local preferences and specific patient populations served. Some examples include -ED Observation Unit, Clinical Decision Unit, Chest Pain Unit, Short Stay Unit, and Rapid Diagnosis and Treatment Unit. It is important to distinguish "observation" patients from patients in the ED who already have a disposition but are "holding" or "boarded" while awaiting an inpatient bed, transfer, discharge, or going to the operating room. Some ED observation units allow "holds" to use their beds as needed. However filling an observation unit with "holds" may result in ED patients being admitted that might have been observed and discharged – thus exacerbating a system problem rather than solving it.

If an observation unit manages both observation patients as well as other categories of patients, then the unit may be considered a "hybrid observation unit." This is generally done to maximize space utilization, meet secondary service needs, allow smaller units to maintain adequate patient volumes, and enhance overall ED throughput. Examples of other patient categories include ED patients, patients that are "holds," and "scheduled procedure patients" (table 1). Kelen described a hybrid emergency acute care model that improved efficiency and was associated with a decrease in ambulance diversion and patients who left without being seen.[21] Ross described a hybrid scheduled procedure/ observation unit that maximized use of nurses and cut procedural patient length of stay in half.[20]

ED Observation Unit Management Issues

The principles of managing an EDOU have previously been described (table 2).[22] Patients managed in an EDOU should have a well-defined reason for observation. This allows for appropriate patient selection, protocol development, and predictable outcomes. Patients may be observed for further diagnostic testing, continued treatment of an acute condition, or management of psychosocial needs. Patients selected for treatment should have at least a 70% probability of discharge, have a relatively low severity of illness and require a level of service that is appropriate for unit resources and staffing.[23] Patients at risk of self harm require a setting where they can be monitored. If this is not possible in the EDOU, then it may be safest to exclude them. Patients with multiple acute clinical conditions are also less likely to be discharged.

While observation services were previously described as "23 hour admissions," most studies of these patients have shown the length of stays to be roughly 15 hours.[4,24,25] Patients that have not "declared" themselves as eligible for discharge by 18-24 hours, are unlikely to do so with additional time in the EDOU.

It is optimal to manage observation patients in a dedicated observation unit, rather than being mixed with patients on an inpatient floor or in the ED for several reasons. In a before – after study of care following closure of an EDOU, Hadden found that EDOU patients "were seen sooner by a doctor, had fewer investigations, and had a shorter stay in hospital than similar patients admitted to the general wards."[18] Prospective randomized studies of patients with chest pain, asthma, TIA, syncope, and atrial fibrillation managed in an EDOU had shorter length of stays, improved patient satisfaction, lower costs, and comparable or better clinical outcomes relative to similar patients admitted to an inpatient unit.[16,17,19,26-33] It is logistically best for the unit to be located within or adjacent to the ED since remote settings can pose issues with staffing, clinical re-evaluations, and transfer of care.

Strong physician and nurse administrative leadership is important for a successful EDOU.[34] The leaders need to interact with other departments, monitor utilization and quality, develop and implement protocols, facilitate medical education in this setting, and oversee unit research activities as needed. The EDOU should have adequate space, staffing, equipment, and supplies appropriate for the conditions being managed.[35,36] Since patients are not expected to spend more than 24 hours in an EDOU bed, the rooms usually do not need to meet the standards of an inpatient room or licensed bed.[35] A 2003 survey reported that units were staffed with an average 4.2 patients per nurse and 21.4% used associate providers (physician assistants or nurse practitioners).[4] Additional support staff may be required based on the size and needs of the unit. EDOU nurses should know the goals, philosophy, policies, procedures, equipment, and supplies of the unit. Observation units are called "open" if any hospital physician or specialty may admit to the unit, and "closed" if admission is limited to a specific group or specialty such as emergency medicine. Open staffing may allow more liberal use of the unit, however it may become difficult to standardize care - potentially resulting in higher length of stays and inpatient admit rates.

The American College of Emergency Physician's policy on ED observation units recommends that the EDOU have guidelines that describe medical and nursing leadership, general criteria for admission and discharge from the EDOU, a clear statement of which physician and nurse will be responsible for the patient throughout the day, how transfer of care and documentation will occur, when a physician should be notified, maximum allowable length of stay in the unit, means of addressing conflicts and outliers, and how utilization and quality will be monitored.[35,36] Some units are protocol driven with guidelines for common specific conditions. These describe EDOU inclusion and exclusion criteria, expected interventions in the ED and subsequently in the EDOU, and criteria for discharge or admission from the EDOU. Such protocol driven units encourage consistency between providers, facilitate efficient care, and have been shown to perform well.[19,25,27,28,37]

