Front-end specialists reduce time to a treatment plan for patients with acute abdomen

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ABSTRACT

INTRODUCTION: Emergency departments (EDs) are replacing acute specialised wards in Denmark. The aim was to compare time to a treatment plan for patients with acute abdomen at a surgical assessment unit (SAU) and at an ED, respectively.

MATERIAL AND METHODS: A comparative prospective observational study was performed. The data collected included time to a doctor, a surgeon, a plan for treatment, analgesics, blood tests and time spent with health professionals.

RESULTS: The study included 109 patients. In the SAU, the median waiting time to be seen by a doctor was 72 min. and in the ED it was 86 min. ($p = 0.25$). The median time to be seen by a surgeon was 72 min. in the SAU and 148 min. in the ED ($p \leq 0.0001$). In the SAU, the median time to a treatment plan was 131 min. and in the ED 166 min. ($p = 0.02$). In the SAU, patients spent 15 min. with nurses, in the ED 32 min. ($p \leq 0.0001$). In the SAU, patients spent 11 min. with doctors in the ED 24 min. ($p \leq 0.0001$).

CONCLUSION: Waiting time until a plan was presented to the patient was significantly shorter in the SAU than in the ED and this was owed to the presence of a specialist surgeon at the hospital front-end in the SAU. The staff spent significantly more time with patients in the ED than in the SAU and significantly more blood tests were taken.

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In Denmark, emergency departments (ED) with front-end specialists are replacing specialised acute surgical and medical wards. This reorganisation aims to improve timely treatment and patient satisfaction through a faster and more targeted intervention upon arrival [1].

Acute abdominal pain is a common reason for referral to hospital [2, 3]. It requires experience to assess this group of patients along with timely clinical decisions on who to operate on immediately, observe, refer to another specialist or discharge without further attention [3, 4]. Opinions differ on what is the optimal way to receive and assess these patients, and existing literature on the subject is sparse. Studies with patient referral directly from primary health care services to surgical assessment units (SAU) which had junior physicians at the front-end have demonstrated a decreased waiting time to surgery and discharge [5, 6] compared with referral to the ED. Others studies found non-significant differences in length of stay [7]. Some studies recommended referral to EDs staffed by front-end junior [8] or senior emergency physicians [9-11]. However, having front-end specialists at the ED is a controversial issue in many countries, including Denmark, where emergency medicine is not a recognised speciality [12]. Consequently, some of the reorganised EDs in Denmark are without front-end specialists [13]. Instead, these units are staffed primarily with emergency nurses and junior physicians who receive the patients and then refer them to specialists from other departments who assess the patients in the ED.

We had the opportunity to investigate a patient trajectory in a reorganised ED without front-end specialists and to compare it with a trajectory observed in an SAU with front-end specialist surgeons during the process of reorganisation in Denmark.

The aim of our study was to compare time from arrival to patient information about a treatment plan for patients with acute abdominal pain at an ED with and without an SAU, respectively. Secondary outcome measures were waiting time to be seen by a doctor, to be seen by a surgeon, analgesics, blood tests and time spent with health professionals.

MATERIAL AND METHODS

This was a prospective observational study of two different cohorts with time measurement of the defined outcomes.

Setting

The study was performed at an SAU in a university hospital in Denmark with a background population for primary referral of approximately 325,000 inhabitants and in an ED in a regional hospital with a background population of approximately 350,000 inhabitants.

In Denmark, nearly all emergency patients are seen before hospitalisation by a general practitioner.

The SAU received patients with acute abdomen and gastrointestinal diseases older than 14 years of age during Monday through Friday. The ED received all acute patients admitted of all ages on all weekdays. On average, the SAU received eight patients a day, while the ED received 30, ten of whom were surgical patients. In both units, there was one nurse for every four patients. In the ED, there was one junior physician and an intern-trainee

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TABLE 1

Participant characteristics.

	Surgical assessment unit		Emergency department		
	n	%	n	%	p-value[a]
Total	54		55		
Gender					0.85
Male	23	43	22	40	
Female	31	57	33	60	
Age, yrs					0.58
15-30	18	33	14	26	
31-60	24	45	25	46	
> 60	12	22	16	29	
Discharge diagnoses					0.39
Cancer, intestinal obstruction	9	17	6	11	
Pancreatitis, biliary diseases	9	17	7	13	
Appendicitis	8	14	3	5	
Diverticulitis, other defined gastrointestinal diseases	9	17	11	20	
Other non-surgical diseases	6	11	11	20	
No definite diagnosis	13	24	17	31	

a) Fisher's exact test.

TABLE 2

Waiting time to occurrence, min.

	Surgical assessment unit		Emergency department		
	median	IQR	median	IQR	p-value[a]
First doctor	72	35-154	86	46-159	0.25
Specialist surgeon	72	35-154	148	105-237	0.0001
Information about a plan	131	64-190	166	105-240	0.02
Blood sample	89	38-134	48	28-73	0.002
Analgesics	139	71-212	206	137-323	0.09

IQR = interquartile range.
a) Kruskal-Wallis test.

per eight patients, along with one on call surgery specialist. In the SAU, there was a specialist surgeon only. The SAU and the ED had both been operational for two years.

