PILOT STUDY

Clinical Decision Unit, an extension of emergency department: An experience and advantage in a tertiary care centre

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Abstract

Objective: To evaluate the clinical decision unit of a tertiary care health facility and to see the disease pattern.

Methodology: The cross-sectional retrospective study was conducted at the Department of Emergency Medicine, Aga Khan University Hospital, Karachi, from September to October 2011, and comprised data of patients admitted to the clinical decision unit from January to December 2010. The protocols were developed for 7 diseases: acute coronary syndrome, ureteric colic, abdominal pain, bronchial asthma, gastroenteritis with dehydration, headache, and minor head injury. Data-collection proforma recorded demographics, dates of admission, presenting complaints at triage, diagnosis at admission, final disposition and bounce back of the patients. Data was analysed using Microsoft Excel 2007.

Results: Of the 1515 patients whose data was analysed, 824(54%) were males. The overall age ranged from newborns to 93 years. Further, 904(60%) patients had presented to the triage counter as P3 category. Acute gastroenteritis was the most common complaint 240(15.84%). Of the total, 1311(87%) were sent home from the clinical decision unit; 39(2.8%) of them bounced back with the same complaint. Overall, 2(0.2%) adult patients expired.

Conclusion: The unit evaluated had a productive initial year. Acute gastroenteritis was the most common protocol in use, but other protocols should also be developed to address local needs.

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Introduction

The clinical decision unit (CDU) is a globally recognised unit within the Emergency Department (ED) that provides diagnostic and treatment options to patients along with the opportunity to observe them in an efficient, safe and comfortable environment.[1] The ED overflow area or holding unit of yore is now clearly defined and named as the Observation Unit (OU), Evaluation Unit (EU) or the CDU. These units have been in existence since the 1960s and have further evolved over the past four decades due to the increasing problem of ED overcrowding and its impact on ED services. The OU or CDU has proven benefits like improved resource utilisation,[2] improved diagnostic accuracy,[3] enhanced patient satisfaction[4] and increased educational and research opportunities.[5,6] Functionally established CDUs help ED physicians to deal with the dilemma of "admit or discharge", and now have the third option of observing patients for up to 48 hours in designated areas within the ED.

The primary objectives of such units are to provide an alternative for patients requiring short periods of hospitalisation, with some extended diagnostic assessment or management, which is not routinely ordered in a busy ED, in patients who may not fulfill the hospital criteria for in-patient admission.

The increasing demand for immediate medical care has resulted in ED overcrowding as well as higher number of inpatients originating from ED. These factors have made redesigning the emergency care resources a priority for emergency management groups. These changes include improving and adapting clinical work to the hourly, daily and seasonal fluctuations of the emergency demand.

In the United Kingdom (UK), Dallos and Mouzas[7] described their work in London from two EDs' observation wards. The patients discussed had presented with different signs and symptoms and diseases like cardiac or non-cardiac chest pain, epilepsy, syncope, non-specific abdominal pain, head or orthopaedic injuries. Patients with psychiatric illnesses and those who needed social support were also dealt with in the CDU. In 1998, a comprehensive survey revealed that only 95 accident & emergency (A&E) departments out of 260 had short-stay beds designated as CDU,[8] where minor head injury, alcohol and drug intoxication, psychosocial care, soft tissue infections and deliberate self-harm or self-poisoning were managed. Recently, chest pain evaluation

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units have been developed to target the group of complex patients with symptoms resembling acute coronary syndrome (ACS).[9] These strategies, based in the ED, have proved to be safe and beneficial. Similar success stories originated during the same time frame from the United States (USA). During the 1970s, the concept of Observation Medicine was forwarded by Landers et al.[10] and Diamond et al.[11] The case patterns detailed were nearly the same as those in the United Kingdom. However, it wasn't until the late 1980s when the first clinical guidelines by the American College of Emergency Physicians (ACEP) were issued.[12] Academic EDs' survey in 2000 revealed 37% functioning observation units. Following the success of CDUs in UK and USA, a significant paradigm shift in ED care provision evolved since the late 1990s in Melbourne, Australia.[13] The interventions reported comprised a range of new services and facilitative initiatives like Short Stay Unit (SSU), Chest Pain Unit (CPU)and home in the hospital (HITH) within the ED.