Physician documentation of the care in the EDOU begins with the traditional documentation of the initial evaluation and management in the ED. This should include initial decision-making, communications, and plans for care in the EDOU. The ED documentation should be present on the patients chart upon arrival to the EDOU for subsequent providers to review. An order to admit or refer the patient for observation services is required for a hospital to bill for observation services. EDOU orders are required and may be protocol driven for specific conditions. Progress notes are written as needed and a final discharge summary should be completed. The discharge summary should include the patient's clinical course in the EDOU, the final examination, final diagnosis, preparation of discharge or admission

records, and instructions for continuing care.[38] These elements are required for optimal patient care as well as billing for observation services as described by CPT. If physicians from the same group and specialty provide both emergency and observation services on the same day, then observation CPT codes are to be used for billing.[38] Both provide similar RVUs for the initial evaluation and management in the ED. However, unlike the emergency CPT codes, observation pays for the work of discharging the patient in addition to the initial evaluation. Comparison of documentation requirements of the observation and emergency codes are listed in table 3.[38]

Just as the ED has been described as the "safety net" of the health care system, the EDOU serves as the "safety net" of the ED by preventing inappropriate admissions or discharges. To ensure optimal performance it is essential to monitor appropriate EDOU utilization and quality of care. (Table 3) EDOUs often have length of stays which average 15 hours and discharge rates of 70 to 80%.[4,24,25] Conditions exceeding these benchmarks should be scrutinized. Mace reported that one in 400 patients complained about their treatment in an EDOU with a complaint profile that was similar to inpatient care rather than ED care.[39] Patient satisfaction and quality of life has been shown to be significantly higher among chest pain and asthma EDOU patients relative to hospitalized patients.[40,41] Mace looked at adverse outcomes and reported EDOU resuscitation rates of 1 per 1,138 EDOU visits (0.09%). In this study the outcomes were 5/9 deaths and 4/9 successful resuscitations having good neurological outcome.[42]

Recidivism following an EDOU visit is another important measure of quality and resource utilization. In a study of EDOU return visits from a protocol run EDOU, 7.9% of discharged patients had a related return visit within 14 days, with most occurring within seven days.[43] Conditions associated with "therapeutic" protocols showed higher recidivism rates than diagnostic protocols (10.8% vs 5.1%), while protocols involving the treatment of painful conditions had the highest recidivism rates. Three randomized studies of chest pain care in an EDOU versus inpatient setting found similar 30-day recidivism rates (6% vs. 7%), similar 30-day major adverse cardiac events rates (0.5% vs 0.9%), and similar six-month cardiac event rates (6.6% vs. 8.5%), with no missed diagnoses on return visit.[31,33,5] A randomized study of asthmatics found no significant difference in relapse rates between patients treated in an EDOU compared with inpatient admission.[6] A case series of heart failure patients found no difference in thirty day hospital re-admission rate for patients treated in an EDOU as compared with a risk-matched admitted group of heart failure patients (17%).[44, 45] A study of 149 transient ischemic attack patients randomized to inpatient versus EDOU care found no difference in related return visits over 90 days (12%).[19] A study of elderly patients in an EDOU found similar 30-day related return visit rates between patients over and under age 65 (9.4% vs 7.6%).[25]

To be successful, an EDOU must be cost effective and equitable for the hospital, physician and those paying for health care services. From the perspective of most payment policies, both emergency services and observation services are classified as an "outpatient" service. CMS has clarified that observation is an outpatient "service" provided to patients who are of an outpatient "status" - similar to emergency or clinic services. Hospital observation services require documentation of medical necessity and a physician order for the service to be provided.[46] CMS policy states the majority of observation care should require less than 48 hours, and "usually less than 24 hours."[46,47,48] CMS clarifies that observation services are not covered when it is provided for the convenience of the patient, family, or physician and should not be used if the service is covered elsewhere, such as an inpatient admission, a postoperative standard recovery period, a routine part of an outpatient diagnostic test, or chemotherapy. Medicare policy states that hospital observation services may occur in a bed anywhere in the hospital where outpatients are treated, which includes settings such as an inpatient bed or an ED observation unit.[47,48] However, ACEP policy recognizes that care "*in a dedicated ED observation area, instead of a general inpatient bed or an acute care ED bed, is a "best practice" that requires a commitment of staff and hospital resources."*[34,35] Hospitals are paid for observation differently depending upon whether a patient is admitted or discharged. For emergency physicians, observing the patient in the EDOU creates an incrementally added amount of work relative to simply admitting or discharging the patient from the ED. If staffed optimally, the added work of the observation unit may be covered by billing the observation CPT codes. (Table 4)

Hospital payment for EDOU patients who are subsequently admitted are covered by the inpatient payment codes, such as the DRG for Medicare patients. This payment covers both the ED and observation services. If patients are observed and discharged, then Medicare pays for most observation "visits" using

a “composite” APC which combines payment for both the ED and observation visit into a single payment code (APC 8003). Like emergency visits, other services associated with an observation visit may have separate additional payment codes which are paid - such as codes for a stress test or a CT scan.[47,49]

Economic and resource utilization benefits of care in an EDOU have been described.[16,50,51] Kelen reported that opening an EDOU reduced the monthly hours of ambulance diversion and patients that leave the ED without being seen in half. This reduction was thought to be a direct result of decongesting the ED and opening inpatient beds through avoided admissions.[21] An analysis by Baugh describes how hospital beds which might have been occupied by observation patients can alternatively be filled with higher acuity, more financially advantageous, hospital admissions.[52] Furthermore, improved patient satisfaction might attract more patients to a hospital and fewer missed MIs may decrease litigation costs.

