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Fast-Track Zone: Analyzing Population and Throughput in an Emergency Department

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Abstract

Introduction

Implementing a Fast-Track solution and optimizing processes for selected patient groups can significantly enhance throughput in an emergency department (ED). Due to limited knowledge about Fast-Track solutions in a Danish context, this study aimed to investigate the patient population and throughput in a newly established Fast-Track zone. Furthermore, the study aimed to investigate differences in patient- and admission-related characteristics among patients with medical conditions or abdominal symptoms.

Methods

This prospective observational cohort study included all patients aged 16 years or older with low-acuity medical conditions or abdominal symptoms, who were referred to the ED and examined in the Fast-Track zone from September 1st, 2022, to April 30th, 2023. Data collection involved detailed recording of patient demographics, referral reasons, and Post-Fast-Track destinations, with validation by medical professionals to ensure accuracy.

Results

During the study period, 2045 patients entered the Fast-Track zone, including 1301 with medical conditions and 744 with abdominal symptoms. Patients with medical conditions were significantly older (median age 62 vs. 49 years; $p < 0.001$) and more likely to be male (55% vs. 47%). Although their length of stay was shorter, they were more likely to revisit the Fast-Track zone compared to those with abdominal symptoms (50% vs. 20%). Ninety-three percent of the patients were discharged home the same day, some after treatment elsewhere, and some requiring follow-up, while 7% required admission.

Conclusion

The Fast-Track zone for low-acuity medical conditions and abdominal symptoms has significantly streamlined throughput in the ED, allowing most patients to be discharged on the same day without extending the length of stay for the entire group of patients with medical conditions or abdominal symptoms. The Fast-Track criteria effectively differentiated patients with varying treatment needs. While one-third of contacts related to abdominal symptoms affected all age groups and genders equally, two-thirds involved older, predominantly male patients with various medical conditions and higher frequencies of ED visits.

Keywords: Emergency service; Fast Track; Emergency Department; Population Characteristics

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Introduction

Emergency departments (EDs) worldwide reported an increased risk of crowding due to increased activity (1). A combination of increased patient referrals to the ED (input), reduced internal flow (throughput), and delays in exiting the ED (output) can lead to overcrowding (2), compromising patient safety, patient privacy, and causing staff frustration (3). Implementing a Fast Track solution and optimizing processes for specific patient groups can decrease the time and resources required for examination, treatment, and discharge. This ultimately increases throughput, thereby reducing crowding in Emergency Departments (4, 5), while maintaining patient admission rates and avoiding increased readmissions (5).

Fast-Track solutions differ across hospitals and countries, including variations in the physical framework, staffing, and patient intake (3). Despite these differences, Fast-Track solutions have shown positive impacts on reducing waiting and admission times in EDs (2-4, 6). Furthermore, Fast-Track solutions have generally shown high patient satisfaction (7-10) and are regarded as effective and safe for elderly patients (11).

Patients referred to Fast-Track solutions are typically described as having low-acuity conditions (3, 6, 12) or having non-urgent, uncomplicated complaints (13). Additionally, patients are described as having minimal care requirements, being able to ambulate, and are likely to be discharged home after brief ED interventions in a Fast-Track solution (4, 7). More specifically, Fast-Track has been used for selected patient groups with minor musculoskeletal problems, minor lacerations, soft tissue infections, ear, nose, and throat or intraoral problems, uncomplicated general medical conditions including urinary tract infections, constipation, deep vein thrombosis, upper respiratory tract infections, and simple gynecological problems (7, 14, 15).

To address the challenges of increased ED activity in Denmark and improve throughput, a Fast-Track solution for patients with low-acuity medical conditions or abdominal symptoms, minimal care requirements, the ability to ambulate, and a likelihood of being discharged home was established in June 2022 in a Danish ED.

WHAT DO WE KNOW?

A Fast Track solution can significantly enhance the internal flow of an emergency department by streamlining processes for specific patient groups, reducing both time and resource requirements.

Due to limited knowledge about Fast-Track solutions in a Danish context, this study aimed to investigate the patient population and throughput in a newly established Fast-Track zone. Furthermore, the study aimed to investigate differences in patient- and admission-related characteristics among patients with medical conditions or abdominal symptoms.

Methods

STUDY DESIGN

A prospective observational cohort study was designed. All patients 16 years or older with a medical condition or abdominal symptoms, referred to the Fast-Track zone within the ED in the period from September 1st, 2022, to April 30th, 2023, were included (161 weekdays).

