A medical admission unit reduces duration of hospital stay and number of readmissions

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ABSTRACT

INTRODUCTION: Political initiatives promoting a more efficient emergency admission process have triggered a reorganisation of the Danish health system with a view to creating fewer and larger admission units counting more experienced physicians. At our hospital, a medical admission unit (MAU) was established. We present the effect of this on the length of hospital stay, mortality rates and the number of readmissions for the last year with the previous structure and the first year of the new MAU structure.

MATERIAL AND METHODS: We retrospectively extracted data from the hospital databases on two periods: one year before and the first year after establishment of the MAU.

RESULTS: After establishment of the MAU, the overall average length of hospital stay was reduced from 4.1 to 3.8 days ($p < 0.01$). No increase in mortality either in-house or within 30 days after discharge was seen. A substantial reduction (26%) in the overall number of readmissions within 30 days after discharge was observed.

CONCLUSION: The establishment of the MAU improved efficacy at the hospital owing to reduction in the length of hospital stay and the number of readmissions. As judged from mortality rates and indicated by readmission rates, neither the quality of treatment nor patient safety was compromised in a setup, where patients with suspected cardiac diseases are admitted along with patients suspected to suffer from other internal medical diseases. The dynamics between multidisciplinary physicians and nurses seems to improve when they are working close to each other in a setting where team spirit evolves.

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The reorganisation of emergency admission units is a hot topic in the current Danish health debate.

In 2007 a political vision for a more efficient emergency admission process made the Danish National Board of Health publish a report recommending fewer and larger units with more competent personnel including more experienced physicians to improve overall medical treatment quality [1].

In Region of Southern Denmark, this reorganisation is developing. Health care professionals and administration staff members issued a paper describing an overall framework for the "future emergency services" [2].This report recommended the adoption by hospitals of a value chain mindset as a basic element with a view to optimizing all activities to ensure the benefit and usefulness of the performed activities to patients. The aim was to further the creation of a coherent, patient-orientated, contemporary and quality-conscious health service. One consequence is that physicians need to work together in multidisciplinary teams across specialities. The medical admission unit (MAU) is an environment where the patient is examined and treated in a single location, as the relevant expertise and support functions show up and make their contribution to the overall process.

A major reorganisation among the medical departments in the hospital was completed in late 2008 and early 2009. In March 2009, the MAU was established. The aim of this paper is to investigate the impact of this reorganisation on the length of hospital stay, mortality and the number of readmissions. This study presents our data for the last year with the previous structure and the first year with the new MAU structure.

MATERIAL AND METHODS

The Hospital of Southwest Denmark, Esbjerg is a 460 bed regional teaching hospital with a mixed urban and rural catchment area counting a population of approxi-

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ORIGINAL ARTICLE

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mately 220,000. All subspecialties of internal medicine except geriatrics are present. Also present are paediatrics; general and orthopaedic surgery; ear, nose and throat surgery and a level-two intensive care unit.

Before March 2009, the medical admission unit was divided in two physically and administratively separate units (cardiology and general internal medicine) staffed by separate teams of physicians and nurses. The units were physically and administratively united in March 2009 as were the nursing staffs. Physicians, however, continued to function as two separate teams with a specialist cardiologist and a junior house officer on call covering the cardiology section and a specialist in internal medicine and a junior house officer on call covering general internal medicine. Both teams share a senior house officer covering both sections.

Adult patients (aged 15 years or above) can be admitted to the MAU by their family doctor, outpatient clinics, emergency medical services or by the Emergency Department. Upon admission and when the relevant test results are available, all patients are first seen by a junior house officer and then by a specialist or senior house officer. Patients whose admission is expected to exceed 48 hours are transferred to specialised departments and the rest are discharged directly from the MAU.

For this retrospective study, we extracted data from the hospital databases on two periods: 1) April 2008 through February 2009 and 2) April 2009 through February 2010. We extracted data on length of stay, readmissions within 30 days after discharge and mortality (both in-hospital and within 30 days after discharge) for all patients admitted through the medical admission units.

According to Danish law, no approval was needed either from the regional ethics committee or the Danish Data Protection Agency.

FIGURE 1

Length of hospital stay given as night and day (24 hours) – before and after the introduction of the Medical Admission Unit. The results are presented as medians. 50% of the values are within the box, the whiskers illustrate the highest and lowest values.