Selected clinical conditions appropriate for observation

General categories of patients

General categories of observation patients have been described in observational studies, national surveys, and consensus documents (table 5). Studies of EDOUs which manage several conditions have detailed unit case mix, EDOU length of stay, percent admissions, and recidivism rates.[25,43,53]

Pediatric EDOU patients

Pediatric patients represent 27% of all U.S. ED visits.[54] The reported rates of admission of ED patients to a pediatric EDOU is 4.0%-4.8%.[55,56] Common pediatric EDOU conditions are listed in table 6.[57-62] In the U.S., most pediatric EDOU patients present with “medical” conditions, with only 6.6%-7.5% presenting with surgical / traumatic conditions.[55,63] The average length of stay (LOS) for pediatric patients varies from 5.5 to 20.4 hours.[55,56,60,63-65] The wide variation in LOS may be related to the hospital setting - academic (20.4 hours) versus non-academic hospital (17.5 hours), or the country (Australia 17.5-20.4, France 5.5, and U.S. 8.4-15.6 hours). A study of an EDOU which managed both pediatric and adult patients reported a lower LOS in pediatric patients (11.2 hours) than adult non-geriatric (15.1 hours) or geriatric patients (15.4 hours).[24,57] The rate of inpatient admission of pediatric EDOU patients ranges from 10.4% to 25%, depending on such variables as conditions managed, setting (academic vs. community hospital), and country.[56,63,66-69] Physician satisfaction with a pediatric EDOU is high.[70] Over 60% of surveyed physicians (pediatricians, family practitioners, and pediatric sub-specialists) whose patients had been admitted to a pediatric EDOU felt that the EDOU was useful in the treatment of dehydration, gastroenteritis, reactive airway disease, and bronchiolitis.[70] A pediatric observation unit was found to decrease the hospitalization rate, increase inpatient complexity, and lower costs in a European study.[60]

Studies of specific pediatric EDOU conditions have included asthma, croup, gastroenteritis, intussusception reduction, hyperbilirubinemia, trauma and specifically head injury. Asthma is the most common chronic disease of childhood, with 10% of the U.S. pediatric population having this condition.[50] Inpatient admission rates for asthma have been increasing over the past few decades. In one study, 9.9% of pediatric ED asthma patients were admitted to an OU.[71] Studies of pediatric asthma patients have shown that observation therapy is medically and economically effective.[1,12,30,71,72] The EDOU discharge rate for pediatric asthma patients is 67% to 75% with a median length of stay of 16.5 hours and an overall decrease in hospital admission rates from the ED.[12,30,72,73] The average cost of hospitalization for the asthmatic patients admitted from the OU "was more than five times the average cost of care for those treated in the holding unit only," indicating that EDOU treatment failures may represent sicker patients.[30] In another study the mean costs for the hospitalized asthmatic patient was nearly three times that for the holding room patient.[73]

A study of pediatric croup patients before and after the introduction of an EDOU found a significant reduction in hospitalization rates (pre OU 9.5% vs. post OU 4.2%), improved overall resource utilization for “non-discharged” patients (median charge: pre OU = $1685 vs. post OU = $1327), and median LOS (pre OU = 27.2 vs. post OU = 21.3 hours).[74] Children with dehydration from gastroenteritis have successful EDOU discharge rates of 81% following failed initial ED therapy. Low risk patients with hyperbilirubinemia can be managed successfully in the EDOU. A study comparing EDOU stay and inpatient, revealed a shorter LOS, 42vs 18 hours. 82% of these patients were discharged home following their care in the EDOU.[75] There are reports of EDOU management of pediatric trauma, surgical, and specifically head injured patients.[76,77] Pediatric patients with a closed head injury treated in a pediatric OU

had a median LOS of 13 hours, with only 4% of patients admitted to an inpatient unit.[76] In a study comparing intussception patients that were successfully reduced by contrast enema and observed in the EDOU, versus admitted to the hospital, there were no difference in clinical outcome but a significantly shorter length of stay in the EDOU group (mean LOS 7.2 vs 22.7 hours).[77]

Geriatric patients

Two British studies (502 patients) and one large U.S. study (14,145 patients) describe the care of geriatric patients (>65yr old) in an adult ED observation unit.[25,78] They report discharge rates of 71 % to 74% among the elderly, which are slightly lower than younger patients. The odds of subsequent inpatient admission for the elderly, relative to younger patients, were highest for back pain (O.R. 2.1), urinary tract infection (O.R. 1.8), and chest pain (O.R. 1.7). EDOU length of stay for elderly patients was slightly longer than younger patients, 15.8 hours vs 14.4 hours. The rates of related return visit within 30-days were comparable between elderly and younger patients, 9.4% vs 7.6%.[25] Recently, Madsen et al reported that geriatric status was not an independent predictor of either hospitalization or cardiac intervention in patients admitted for chest pain in their EDOU.[79]