SETTING

In June 2022, a new Fast-Track zone was established in an ED at a regional hospital with no co-payment, serving a mixed rural and urban district in Denmark. The hospital provided 24-hour emergency assessment, surgical gastro-enterology, and internal medicine services. The Fast-Track zone was established to reduce waiting times, increase throughput, and prioritize personal resources for more acute cases. The existing physical and staff resources of the ED were utilized.

FAST-TRACK ZONE

General practitioners (GPs), ambulance personnel, or doctors from outpatient clinics contacted the hospital ED's visitation centre. The visitation centre was staffed with ED nurses who had the qualifications and training to assess the patient's condition. The dedicated ED nurses

assessed whether the patient qualified for the Fast-Track based on pre-defined criteria. The pre-determined criteria were patients aged 16 years and older, with low-acuity medical conditions or abdominal symptoms, minimal care requirements, the ability to ambulate, and a likelihood of being discharged home. Patients within the Fast-Track underwent triage in accordance with the standard ED procedures.

The Fast-Track zone is staffed by one emergency medicine consultant, an intern allocated to the Department of Gastrointestinal Surgery (with a consultant on call), an emergency nurse, and a secretary. The Fast-Track zone operated between 8 a.m. and 4 p.m. on weekdays. The emergency medicine consultant and the nurse worked in the ED, while the surgical gastrointestinal intern and consultant were based in the Department of Gastrointestinal Surgery, working in the operating theatre and fulfilling roles in the ED.

The Fast-Track zone was organized with a central waiting area furnished with comfortable high-backed chairs, an adjacent triage room, and three dedicated examination rooms for the emergency medicine consultant, the surgical gastroenterology intern, and the nurse.
To create an overview of patients referred to the Fast-Track zone, a clinical logistics system, *Cetrea* (INSIGHT Patient Flow Management (getinge.com), was used.

DATA SOURCES AND COLLECTION

Every Monday to Friday, a dedicated secretary recorded patient data in an Excel sheet for each patient entering the Fast-Track zone. Data included date, time of arrival, discharge time, personal identification number (providing data on age and sex), specialty (medical condition or abdominal symptoms), referral reason, and Post-Fast Track destination.

Specialty referral involved directing patients to either the Internal Medicine specialty, categorized as having a "medical condition," or the Gastroenterology specialty, categorized as presenting with "abdominal symptoms".
The reason for the referral was extracted from the written referral text. If multiple reasons were provided, the first listed reason was selected. Subsequently, the referral reasons were divided into 50 categories (Please see Supplementary table 1: Specifikke kontaktårsagskort (Danish)) according to the 5-level triage system of the *Danish Emergency Process Triage* (DEPT) (16) plus three additional study-specific categories (Scan or x-ray, Follow-up in the Fast-Track zone, and Telephone consultation follow-up on results). Finally, an emergency medicine consultant, a surgeon in gastroenterology, and/or an ED nurse validated each referral reason. Some categories were subdivided into relevant subcategories while maintaining the same card number. Categories with the highest proportion of referral reasons are displayed alphabetically in Table 1.

Post-Fast-Track destinations were categorized as follows: discharged home directly from the Fast-Track zone, discharged home from another ED zone on the same day, transferred to the Orthopaedic Injuries ED zone, admitted to another ED Zone for up to 48 hours, admitted to a hospital specialist department, treated in the day unit or minor surgery section, or registered as a telephone contact.

If any uncertainties arose regarding the referral reasons or the Post-Fast-Track destination noted in the Excel sheet, a dedicated ED nurse made the corresponding journal entries for the respective patients.
Additionally, the length of stay for all patients with a medical condition or abdominal symptoms across the entire ED (including Fast-Track) for the periods from September 1st, 2021, to April 30th, 2022, and from September 1st, 2022, to April 30th, 2023, was extracted from the patient administration system.

STATISTICAL ANALYSIS

Numeric data were tested for skewness using skew test and Q-norm. Numeric patient and admission-related characteristics were expressed as medians (25th–75th percentiles), and the Mann-Whitney U test was used as the data were not normally distributed. When assessing categorical variables, proportions were used, and the chi-squared test was applied.

ETHICS

The study was registered with the record of data process of the Registry of Southern Denmark (Journal no. 22/46734). The management of Lillebaelt Hospital approved the entry of hospital data (Ref no: 24/511). Data were stored in a secure server only available to the data collectors and researchers.

Results

In total, 2045 patients entered the Fast-Track zone during the study period: 1301 patients with a medical condition and 744 with abdominal symptoms. Data were collected on 152 out of 161 weekdays. Patients with medical conditions were significantly older (median of 62 vs. 49 years; $p < 0.001$) and proportionally more men (55 vs 47%). Furthermore, the length of stay (LOS) in the Fast-Track zone was significantly shorter for patients with medical conditions (101 vs 168 minutes; $p < 0.001$); however, they were more likely to return to the Fast-Track zone compared to patients with abdominal symptoms (50% vs 20 %) (Please, see Table 1).