Most ED professionals agreed that observation units seemed to be here to stay, and that those who are discharged from the CDU may bounce back with similar or different complaints.[14]

CDU has been documented to be effective in managing patients and reducing total length of hospital stay (LOS), costs and delays in disposition. This continued patient care within the ED not only decreases the incidence of bounce-back, if discharged safely, but can also buffer the backlog of in-patient admissions. An appropriately functional CDU is one of the prime factors in reducing complaints of delays and extra costs, hence improving patient satisfaction.

The Aga Khan University Hospital (AKUH) in Karachi started experiencing ED overcrowding 15 years back. In 2004, Riffat et al. proposed a holding unit as one of the possible solutions for managing ED overcrowding.[14] The CDU at AKUH works as an observational unit within the ED where patients are admitted for up to 48 hours for observation and treatment. If the patient remains well in CDU and meets the discharge criteria, they are sent home. But if they require further investigation or stay for more than 24-48 hours, they are then admitted into the hospital under the appropriate service.

The CDU at AKUH became functional in January 2010. Although protocols were developed for 7 diseases/ presentations — acute coronary syndrome, ureteric colic, abdominal pain, bronchial asthma, acute gastroenteritis with dehydration, headache, and minor head injury[15] — stable patients who required care for not more than 48 hours, and patients with other conditions were also admitted. The current study was planned to observe the disease pattern of patients admitted to the CDU over its first functional year.

Material and Methods

The cross-sectional retrospective study was conducted at the AKUH ED, Karachi, from September to October 2011, and comprised data of patients admitted to the CDU from January to December 2010. AKUH is a 600-bed tertiary care teaching hospital located in a metropolitan setting. It provides medical care to a population of approximately 14 million across all specialties. The Department of Emergency Medicine is the only ED in the city with a postgraduate training programme. The ED caters to more than 65,000 patients annually, which includes all sorts of medical and surgical cases as well as those of poly-trauma. About 15,000(33%) inpatient admissions originate from warded (Figure-1).

The CDU is an 8-bed unit separate from the other ED areas. Administratively, it is part of the ED. An attending doctor is assigned to the CDU 24 h/day, with three shifts throughout the week. The ED does triage based upon Emergency Severity Index (ESI)[16 that has 4 categories. P1 is the most acute, followed by P2, P3 and P4.

For the purpose of the current study, patient identifiers were not disclosed and data was recorded without the identifiers. After having clearance from the institutional ethics committee, the patient charts were accessed.

CDU patients are defined as those triaged in the ED and

Figure-1: Flow of patients - from arrival to disposition.

subsequently managed as per ED policy. Record of patients of all ages and genders presenting to ED and admitted to the CDU were included. After initial resuscitation and stabilisation (if applicable), all patients were re-assessed, and their disposition was decided. Patients requiring further ED stay were later moved to the CDU as per their observational needs, depending on the physicians' clinical discretion. A few patients were directly sent to the CDU by the triage physician for observation or further investigation. CDU admissions enabled the patient to stay in the ED for approximately 24-48 hours. Patients who were discharged, awaiting in-patient admission or admitted in the hospital were excluded.

Charts/files and collected data using the physician and nurse reports from the ED files as well as online data from the Emergency Patients Information System (EPIS) for data extraction were reviewed. EPIS records date and time of registration for each ED visit. Patients are registered as soon as they report at the ED. The EPIS also generates daily reports for patients who stay <12 hours in the CDU and includes total LOS in ED, destination and the specialty under which they are admitted.

The questionnaire elicited information recall of the socio-demographic factors, date and time of admission, presenting complaint at triage, diagnosis at CDU admission, LOS <12 hours or 12-24 hours, final disposition from ED and patient bounce-back status. Admitting complaints and diagnosis at admission to CDU were collected to identify disease patterns that required longer duration of stay in the ED. Final dispositions recorded included discharged home, to the hospital, dead, left against medical advice (LAMA) or transfer to other vicinity. Data was analysed using Microsoft Excel 2007. Frequencies and percentages were calculated. Selection bias was minimised by including all patients admitted to CDU. Information bias was minimised with random chart review by an independent reviewer — a volunteer — experienced in reviewing files of ED patients. Incomplete/inaccurate data recording in the hospital system was considered information bias, and we extracted data from multiple sources to minimise this possible error.