There are unique benefits of shorter hospital stays in the elderly. Previous studies have shown the elderly to be more vulnerable inpatient complications, with higher rates of adverse drug events, nosocomial infections, falls, use of restraints, pressure sores, delirium, and a decline in functional status.[80,81] For some elderly, the decline begins within one day of inpatient admission.[82] However, elderly EDOU patients are also likely to require more resources due to their greater health care needs. The EDOU is an ideal setting to involve geriatric and social services to help manage these patients.

Specific conditions appropriate for observation

Chest Pain

Over six million patients present to EDs in the U.S annually with chest pain, with chest pain being the symptom most commonly associated with acute myocardial infarction.[14] Studies have indicated that roughly 4% of patients with acute coronary syndromes are inadvertently discharged from the ED, often due to diagnostic uncertainty.[83]

To address this, guidelines such as those published by the American College of Cardiology and the American Heart Association suggest a systematic approach to the patient with possible acute coronary syndrome.[84] Since the 1980's chest pain centers have been developed and include protocols for the evaluation of low to intermediate-risk patients to rule out ACS as the cause of their chest pain.[85] These often involve protocol-driven units where patients receive serial cardiac markers, serial ECGs, and stress test cardiac imaging. An AHA scientific statement summarizes the key components of these protocols.[86] As of 2010, there are 629 accredited chest pain centers in the U.S. with all having a of low risk chest pain diagnostic protocol.[87] Although numbers vary, chest pain is often the most common condition managed in an EDOU.[24] Multiple studies have described improved outcomes with chest pain observation programs. Four prospective randomized studies have shown that relative to inpatient admission, chest pain protocols are associated with lower cost, shorter length of stays, and improved resource utilization.[17,31,33,51] Two population studies of the impact of an EDOU on the outcomes of all ED chest pain patients, not just low risk patients, found a significant reduction in both cost and inpatient admission for the whole group with reduced rate of missed myocardial infarction.[51,88] Studies have also reported improved ED chest pain patient satisfaction and quality of life with care in an EDOU relative to inpatient care, and clinical outcomes that were no worse than patients managed in an inpatient bed.[89] Additionally the protocol driven care in this setting is associated with improved rates of stress testing completion.[90,91]

Asthma

Patients with acute asthma attacks frequently present to ED's for acute treatment (1.8 million ED visits annually) with 233,000 of these patients being hospitalized due to failure in improvement.[92] Since the 1970's ED observation units have been used to continue the treatment of patients who remain symptomatic despite initial ED therapy.[93] The observation unit interventions include bronchodilator treatments, serial examinations, peak flow testing, and hydration. This results in significant cost savings since 25% of patients that require care beyond ED treatment for acute asthma who would otherwise have

had to be admitted to the hospital can be successfully treated in the ED observation unit and discharged.[53] The efficiency and effectiveness of ED observation units in the treatment of asthma have been validated in both observational and randomized controlled clinical trials.[29,30,16] In a study by McDermott acute asthmatics were randomized to either aggressive EDOU care for an additional 9 hours or to routine inpatient care following standard ED treatment. They found that 59% of EDOU asthmatics were discharged home compared with control groups where all were admitted. There were no differences in the two groups during the follow-up period in terms of relapse rates or subsequent morbidities. However there were significant differences in their length of stays (8.8hr vs 59 hr), costs ($1202 vs $2247), and quality of life.[16,94]

CHF

The prevalence of congestive heart failure is reported to effect 5.8 million people in 2009.[95]Although heart failure is a chronic condition, the 658,000 ED visits for acute exacerbations of heart failure represents almost 20% of the total heart failure specific ambulatory care delivered each year.[96] Most of these ED visits result in hospitalization.[97,98] Initial experience suggests that observation unit management of heart failure patients is safe and cost-effective.[44,45,99,100] Peacock reported that the introduction of an observation unit treatment protocol for heart failure was associated with a 56% reduction in the 90-day heart failure ED revisit rate and a 64% reduction in the 90-day heart failure rehospitalization rate. Additionally, there was a trend toward a reduction in the 90-day mortality rate, from 4% to 1%.[99] Successful discharge of patients from the EDOU depends on appropriate patient selection. Diercks reported that heart failure patients with a systolic blood pressure over 160 mm Hg on ED presentation and a normal initial cardiac Troponin I were significantly more likely to be discharged from the EDOU and not experience a 30-day adverse events (death, readmission, myocardial infarction, arrhythmias).[101] Guidelines published by both the AHA and the Society of Chest Pain Centers propose a standardized approach to the diagnosis, treatment and disposition of these patients.[36,102] This approach includes guidelines which delineate EDOU patient selection, interventions and patient education.

