

ORIGINAL ARTICLE

Quick diagnostic unit integrated in an emergency department setting reduces medical admissions – an observational study

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Abstract

Background: Hospitals in countries with public health systems have recently adopted organizational changes to improve efficiency and resource allocation, and reducing inappropriate hospitalizations has been established as an important goal, as well as avoiding or buffering overcrowding in Emergency Departments (EDs).

Aims: Our goal was to describe the impact of a Quick Diagnostic Unit established on January 1, 2012, integrated in an ED setting in a Danish public university hospital following its function for the first year.

Design: Observational, descriptive and comparative study.

Methods: Our sample comprised the total number of patients being admitted and discharged from the Department of Internal Medicine in 2011 and 2012, with special focus on the General Medicine Ward.

Results: Compared with 2011 the establishment of the Quick Diagnostic Unit integrated in the Emergency Department resulted in the admittance and discharge of fewer patients (40%; $p < .0001$) to the hospital's General Medicine Ward and 11.6% ($p < .0001$) fewer patients in the whole Department of Internal Medicine.

Conclusions: A Quick Diagnostic Unit integrated in an ED setting represents a useful and fast track model for the diagnostic study and treatment of patients with simple internal medicine ailments, and also serves as a buffer for overcrowding of the ED.

Key words

Quick diagnostic unit, Reduction of medical admissions, Emergency department, Acute admission

1 Background

Handling of acute patients can be challenging, also on an organizational level. Activity varies during the day and increases over time, and efforts are put into improving efficiency, managing patient flow and making patient stay in the hospital shorter ^[1].

Various organizational solutions has included Medical Admission Units ^[2], that has proven safe and efficient both

internationally^[3] and in Denmark^[4], Short Stay Units (either as part of or close to the Emergency Department)^[5], and Quick Diagnosis Units (QDUs) as a cost-effective alternative to hospitalisation with high patient satisfaction^[6,7].

Further implementation of such units is believed to have the potential of reducing health care cost substantially^[8].

The organizational structure of hospitals in Denmark has changed dramatically within recent years, concentrating activities on fewer, but larger hospital units. The hospital infrastructure has been greatly influenced by the principles for hospitals receiving acute patients outlined in the report about the emergency medical system issued by the National Board of Health in 2007^[9].

Region Zealand was one of the first regions in Denmark to establish independent Emergency Departments (EDs) on the four hospitals chosen to be the “acute hospitals” of the Region^[10]. The EDs have their own leadership and physician staffing and receive almost all of the acute patients referred to the hospital. The purposes of EDs are to enhance the focus on the acute patients and to reduce some of the pressure on the specialty wards, which on a regional level already seems to have been achieved to a certain extent^[11].

On January 1, 2012, a QDU integrated in an Emergency Department setting was established at Holbaek University Hospital. Concomitantly a community hospital (with 56 general internal medicine beds) in the vicinity was closed. Being integrated in the ED, the QDU is manned by nurses and physicians employed by and referring to the ED.

The General Medicine Ward (GMW) is the largest ward within the Department of Internal Medicine (DIM) receiving most acute patients. Earlier studies in the ED has suggested that brief hospitalizations of elderly patients could be handled more efficiently: Prior to the reorganization an audit of 30 charts from medical admissions was performed, showing that 12 patients (40%) could have been diagnosed and treated in a QDU rather than in the GMW (unpublished data). It has previously been shown that implementing alternatives to conventional hospitalization can solve the problem of lack of access to inpatient beds^[12].

To our knowledge this is the first study regarding a QDU fully integrated in an ED setting primarily to treat patients with simple internal medicine ailments, *i.e.* typical general internal medicine ward patients.

We wished to investigate if the number of medical admissions were reduced after the establishment of the QDU, and furthermore evaluate the distribution of admissions between the different medical subspecialties. It should be noted that medical admissions comprise by far the majority of admissions (around 70%), and therefore are quantitatively the most important.

The hospital and the QDU integrated in an ED setting

Holbaek University Hospital is a 300 bed regional hospital with a catchment area of approximately 200,000 persons. The new, independent ED opened on March 1st 2009 receiving acute patients referred to any of the specialties represented at the hospital: internal medicine, neurology, surgery and orthopedic surgery (but not patients referred to obstetrics, gynaecology or medical paediatrics). Undifferentiated acute patients and walk ins are also received and treated in the ED.