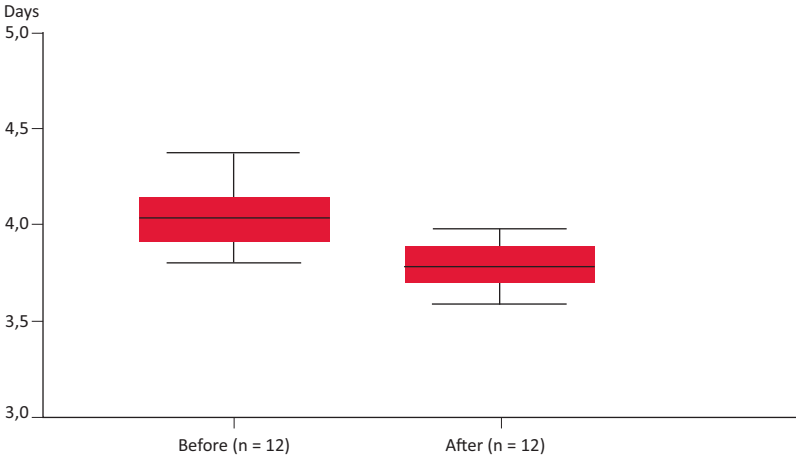
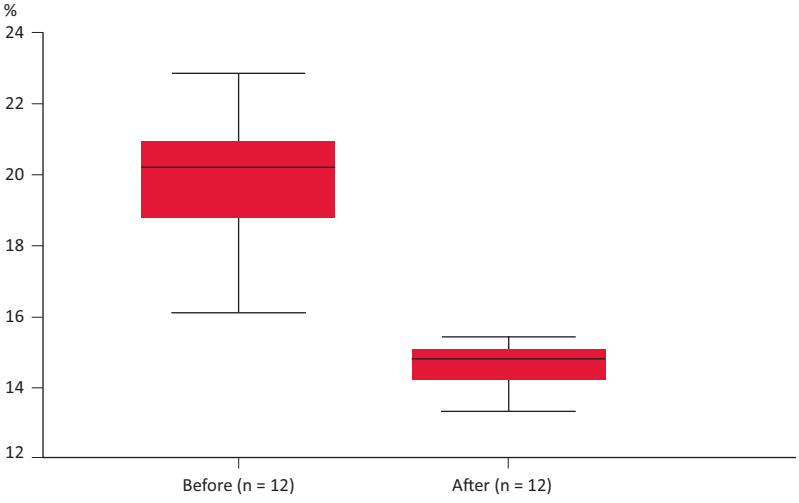


FIGURE 2

Readmissions within 30 days from discharge as percentages of the patients – before and after the introduction of the Medical Admission Unit. The boxes represents the inter quartile ranges and medians and whiskers represent the total range.



Statistics

Data are presented descriptively as median (interquartile range) or proportions wherever appropriate. Differences between the two periods were tested using Wilcoxon Rank-Sum-Test or χ^2-test. SPSS 10.0.1 (Spss Inc. Chicago, IL, USA) was used for analyses.

Trial registration: not relevant.

RESULTS

The intake of patients was relatively stable over time: approximately 12,000 admissions per year with an average of 32 patients daily (range 13-54).

After establishment of the MAU, the overall average length of hospital stay was reduced from 4.1 (3.8-4.3) to 3.8 (3.7-3.9) days (**Figure 1**).

As seen in **Table 1**, no increase in mortality either in-house or within the first 30 days after discharge was seen.

A dramatic reduction in the overall number of readmissions within 30 days after discharge (approximately 25%) was observed (**Figure 2**, Table 1).

Before March 2009, the MAU was divided in two physically and administratively separate units (cardiology and general internal medicine). We were therefore able to investigate the duration of hospital stay, relative mortality and the number of readmissions before and after MAU in the cardiology unit as well.

In the cardiology unit, we found a marked increase in the duration of hospital stay and relative mortality. The readmission rate was higher than before the establishment of the MAU (**Table 2**).

DISCUSSION

After the establishment of the MAU, the overall average length of hospital stay was reduced from 4.1 to 3.8 days ($p < 0.01$). No increase in mortality was seen – either in-house or within 30 days after discharge. A dramatic reduction in the overall number of readmissions within 30 days (approximately 25%) was seen.

Many clinicians were sceptical when the reorganisation took place and the MAU was established. Especially the cardiologists were concerned. Before the reorganisation, all patients suspected to suffer from cardiac diseases were admitted directly to the Department of Cardiology. All other patients with suspected internal medical diseases were admitted to an acute ward specialised in general internal medicine.