Abdominal Pain

Abdominal pain is the most common reason for ED visits in the United States accounting for 8% of the 120 million ED visits annually.[14] Acute appendicitis is the most common cause of an acute abdomen with approximately 250,000 appendectomies for suspected appendicitis being performed in the US each year.[103] Since the 1970's "active observation" of selected patient with acute abdominal pain has been shown to improve patient care and has become integral to the evaluation of abdominal pain.[104,105] Patients may be admitted to the EDOU for serial exams and diagnostic tests, such as CBC or selective imaging. Graff showed that short term observation of patients with suspected appendicitis was effective in determining the need for surgery.[106] In the late 1990s, Rao et al reported a high accuracy (98%) of CT scan in the diagnosis of appendicitis and showed that appendiceal CT imaging decreased the rate of negative appendectomies and need for observation.[107,108] However, others have subsequently questioned these findings and concerns related to increased ionizing radiation.[109-111] A recent prospective randomized trial showed that the use of computed tomography in women of childbearing age who presented with right lower quadrant was not significantly different from clinical assessment by an experienced clinician in accurately identifying patients who require an operation for appendicitis.[112] Hence, active observation with or without CT Scan remains an important strategy in the management of patients with undifferentiated abdominal pain for conditions such as appendicitis. The EDOU lends itself to the management of other conditions such as ureteral colic, uncomplicated diverticulitis, and uncomplicated upper GI bleeding.[25,113,114]

Syncope

The estimated incidence of self reported syncope is 6.2 per 1000 person years in the Framingham study.[115] These patients account for 1% of all ED visits.[116] It is widely accepted that patients with syncope and a high risk for cardiac events warrant inpatient admission for work up of the underlying disease processes.[117] However, it has been reported that 30% of syncope patients admitted by emergency physicians have an estimated risk of serious outcomes less than 2%.[118] There are several risk stratification scores and guidelines which may be used to select patients for further investigation in the EDOU, and

who may be safely discharged.[117,119-121] Shen performed a prospective randomized control study of intermediate risk syncope patients who were randomized to a designated syncope unit or an inpatient admission following initial ED management which included an ECG and cardiac monitoring.[28] The syncope unit protocol included serial vital signs, continuous cardiac monitoring for up to 6 hours. When clinically indicated patients received an echocardiogram (for an abnormal ECG or cardiovascular exam) or a tilt-table test with electrophysiology consultation. The results of this study showed that at the time of dismissal from the ED, the presumptive cause of syncope was established for 67% of patients in the syncope unit group compared to 10% in the standard care group. The total hospital bed days were reduced by 54% for patients in the syncope unit group and 2-year clinical outcomes, including all-cause mortality and recurrent syncope, were similar between EDOU and admitted control groups.[28]

Dehydration

Dehydration, often from gastroenteritis, accounts for 2% to 11.7% of an adult EDOU population.[25,53] Patients who present to the ED with dehydration require intravenous fluids therapy, anti-emetics, and reassessment. In a small retrospective observational study the diagnosis of dehydration was identified as the highest risk for early return visit to the ED and subsequent admission to the hospital on early return.[122] Hence, these patients are ideal for further management in the EDOU after initial resuscitation in the ED. In general, high risk patients, such as those with renal failure, congestive heart failure, liver failure and those with hemodynamic instability should be excluded from the EDOU. Studies of the efficacy of EDOU treatment of adults with this common condition are needed.

Transient Ischemic Attack

In the U.S. approximately 300,000 TIAs are diagnosed each year. Within this population, 10.5% of TIA patients who present to the ED will suffer a stroke within three months, with half of these occurring within two days.[123] Recommendations regarding the disposition of ED patients with transient ischemic attack remain vague.[124-126] Treatment of transient ischemic attack patients in an EDOU has been suggested as an alternative.[124] Ross reported a prospective study of 149 patients with transient ischemic attack who were randomized to either inpatient admission (control group) or ED observation unit admission for management using an accelerated diagnostic protocol.[19] All patients with transient ischemic attack had normal findings on computed tomography (CT) of the head, electrocardiography, laboratory studies and no known embolic source. Both groups had orders for serial clinical examinations, a neurology consultation, carotid duplex ultrasonography, echocardiography, and cardiac monitoring. Accelerated diagnostic protocol patients with positive testing results were admitted. Compared with the inpatient control group, patients in the accelerated diagnostic protocol group had total lengths of stay that were half as long (26 versus 61 hours), lower 90-day total direct costs ($890 versus $1,547), and comparable 90-day clinical outcomes. Accelerated diagnostic protocol patients were more likely to undergo carotid imaging (97% versus 90%) and echocardiography (97% versus 73%). Both groups had comparable rates of related return visits, subsequent strokes, and major clinical events. Stead reported that an EDOU TIA protocol is a feasible in a study of 418 patients. The mean age was 73.1 (±13.3) years with 30.4% of all TIA patients were discharged from the EDOU. The risk of stroke was 1.2% at 7 days and 2.4% at 90 days, which was lower that rates estimated by patient ABCD2 scores.[127]