Results

Of the 49,537 patients who visited the hospital,

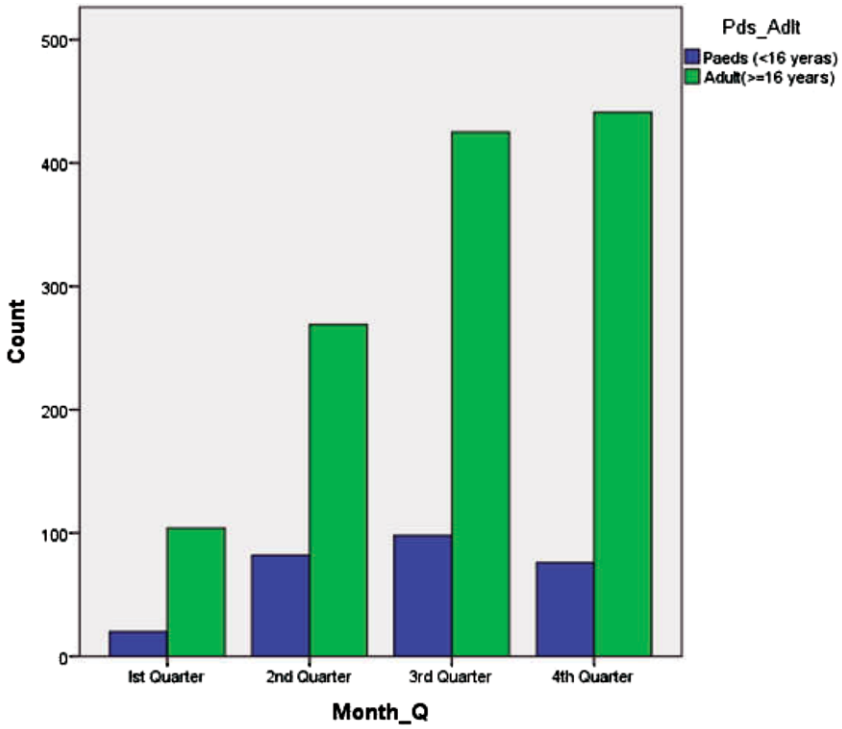

Figure-2: Age and quarterly patient admission.

Table-1: Triage category, age and gender comparison.

Gender	Age	Triage				Total	P value
		P1	P2	P3	P4		
Male	Paediatric	15	15	130	8	168 (61%)	
	Adult	103	146	367	40	656 (53%)	0.000
	Total	118	161	497	48	824 (54%)	
Female	Paediatric	12	4	83	9	108 (39%)	
	Adult	92	139	324	28	583 (47%)	0.000
	Total	104	143	407	37	691 (46%)	
Total	Paediatric	27	19	213	17	276 (18%)	
	Adult	195	285	691	68	1239 (82%)	
	Total	222	304	904	85	1515 (100)	

Table-2: Quarterly Triage Acuity level.

	Triage				Total
	P1	P2	P3	P4	
1st Quarter	17	33	61	13	124
2nd Quarter	51	84	198	18	351
3rd Quarter	61	83	354	25	523
4th Quarter	93	104	291	29	517
Total	222	304	904	85	1515

Table-3: Length of hospital stay (LOS), age and triage acuity comparison.

Triage			Age		
			Paediatric	Adult	Total
P1		less than 1 hr	0	1	1
		1 hr to 4 hrs	2	14	16
		4 hr to 8 hrs	7	23	30
		8 hrs to 12 hrs	4	31	35
		12 hrs to 24 hrs	13	95	108
		> 24 hrs	1	31	32
	Total		27	195	222
P2		less than 1 hr	0	2	2
		1 hr to 4 hrs	1	11	12
		4 hr to 8 hrs	6	26	32
		8 hrs to 12 hrs	2	55	57
		12 hrs to 24 hrs	7	154	161
		> 24 hrs	3	37	40
	Total		19	285	304
P3		less than 1 hr	1	10	11
		1 hr to 4 hrs	16	45	61
		4 hr to 8 hrs	44	120	164
		8 hrs to 12 hrs	35	129	164
		12 hrs to 24 hrs	91	270	361
		> 24 hrs	25	117	142
	Total		212	691	903
P4		less than 1 hr	0	2	2
		1 hr to 4 hrs	4	13	17
		4 hr to 8 hrs	3	12	15
		8 hrs to 12 hrs	1	11	12
		12 hrs to 24 hrs	5	20	25
		> 24 hrs	4	9	13
	Total		17	67	84
Total		less than 1 hr	1	15	16
		1 hr to 4 hrs	23	83	106
		4 hr to 8 hrs	60	181	241
		8 hrs to 12 hrs	42	226	268
		12 hrs to 24 hrs	116	539	655
		> 24 hrs	33	194	227
	Total		275	1238	1513