The QDU is both organizational and physically integrated in the ED, accommodates 16 patients and is comprised of 10 beds and six ambulatory seats/chairs. It is manned by a Chief Physician (specialist in internal medicine) an additional rotating senior physician and an intern during day time 08:00 – 16:00, three nurses and a secretary. After 16:00 to the following morning it is manned by the physicians on call in the ED proper. Hence the QDU is independent of the DIM and the staff is rotating between working in the ED and the QDU.

The QDU receives patients referred by general practitioners or specialized departments at other hospitals for suspected severe disease or minor medical ailments (deep venous thrombosis, anaemia *etc.*) that cannot be handled in an out patients setting, but don't need a traditional admission.

The QDU also functions as a short stay or observation unit in the ED, hence accommodating patients that need either a short observation period (*e.g.* concussion or systemic, but not yet severe infections) or further diagnostic clarification (*e.g.* abdominal pain that doesn't prompt surgical intervention).

The ED has its own Point of Care laboratory (POCT) manned by two bio analysts from 08:00 – 22:00, as well as an x-ray facility manned from 10:00 – 18:00. Additionally the Department of Radiology provides more advanced diagnostic procedures such as *e.g.* CAT scans or MRI scans on a fast track basis. There is easy access to additional specialist evaluations from the ED staff or, albeit rarely, from various in house specialists.

2 Methods and material

We compared the total number of acute patients admitted to and discharged from the Department of Internal Medicine in 2011 and 2012 (before and after the opening of the QDU).

By comparing two separate years there should be no difference on the impact of public holidays or seasonal variations.

The number of patient contacts were extracted from the ED statistical overview based on the general patient administrative system (PAS) of the hospital. The number of patient contacts was registered on a monthly basis.

Statistics

Results are given as means \pm SEM. Statistical significance was ascertained by Student's two tailed *t* test for unpaired observations $p < .05$ was considered significant.

3 Results

3.1 Admission to the general medical ward

As shown in Figure 1, the total number of patients being admitted and discharged from the GMW was 3,849 in 2011 and 2,309 in 2012.

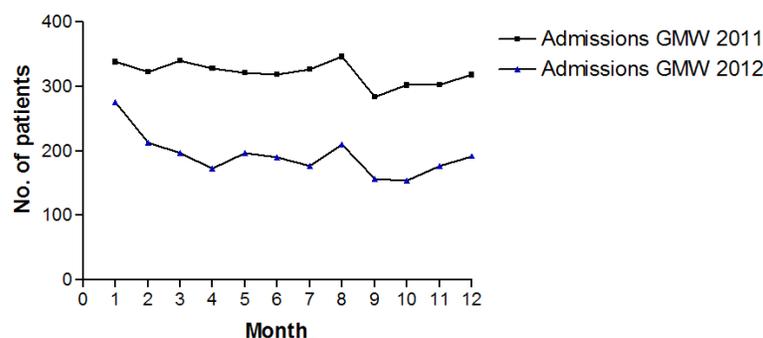


Figure 1. The number of acute patients admitted and discharged from the GMW in 2011 and 2012

The average number of patients being admitted and discharged pr. month was 320.8 ± 5.1 in 2011 and 192.4 ± 9.3 amounting to a 40% reduction ($p < .0001$) in 2012.

3.2 All admissions to department of internal medicine

As shown in Figure 2, the total number of patients being admitted and discharged from the DIM was 9,177 in 2011 and 8,109 in 2012.

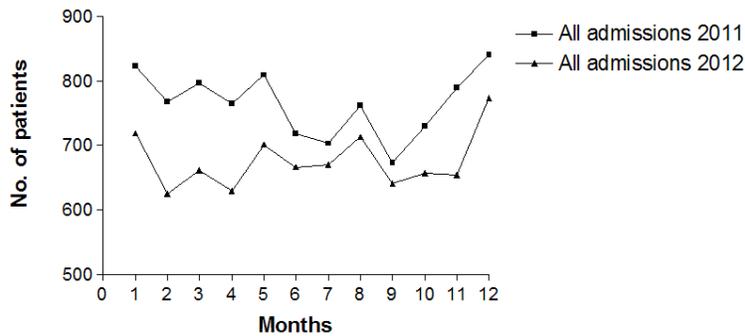


Figure 2. The total number of acute patients admitted and discharged from DIM in 2011 and 2012

The average number of patients being admitted and discharged pr. month was 764.8 ± 14.6 in 2011 and 675.8 ± 12.5 amounting to a 11.6% reduction ($p < .0001$) in 2012.