Atrial Fibrillation

Between 1993 to 2004 there was an 88% increase in the absolute number of ED visits for atrial fibrillation, and a doubling in the population adjusted visit rate - from 0.6 to 1.2 visits per 1,000 US population.[128] During the past 20 years, hospital admissions for atrial fibrillation have increased by 66%.[129] A subset of patients, those with uncomplicated acute onset (<48 hours) atrial fibrillation, may be eligible for treatment in an EDOU based on prospective studies as well as current American Heart Association practice guideline. This subgroup does not require routine anticoagulation or transesophageal echocardiograph before cardioversion.[130] Ross reported that with this approach 82% of this subset may be discharged home in an average of 11.8 $\pm$7.0 hours.[26] Kim reported that an atrial fibrillation accelerated treatment protocol showed a favorable trend toward mean cost reduction ($1,706 vs $879).[131] Decker reported the results of a randomized trial which compared an accelerated treatment protocol in an EDOU care with routine hospitalization in patients with acute onset uncomplicated atrial fibrillation.[27] The 8-

hour EDOU protocol included an initial ECG, chest radiograph, and blood work. This was followed by pharmacologic heart rate control using a calcium channel blocker or a B-blocker. All patients received continuous cardiac monitoring and were reassessed after 6 hours. Those still in atrial fibrillation were sedated and received electrical cardioversion followed by observation for at least 2 more hours. Those in sinus rhythm after the 2-hour observation period were discharged home, with cardiology follow-up arranged within 3days. They found that patients in the EDOU group had substantially shorter hospitalizations with a median length of stay of 10.1 versus 25.2 hours and were 12% more likely to be discharged in sinus rhythm. There were no significant differences between the groups in terms of their frequency of recurrent atrial fibrillation, re-hospitalization, number of tests or procedures, or adverse events during their 6-month follow-up.[27]

Deep Vein Thrombosis

The average annual incidence of venous thromboembolism in the United States is 1 episode per 1000 registered patients.[132] Many of these patients present to the ED with a DVT as their isolated problem. Prompt anticoagulation is necessary to halt progression of the thrombus and to prevent the development of symptomatic pulmonary embolism.[133] Recommendations for treatment of DVT by ACP and ACCP state that outpatient treatment should be provided whenever possible.[134,135] This approach has been found to be cost effective, reducing both healthcare costs and hospital length of stay.[136-138] Compared with inpatients, those treated for DVT at home have greater levels of physical activity and social functioning, and demonstrate a more rapid return to pre-morbid levels of activity.[139-141] Integrating the many necessary steps that contribute to successful outpatient DVT management often requires the coordination of multiple therapies and services. This includes coordinated outpatient laboratory testing during bridge therapy, pharmacy, patient education and home healthcare.[142] Coordination of these services is complex and time consuming, and as a result it is often not feasible to effectively coordinate this therapy in the timeframe of an ED visit - making the EDOU an ideal setting for initiation of this therapy.[142] If patients develop bleeding or thromboembolic complications, as has been described in initial studies, then inpatient admission will occur. Otherwise, patients with confirmed uncomplicated DVTs have low molecular weight heparin therapy initiated, receive patient education and training for self injections, and arrangements for timely outpatient clinic evaluations including INR testing while heparin bridge therapy is being provided.[135]

Infections

Uncomplicated infectious diseases such as community acquired pneumonia, pyelonephritis and cellulitis are common ED conditions and account for 7.7% of all hospital inpatient admissions.[14]

Pneumonia - While most pneumonia decision rules risk stratify patients into one of two dispositions (home vs hospital admission), recent community acquired pneumonia (CAP) guidelines by ACEP note that observation in a setting such as the EDOU is an alternative option for patients with low risk CAP.[143] Decision rules such as PORT scores, PSI, and CURB-65 are designed to primarily predict the risk of death.[144,145] However, patients with a low score may have other issues, such as mild hypoxia or vomiting, that would prevent immediate discharge. This group of patients may be ideal for the observation unit. Martinez reported that pneumonia accounted for 5% of all EDOU patients at Cook County hospital with 76% discharged within 23 hours.[53] Chan reported the outcomes of a Hong Kong based CAP outpatient program that used the EDOU. Of 72 CAP patients treated, 83% were discharged with no return visits, while 12.5% required hospital admission within 30 days.[146] Factors associated with the need for subsequent re-hospitalization included TB, malignancy, persistent fever, IVDA, alcoholism, and co-morbidities such as rheumatoid arthritis or severe osteoporosis.[147]