17,955(36%) were admitted and 28,452 (57%) were discharged safely. Of the remaining 3130(7%) individuals, LAMA accounted for 1989(4%) cases, referred or transferred to other hospitals 473 (0.95%), either expired in ED or dead on arrival 622(1.2%), and data was missing for 46(0.09%). A total of 4954(10%) patients left without being seen (LWBS) from the triage.

Table-4: Distribution of the most frequent diagnosis-related groups in the clinical decision unit (CDU).

Diagnoses	Total n=1515 (%)
Abdominal pain	240 (15.84)
Chest pain/ acute coronary syndrome (ACS)	163 (10.75)
Drug overdose	98 (6.46)
Mild head injury	96 (6.33)
Electrolyte imbalance	95 (6.27)
Hypoglycaemia	92 (6.07)
Transfusion of blood products	82 (5.41)
Fever	80 (5.28)
Others	569 (37.55)

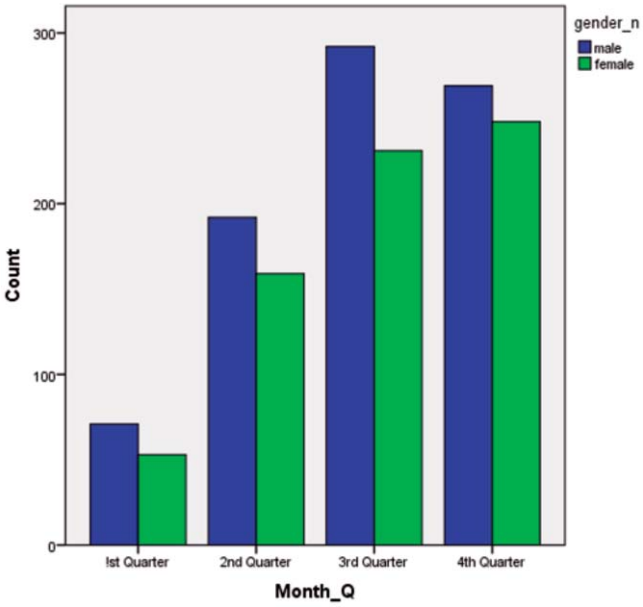

Figure-3: Gender and quarterly patient admission.

Of the 1515(3%) patients who were admitted in the CDU, 276(18%) were children with a mean age of 4.1±4.3 year and 1239(82%) were adults with a mean age of 43.6±18.1 years. Overall, 824(54%) cases were males, and the age ranged from newborns to 93 years (Table-1).

Among patients admitted during the third and fourth quarters of the year, 866(83%) were adults, and 174(17%) children. In terms of gender, 479(46%) were females and 561(54%) were males. Most patients 904(60%) (p=0.002) were categorised P3 in triage and were managed in CDU (Table-2).

July was the month when most patients were managed in

CDU 191(12.6%) followed by August 188(12.4%). Quarterly age and gender distributions were tabulated (Figures-2,3).

From the CDU, 165(11%) cases were admitted to hospital, while 1350(89%) were discharged home, with 39(2.8%) patients bouncing back with the same complaint. Besides, 2(0.2%) adult patients expired in the CDU. Both had been categorised P1. No paediatric mortality was observed. Out of 276 children, 39(14%) were admitted to the paediatric ward.

Further, 655(43%) patients had LOS 12-24 hours in CDU, while 227(15%) stayed >24 hours. These groups were analysed for age and triage acuity (Table-3).

Acute gastroenteritis was the most common complaint 240(15.84%) (Table-4).

Discussion

The findings showed that the CDU was able to offer a classic resource, the hospital bed, for a brief period of time to a selected group of patients. In our experience, the unit proved to be effective, safe and satisfactory for patients.