3.3 Admissions to all subspecialties

As shown in Figure 3, there were significant changes (marked with an asterisk) in only two medical subspecialties: Department of Pulmonary Diseases and Department of Gastroenterology.

The average number of patients being admitted and discharged from Department of Pulmonary Diseases pr. month was 96.7 ± 4.7 in 2011 and 72.1 ± 4.1 ($p = .002$) in 2012.

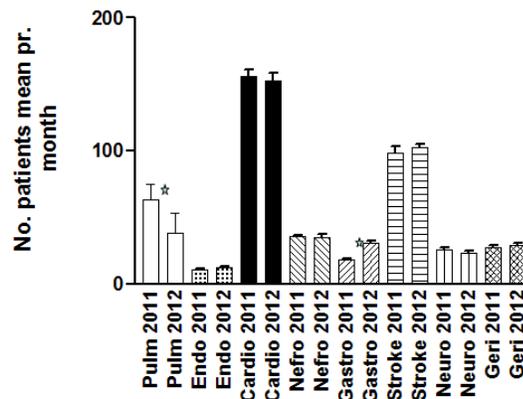


Figure 3. The mean number of acute patients admitted and discharged pr. month from all the different medical subspecialties in 2011 and 2012

The average number of patients being admitted and discharged from Department of Gastroenterology pr. month was 18.0 ± 1.2 in 2011 and 31.1 ± 1.9 ($p < .0001$) in 2012.

4 Discussion

There was a 40% reduction in the number of acute patients being admitted to and discharged from the GMW. This corresponds to the expected reduction from an audit done prior to the introduction of the QDU.

The QDU was the only variable that differed in the department set up between 2011 and 2012, overall the reduction in discharges from DIM must be due to the introduction of the QDU integrated in the ED.

The reductions were followed by a single decrease (mean no. of patients 24.6% or 25% pr. month) of admissions to the Department of Pulmonary Diseases and a single increase (mean no. of patients 73.1% or 73% pr. month) of admissions to

the Department of Gastroenterology, all other subspecialty wards showed no statistically significant change. It is conceivable that some of the overall increase between patients received in 2011 and in 2012 is due to the closing of a 56 bed internal medicine ward facility in the vicinity by January 1st 2012.

Figure 1 and 2 show approximately the same seasonal variation in patient flow in both 2011 and 2012.

Because this study only describes the number of admissions and not the length of stay (LOS), it does not reflect the patient and work load of the DIM. The ED and QDU discharge the majority of patients with minor problems and complaints.

More serious conditions are still admitted to the DIM, including patients admitted for long term rehabilitation that previously were transferred to the small community hospital closed on January 1st 2012. Further studies must show, if the LOS at the DIM are also influenced by the work done in ED or by other factors.

It is also possible that the establishment of the QDU in question has generated more referrals of patients from the primary health care sector, but this study focuses only on the reduction in acute admission for internal medicine. Further research is needed to accomplish clarification.

Follow up on individual patients demands chart reviews which was not possible during the study, but earlier studies^[11] have shown no increased readmissions of ED-discharged patients generally in the period.

Furthermore, this study does not include the development of admissions to the department of surgery or orthopaedic surgery, but the ED statistical overview based on the general PAS of the hospital used for this study also suggests that reductions are also possible in these specialties, which must be the subject of another study.

The changes in patient flow caused by short stay units and QDUs are already recognized in the literature^[13,14], and our study confirms these findings and corresponds with the expected reduction in admissions.

QDUs have the potential to have both clinical and financial benefits^[15], but only if the majority of the patients can be handled solely in the QDU and not transferred to stationary departments^[16].

5 Conclusions

The QDU reduced acute admissions to Department of Internal Medicine significantly by 11.6%, primarily by reducing acute admission to the General Medical Ward significantly by 40.0%.

The perspectives for the future are even better and faster diagnostics, *e.g.* with ultrasound scan for deep venous thrombosis performed at arrival at the ED by the emergency physicians instead of patients waiting for a scan at the department of radiology.

This will demand a continuous education of the emergency physicians and regular follow up studies to control the organizational development.

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