Cellulitis - Martinez reported that cellulitis accounted for eight percent of all EDOU patients, with 85% discharged within 23 hours.[53] In a review of cellulitis treatment in an EDOU Roberts suggested that patients should be excluded if they have severe pain (possible deep infection), tissue necrosis, neck abscess, peripheral vascular disease, foreign bodies, bite wounds, and specific locations (hand, orbit, joints, scrotum, neck).[148] Often immunocompromised are also excluded – such as diabetics, cancer patients, patients on immunosuppressants, and patients with HIV. One of the primary goals of observation of selected patients is to monitor for rapidly progressing cellulitis or necrotizing fasciitis. In an analysis of 179 EDOU cellulitis patients, Shrock reported that 38% required admission and that admission was

associated with intravenous drug use, gender, a positive community-acquired methicillin-resistant Staphylococcus aureus culture, age, presence of medical insurance, drainage of an abscess in the ED, diabetes and a white blood cell count (WBC) greater than 15,000. However following multivariate analysis - admission was most likely patients that were females (Odds ratio 2.33) or whose WBC was over 15,000 (Odd ratio 4.06).[149]

Pyelonephritis - Outpatient treatment of uncomplicated pyelonephritis patients has been reported in observational studies.[25,150,151] The patients were otherwise healthy childbearing age females with confounding findings such as severe pain, vomiting and high fevers which prevent initial discharge from the ED. Ward reported successful discharge of 43/44 patients admitted to an EDOU after two doses of intravenous antibiotics over 12 hours.[151] Israel reported that 72% of patients with confirmed pyelonephritis were discharged following 12 hours of EDOU treatment, with a 6% re-admission rate.[150] Ross reported that EDOU uncomplicated pyelonephritis patients over 65 had admission rates that were higher than younger patients (18% vs 32%) but still reasonable for an EDOU setting.[25]

Treatment of painful conditions

Pain is the most common complaint of patients presenting to the ED.[14] Often, there are patients for whom the cause of their pain cannot be determined during the usual ED visit and who require pain relief and continuing diagnostic interventions. It is for these groups of patients that the EDOU provides the best site of care. No studies have been done relative to the use of EDOUs in the management of painful conditions. The most common conditions that require extended care are sickle cell disease, severe back pain, headache, urolithiasis, and orthopedic pain. The EDOU can provide multiple services that improve pain management, including a quiet and less stressful environment, comfortable beds, and distractions, such as television and refreshments. It is also an easier site from which to implement a pain management plan, perform patient controlled analgesia, and obtain consultation from specialists should they be needed, concerning the cause of the pain and its management.[152] However patient selection is important. Ross reported that elderly EDOU back pain patients were 2.1 times more likely to be admitted than young patients, and that discharged EDOU patients treated for painful conditions were more likely to return within 14 days (10.8% vs 5.1%).[25,43]

Patients at risk for self harm

In 2004 the AAPCC reported 300,000 intentional drug/toxic substance ingestions. Nearly 200,000 of these were secondary to suicidal intent.[153] Based on the current AAPCC data majority of these patients are either non-toxic or minimally toxic. Commonly used clinical toxicology and emergency medicine textbooks recommend observation for overdose patients.[154,155] The western Australian toxicology Service (WATS) has utilized observation units for the management of overdose patients.[156] Lateef et al reported the use of Short stay units (SSU) in Singapore for initial decontamination procedures for mild poisoning or overdoses. Antidote administration, monitoring of serum drug levels and social and psychiatric management is also provided in their SSU.[7] A recent study has developed a risk stratification nomogram for acute acetaminophen toxicity which can be used to identify a low-risk patient population who are ideal for 20 hour NAC therapy.[157] Until recently there were no published guidelines or algorithms for management of patients with deliberate ingestions in EDOUs in the US. The Mayo Clinic in Rochester recently developed and implemented an EDOU protocol for deliberate drug ingestion in adults.[158] Inclusion criteria for placement in this EDOU protocol were asymptomatic adult patients (age 15 years or older) who presented after known or suspected potentially toxic deliberate ingestion. The exclusion criteria were, patients with isolated alcohol intoxication, ingestion of sustained release preparation, chronic drug intoxication, elevated drug levels requiring prolonged medical therapy, end organ toxicity upon arrival, persistent self injurious or violent behavior possessing a serious threat to safety of patient, nursing and ancillary staff. Those patients that exhibited high risk criteria for deterioration after ingestion of an antidepressant were also excluded.[159] Over a period of 6 months they treated 6 patients in the EDOU. These numbers are too low for definitive analysis. However, no safety problems were identified by the nursing staff caring for these patients.

Conclusion

The EDOU continues to be a critically important "tool" used by emergency physicians in the care of selected acutely ill and injured patients. The proper utilization of these units remains important in order to achieve the beneficial outcomes that may be associated with these units. This aspect of emergency medicine merits further support as its role in the health care system continues to be refined and expanded.

Table 1 - Scheduled procedure patients which may share an EDOU to optimize resource utilization.