As can be seen from Table 2, the number of patients admitted to the Department of Cardiology was dramatically reduced to around one third. Only those who could be expected to stay in the hospital for more than 48 hours and those who suffered from complicated or severe cardiac disease were transferred to the Department. All other cardiac patients were treated at the MAU and dismissed from there. As expected, the patients at the Department of Cardiology now stay longer, have higher mortalities and are more often readmitted to the hospital – which is a natural consequence of the increased severity of their conditions.

We were able to reduce the overall length of hospital stay and the overall readmission rates while keeping rates of mortality unchanged in-house and 30 days after discharge. The cardiologists' and others' concerns therefore seem unfounded.

We expected that the reduction in the readmission rate from 19.8% to 14.6% would be accompanied by a decline in total admissions of around 650 patients. However no such decline was observed. We have no indications to suggest substantial changes in demographics, admission thresholds or composition of the catchment population before and after the establishment of the MAU, except for the disappearance of approximately 110 patients per year (nine per month) with acute cardiac incidents (ST-elevations). Until January 2009 these patients were taken in, stabilized and then admitted to our collaborating cardiac centre at Odense University Hospital. As from January 2009, these patients have been sent directly to the Cardiac Centre when an electrocardiogram radiotransmitted from the ambulance shows ST elevation. Approximately at the same time, our collaborating cardiac centres changed procedures and started sending patients who had percutaneous coronary intervention performed to their own homes instead of transferring them to us. These modifications can account for around 15-20% of the observed decline in the readmission rate. Nevertheless, a substantial decline in the readmission rate remains unexplained. The length of stay seems not to have been affected.

The evidence for making such a major reorganisation in hospitals is limited [3]. However, studies indicate that the establishment of a MAU is likely to reduce lengths of hospitalisations [4-9], with no increase in mortality [6, 10] or number of readmissions [8, 11, 12].

We have increased the presence of experienced physicians from more specialities in the MAU which seems to improve accuracy in clinical decisions [13] and to increase the number of same-day discharges [14]. The substantial decline in the length of hospital stay may, in part, be ascribed to this change. The physicians come to know each other which makes it easier to discuss a problem across specialities and to draft a well-founded plan without delay. It also consolidates team spirit and strengthens staff dedication hence creating a stronger unit focused on coherent and efficient quality health service.

This study only presents the data from the first year after a major reorganisation. Efficacy may improve even further when routines and teamwork become more established.

Further studies are needed to evaluate the impact of the reorganisation on other aspects such as the re-

TABLE 1

All medical patients.

	Before reorganization (n = 12,372)	After reorganization (n = 12,632)	p value
Length of stay, days, median (range)	4.1 (3.8-4.3)	3.8 (3.7-3.9)	< 0.01
In-hospital mortality, ‰, median (range)	31.6 (26.7-36.6)	32.2 (27.4-37.1)	< 0.70
30-day mortality after discharge, ‰, median (range)	57.5 (48.5-66.4)	58.8 (52.9-64.6)	< 0.81
Readmissions within 30 days after discharge,%, median (range)	19.8 (18.5-21.1)	14.6 (14.2-15.1)	< 0.01

TABLE 2

Patients admitted to the Department of Cardiology.

	Before reorganization (n = 3,338)	After reorganization (n = 920)	p value
Length of stay, days, median (range)	3.1 (2.9-3.4)	6.5 (5.9-7.2)	< 0.01
In-hospital mortality, ‰, median (range)	22.9 (17.7-28.1)	49.9 (33.0-66.8)	< 0.01
30-day mortality after discharge, ‰, median (range)	51.7 (42.5-61.0)	88.8 (68.0-109.6)	< 0.01
Readmissions within 30 days after discharge, %, median (range)	16.1 (14.1-18.2)	20.0 (17.3-22.9)	0.05

maining departments, hospital economics, patient safety, patient satisfaction, education, etc.

In conclusion, the establishment of the MAU improved the efficacy of the hospital owing to a reduction in the length of hospital stay and the number of readmissions.

As judged from mortality rates and indicated by readmission rates, neither quality of treatment nor patient safety were compromised in a setup where patients with suspected cardiac diseases are admitted to a MAU along with patients suspected to suffer from other internal medical diseases.

The dynamics between multidisciplinary physicians and nurses seems to improve when they are working close to each other in a setting where team spirit evolves.

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CONFLICTS OF INTEREST: none

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