In the SAU, patients were mainly seen in the order of their arrival by a nurse who measured vital signs and then by a specialist surgeon. The surgeon drafted a patient record and made a treatment plan. In the ED, nurses performed triage on arrival and collected some social information and a brief medical history. The junior physician then examined the patient, drafted a patient record, prescribed analgesics and requested a specialist surgeon to assess the patient. The specialist surgeon then re-examined the patient and made a treatment plan.

Data collection

In the SAU, inclusion took place in February-April and September-October of 2011. In the ED, inclusion was done in May-June and November-December of 2011. The criteria for inclusion were: an admission diagnosis of acute abdominal pain and a minimum of 15 years of age.

Patients were included from 07:00 to 23:00 Monday through Friday on random days and times [14]. The first author performed all observations. We chose not to include patients in the night time due to an a priori low admittance rate or in weekends when the SAU was closed. Patients were observed from arrival to information about a treatment plan, discharge from the ED without a treatment plan or discharge from the examination room in the SAU without a treatment plan.

In the first half of the observation period (February-June), patients were observed individually with the observer sitting next to the patients. On observation days, the first patient arriving after the observer was included. In the second half (September-December), several patients were observed at the same time, while the observer sat in the corridor. Patients were included consecutively on days of observation.

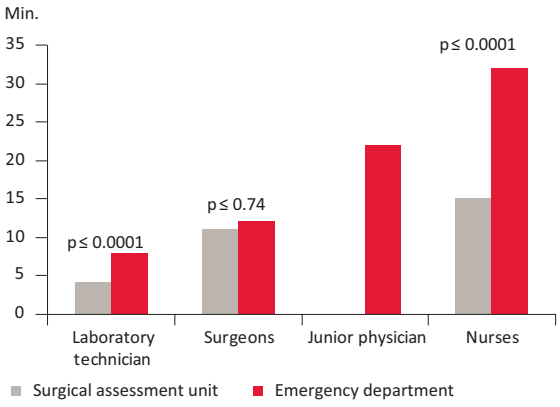
During observation, the time of the following data was recorded: arrival, blood tests, analgesics, seen by a doctor, seen by a surgeon, informed about a treatment plan and discharge from the ED or the examination room of the SAU. Duration of contact with health professionals was also recorded. The staff in both units received oral and written information about a project investigating the arrival of acute patients, but they were not informed in advance about endpoints of the study or of days of observation.

Time of arrival was defined as arrival at the information desk. Time for a treatment plan was defined as time passed until patients were informed about a plan or left the unit without a plan. A treatment plan was defined as interventions including at least one of the following: re-assessment within a given time period, request for assessment by another specialist or a radiological investigation, referral to surgery or discharge.

Statistical analysis

A difference of 30 min. in waiting time to a treatment plan was considered clinically relevant for the treatment and for the patient experience. With a significance level of 0.05, a standard deviation of 45 min. and a power of 0.90, a total of 96 patients needed to be included. Data were recorded on a study form and then entered into a database. Time intervals from time of arrival to the various actions were calculated and analysed in STATA (version 12). Continuous data were reported as medians and interquartile ranges (IQR), means and 95% confidence intervals (CI) and categorical data as absolute numbers and percentages of occurrence. Categorical variables were compared by the χ^2-test or Fisher's exact test if the number was lower than five. Kruskal-Wallis one-way

FIGURE 1



analysis was used to compare continuous variables. A p-value < 0.05 was considered significant.

Ethical considerations

The study was approved by the Danish Data Protection Agency (ID: 2010-41-5648). In response to our request, the Ethics Committee of the Region of Southern Denmark informed that no ethical approval was needed (ID: S-20100062).

Trial registration: NCT01733511

RESULTS

The results were based on 143 hours of observation in the ED and 155 hours in the SAU. In the ED, each patient was observed for 67-472 min. and in the SAU for 22-419 min.

We included 109 patients, 55 from the ED and 54 from the SAU. There was no statistically significant difference between the two groups with regard to age, sex and diagnosis (**Table 1**).

The median waiting times are shown in **Table 2**. The mean time to a surgeon was 168 min. (95% CI: 139-197 min.) in the ED and 93 min. (95% CI: 73-114 min.) in the SAU. Consequently, patients waited 75 min. (1.8 times) longer in the ED ($p \leq 0.0001$) than in the SAU. The mean time until a plan was presented to the patient was 185 min. (95% CI: 153-216 min.) in the ED and 135 min. (95% CI: 110-160) in the SAU, equivalent to 50 min. (1.4 times) longer in the ED ($p = 0.002$) than in the SAU. In the ED, 60% of the patients were seen by more than one doctor. Blood samples were taken in 96% of the patients in the ED and 74% in the SAU ($p = 0.001$).