Adult scheduled procedure patients	Pediatric scheduled procedure patients
Blood transfusion	Sedation for procedure
Intravenous medication	pH probe
Myelogram	Infusion (eg, IV immunoglobulin, Remicade)
Arteriogram	Biopsy (eg, renal, liver, bowel, eye)
Cardiac catheter	Closed-circuit television EEG
Liver biopsy	Intrathecal baclofen trial
Thoracentesis	Orthopedic procedure
Paracentesis	Percutaneous endoscopic gastrostomy
Lumbar puncture	Sleep study
Intravenous chemotherapy	Post cardiac catheterization
Peripherally inserted central catheter lines	
Lung biopsy	
Renal biopsy	

Table 2. Principles of managing an ED observation unit[22]

1. Focused Patient Care Goals
2. Limited duration and intensity of services
3. Appropriate hospital location
4. Appropriate staffing
5. Providing ongoing care to an ED patient
6. Intensive review
7. Economical service

Table 3. ED Observation Unit Monitors

Utilization monitors

- Key data elements – patient identifier, reason for observation, date/time elements (ED arrival, EDOU arrival, EDOU departure), disposition (admit/discharge).
- Utilization monitors - to be reviewed monthly and annually, for the unit as a whole and by specific condition:
    - EDOU Census – for unit and by condition
    - Length of stay - average and outliers (LOS <6 hours, LOS > 24 hours).
    - Percent discharge
    - Percent of ED census observed
    - Number of patients / EDOU bed / day.

Quality monitors

- Return visits within 7 or 14 days
- Concerns and complaints
- Patient satisfaction surveys
- Unit and protocol compliance audits
- ICU admissions
- Sentinel events, resuscitations, and deaths in the unit

Table 4. Physician CPT payment codes for emergency and observation services.*

Service	CPT	Required Documentation *			2010 Total RVUs
		History		M.D.M.	
Emergency level 1	99281	PF	0.58	S	0.58
Emergency level 2	99282	EPF	1.12	L	1.12
Emergency level 3	99283	EPF	1.71	M	1.71
Emergency level 4	99284	D	3.21	M	3.21
Emergency level 5	99285	C	4.74	H	4.74
Observation Discharge	99217	+	1.88	+	1.88
Observation level 1	99218	D or C	1.77	S or L	1.77
Observation level 2	99219	C	2.93	M	2.93
Observation level 3	99220	C	4.1	H	4.1
Same Day Obs / dschg 1	99234	D or C	3.59	S or L	3.59
Same Day Obs / dschg 2	99235	C	4.71	M	4.71
Same Day Obs / dschg 3	99236	C	5.84	H	5.84

*For observation patients staying three or more calendar days, the middle days of their visit are paid using the Subsequent Observation code set: CPT 99224 (Total RVU .82), 99225 (Total RVU 1.45) and 99226 (Total RVU 2.17). These are similar to the inpatient subsequent inpatient care codes and consider level of care and time spent.

Table 5. Common EDOU conditions - ranked by levels of evidence and estimated prevalence

Rank	Adult Condition List	Estimated Prevalence	Specific Conditions: Randomized Controlled Trials	Specific Conditions: Observational Studies	General EDOU observational studies [4-7,24,25,51,52,159]
1	Chest Pain- possible acute cardiac ischemia	80.6%	[17,31,33,50,87]	[23,86-89,160-163]	X
2	Acute asthma exacerbation	56.1%	[16,30]	[29]	X
3	Syncope	11.2%	[28]	[164]	X
4	Transient ischemic attack	6.1%	[19,126]	[126,165-168]	X
5	Deep vein thrombosis	1.0%	[138]	[137,139]	X
6	Acute onset atrial fibrillation		[27]	[26,130]	
7	Abdominal Pain	57.1%	[111]	[105,169-171]	X
8	Psychiatric conditions	14.3%			X
9	Acute congestive heart failure	11.2%		[43,97,172,173]	X
10	Head injury	8.2%		[74]	X
11	Uncomplicated pyelonephritis	7.1%		[149,150]	X
12	Cellulitis / Soft tissue infections			[148]	X
13	Upper GI Bleeding			[112,113,174]	X
14	Abdominal trauma			[175-177]	X
15	Toxicology / Drug overdose (stable)			[156-158,178]	X

16	Pneumonia			[145]	X
17	Dehydration / Vomiting / Diarrhea	32.3%			X
18	Social services management	14.3%			X
19	Renal Colic / Kidney Stones	7.1%			X
20	Extremity Pain / Injury	4.1%			X
21	Intractable Back Pain	3.1%			X
22	Vertigo / ENT problems	1.0%			X
23	Blood Transfusions	1.0%			X
24	Alcohol intoxication				X
25	Intractable Headache				X

Table 6. Commonly observed pediatric conditions[12,24,30,54,55,57,60,61,63,64,66-75,104,178-181]

Rank	Pediatric EDOU common conditions
1	Asthma
2	Dehydration
3	Gastroenteritis
4	Pneumonia
5	Abdominal pain
6	Seizures
7	Fever
8	Bronchiolitis
9	Croup
10	Poisonings
11	Trauma

Written by members of the ACEP Observation Medicine Section

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