The guaranteed 24-hour continuous care by means of an operational model based on shifts work/calls, as opposed to the traditional model observed globally in the in-hospital wards system, meant that each patient was routinely seen at least thrice a day (once per shift) in the ED by senior on-call physican.[17] In addition, the admission or discharge process could be performed round-the-clock as and when needed throughout the day, in contrast to in-hospital wards where admission or discharge is restricted to the morning/afternoon period. This phenomenon resulted in increased turnover of patients all the while helping the hospital administration to have beds for more deserving patients. The active dynamics of admission and discharges, in which the night shift had a key role, might have had negative effects on the patients' assessment of comfort level,[17] so this point should be considered and improvements be made, if needed, in the future.

Patients with vague presentations needed in-depth and continuous evaluation for serious clinical conditions, like acute cardiac or non-cardiac chest pain or appendicitis. CDU observation not only made this process cost-effective but also decreased inadvertent discharges with potential serious disease or outcome,[18] as shown by another recent study showing marked reduction in admission of chronic obstructive pulmonary disease (COPD) patients by introducing CDU care, treating around one-fifth of such patients in CDU only, helping the hospital administration with cost as well as in decompressing the ED.[19]

There were 222 patients P1 triage category who were later observed in CDU; chest pain 163 patients, abdominal pain having tachycardia 32, mild head injury 12, hypoglycaemia 9, and drug overdose 6. The significance for this observation is that patients who were taken into the resuscitation area on account of their presenting symptoms were later observed in CDU, for want of either lab results or for further observation of any clinical sign that may require admission.

Most patients admitted to the CDU were of the P3 category, and only a few of them needed admission to hospital from CDU. Even fewer bounced back and LOS in CDU was <24 hours in most cases. Adult males were the most common population admitted in CDU from within this triage category. The most common admitting diagnoses were abdominal pain, acute coronary syndrome (ACE), electrolyte imbalance, hypoglycaemia, transfusion of blood product and fever, so protocols with certain criteria were developed in the ED to cater to this subset of patients. All the patients initially received standard emergency care in the main ED and were later admitted in CDU if they fulfilled the criteria for further management.

Abdominal pain was the most frequent complaint seen in the ED, especially in elderly patients, which showed great benefit as mentioned in literature using this observational model.[20] The rate of hospital admission for chest pain-related complaints was observed at around 41%,[21] but CDU may reduce the non-cardiac chest pain admission to the coronary units. International data[22] suggests that chest pain was the most common CDU presentation, but we found abdominal pain to be the most common followed by chest pain as the commonest reason of CDU admission. This variation from the international data may be due to the possibility of the emergence of new sets of disease-related groups in this region. We will have to follow up on this trend and document the variation to see if it persists for at least a decade.

Of the 1515 patients managed in CDU, 89% were discharged home and only 11% were admitted to in-hospital beds. Looking at the big picture i.e. hospital admissions, we can say that by the utilisation of CDU, we prevented around 8% of hospital admissions, because of which ED through-put stood improved, LOC was decreased and congestion was resolved.[22-24] We will be following these numbers and will report them separately if statistically significant.

ED functional acuity is assessed by its through-put: the time taken for the decision either to discharge or admission to hospital. The access block is the major contributor of congestion and delays in ED.[13] The use of

CDU may improve efficiency in a paediatric healthcare system with limited resources, though limited data is available to assess the overall effectiveness of patients admitted in the CDU.[25,26]

The following saying by Hippocrates is the essence of what the CDU is all about. Hippocrates, stated in 410BC, "Leave nothing to chance, overlook nothing: combine contradictory observations and allow enough time. A great part, I believe, of the art is to be able to observe.[27]

One of the major limitations of the current study is its retrospective nature which exposes it to the possibility of data and selection biases. True comparisons of patients, their presentations and diagnoses were not possible. Physician appropriateness, cost and patient satisfaction are a few other factors missing from the current study. Another weakness of the study is that it is a pilot study done in 2010-11. It could not be submitted immediately due to administrative delays.

Conclusion

Increasing burden on EDs has resulted in the evolution of a few new ideas for decongesting it, with increasing trends of assessing and managing patients as outpatient or in observational units in order to reduce the time, cost and patient load. However, more work is needed in terms of evaluating the geriatric, paediatric, pregnant and trauma patients.

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