In the ED, 55% of the patients had a pain score ≥ 5 (scale 1-10) on a visual analogue scale (VAS). In the SAU, patients were not pain-scored. Analgesics were provided to 38% of patients in the ED and to 44% in the SAU ($p = 0.53$) (Table 2).

The median time patients spent with professionals is shown in **Figure 1**. The mean total staff presence with the patient was 73 min. (95% CI: 63-82 min.) in the ED, which was 2.0 times more than in the SAU (mean time 36 min., 95% CI: 31-40 min.) ($p = 0.0001$).

DISCUSSION

This study revealed three major findings: firstly, it took twice as long to be seen by a specialist in the ED as in the SAU; secondly, it took 1.4 times longer before the patient was informed about a plan; and thirdly, the time staff spent with the patient was twice as long in the ED. These findings indicate that the SAU patient trajectory is associated with a significantly shorter waiting time with fewer staff resources in direct patient contact during the patient trajectory than a trajectory in the ED.

A major difference between the units was the use of front-end specialists at the SAU.

The longer waiting time before patients were seen by a surgeon in the ED compared with the SAU was primarily due to patients being assessed by a junior physician before the surgeon was called. Junior physicians did not have the competence to make a plan for surgical patients. EDs with front-end specialists are controversial in Denmark [12, 13]. However, our finding of a reduced time to a plan is confirmed in several studies from other EDs employing senior emergency physicians at the ED front-end [9-11].

The surgical specialists of the SAU examined patients 75 min. earlier compared with the ED; however, a plan for the patient was present only 50 min. earlier in the SAU. The difference might be explained by the fact that blood tests are taken routinely from all patients on arrival in the ED or that the surgeons needed time for reflection before making a plan for patients with acute abdominal pain. In the ED, the surgeons may have reflected on the relevant options before assessing the patient as they were reviewing the medical file prepared by the junior

Waiting time for patients with acute abdominal pain was shorter when a specialist surgeon was at the hospital front-end.

physician. Conversely, in the SAU, the surgeons may have needed time for reflection after assessing the patient. Nevertheless, our results show that reduced time to a specialist might not equally reduce time to a plan, unless other factors are taken into consideration.

Whether a difference of 50 min. in the time to a treatment plan was provided had any influence on the patient outcome cannot be answered from this study, but early information to the patient about the plan reduces uncertainty and anxiety, as we have reported elsewhere [15].

Finally, patients spent significantly more time with health professionals in the ED than in the SAU, as the nurses in the ED performed triage, pain-scored, took patient histories and made documentation while staying with the patient. This was not the standard procedure in the SAU. In addition, junior physicians were part of the admission process, as were routine blood samples. This study was not designed to measure the time consumption, only the confrontation time with the patient, and we cannot conclude whether the total staff time consumption to reach a plan is higher in the ED than in the SAU. However, we believe that the longer confrontation time also reflects more time used on the patients in total as more staff categories were involved and more routine procedures were performed in the ED compared with the SAU.

The longer period of time patients spent with the ED's staff resulted in a patient experience characterized by a shorter waiting time in the ED than in the SAU, as reported elsewhere [15], despite the fact that the actual waiting time was longer in the ED than in the SAU. Differences between perceived and actual waiting time have been described in other studies [16, 17]. Waiting time is a strong predictor of patient satisfaction, but perceived waiting time is a stronger predictor than actual waiting time [18].

The strength of our study is the detailed field observation that was chosen with a view to achieving precise and reliable information, which is difficult to obtain from registers and patient records due to the nature of time-delay in registration of data in a busy clinical setting. Furthermore, observation was performed over several months and by two different methods in order to minimize the presence of the observer as a confounding factor.

Possible limitations and weaknesses of the study include the presence of an observer who might have affected how the professionals prioritised and spent time with patients, but observer impact is considered to have been equal in the two units. Observation at night could either have increased or decreased the differences between the units. Patients arriving at night might have been more acutely affected by pain; accordingly, they may have been seen sooner than during day and evening. Observation at weekends was impossible in the two set-ups as the SAU was closed, but how the patient trajectory was affected by a closed SAU at weekends was not a part of the study and was therefore not described. The patients at the university hospital could have been more acutely affected as a higher pressure on inpatient beds might have made hospital referral more difficult than at the regional hospital.

CONCLUSION

The mean time until a plan was presented to the patient was significantly shorter in the SAU than in the ED due to the presence of a specialist surgeon at the hospital front-end in the SAU.

The staff spent significantly more time with patients in the ED than in the SAU and significantly more blood tests were taken in the ED than in the SAU.

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CORRECTION: Table 1 has been correct on 16 September. Discharge diagnoses 0.39 has correctly been placed under p-value.

Table 2 has been corrected on 16 September 2013. Specialist surgeon / Emergency Department (median) has been corrected from 48 to 148.

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