Table 1. Patient and admission-related characteristics (n = 2045)

	Total	Medical conditions	Abdominal symptoms
Patient contacts in the study period, n (%)	2045	1301 (64)	744(36)
One single contact	1252 (61)	658 (50)	594 (80)*
2-3 contacts	513 (25)	378 (29)	135 (18)
4 -10 contacts	280 (14)	265 (21)	15 (2)
Number of patient contacts per day, median (min;max)	14 (4;36)	9 (5;36)	5 (4;22)
Age, years, median (p25;p75) (n=2044)	57 (40;73)	62 (45;77)*	49 (32;63)*
Male, n (%)	1059 (52)	710 (55)*	349 (47)*
LOS, median minutes (p25; p75) (n=2025)	122 (71; 191)	101 (49;154)*	168 (111;286)*
Selected reasons for referral, n (%):			
Abdominal infection (card 14)	158 (8)	1 (0)	157 (21)
Abnormal laboratory tests (card 31)	17 (1)	14 (1)	3 (0)
Abscess/cyst (card 26)	79 (4)	3 (.2)	76(10)
Ascites (card 27)	24 (1)	N/A	24 (2)
Antibiotic treatment by pump (card 14)	263 (13)	244 (19)	19 (3)
Anorectal symptoms (card 3)	43 (6)	1 (0)	42 (6)
Anemia (card 31)	32 (2)	32 (2)	N/A
Deep vein thrombosis (DVT)/phlebitis (card 11)	206 (10)	205 (16)	1(0)
Detoxification (card 1)	11 (0.5)	11 (1)	N/A
Blood sugar abnormalities (card 7)	10 (0.5)	10 (1)	N/A
Dizziness, fainting or tendency to fall (Card 4 & 41)	16 (1)	16 (1)	N/A
Electric injury (card 13)	17 (1)	17 (1)	N/A
Erysipelas (card 14)	43 (0.5)	43 (3)	N/A
Gastrointestinal bleeding (card 19)	44 (2)	26 (2)	18 (2)
High blood pressure (card 8)	18 (1)	17 (1)	1 (0)

Hernia (card 33)	19 (1)	1 (0)	18 (2)
Infection/fever (card 14)	172 (8)	164 (13)	8 (1)
Oedema pleura (card 47)	60 (3)	59 (5)	1 (0)
Respiratory symptoms (card 46)	43 (2)	43 (3)	N/A
Stomach pain (card 33)	296 (14)	1 (0)	295 (40)
General discomfort or malaise (extra card and card 100)	64 (3)	57 (4)	7 (1)
Scan or x-ray (extra)	56 (3)	13 (1)	43 (6)
Follow-up in the Fast-Track Zone (extra)	93 (5)	69 (5)	24 (3)
Telephone consultation follow-up on results (extra)	138 (7)	132 (10)	6 (1)
Post-Fast-Track Destination, n (%)			
Discharged home from the Fast-Track zone	1478 (73)	955 (74)	523 (70)
Discharged home from another ED Zone (same day)	126 (6)	41 (3)	85 (11)
Transferred to the ED zone specialized in Orthopedics	6 (0)	6 (0)	N/A
Admitted to another ED zone for up to 48 hours	117 (6)	60(5)	57 (8)
Admitted to a specialist department at the hospital	27 (1)	15 (1)	12 (2)
Treated in the day-unit or minor surgery section	152 (7)	91 (7)	61(8)
Telephone contact, n (%)	139 (7)	133 (10)	6 (1)

Table 1 (continued). * $p < 0.001$; LOS: Length of Stay; ED: Emergency Department.

Additional referral reasons included allergy (n = 1), arthritis (n = 2), arthritis temporalis (n = 8), dehydration (n = 8), detoxification (n = 2), headache (n = 6), facial edema (n = 6), constipation (n = 6), vomiting, diarrhea and/or nausea (n = 9), tachycardia (n = 9), and acute problems with a tube or catheter (n = 10) (data not shown in the table). Moreover, 56 patients had reasons such as problems around their eyes, foreign body injuries, smoke inhalation, skin issues, operation scars, and urinary problems (data not shown in the Table).

Of the entire population, 93 percent of patients were discharged home the same day, with some requiring follow-up or treatment in other zones or units/sections. This included 6% of patients who were transferred to another ED zone when the Fast-Track zone closed, where they completed treatment before being discharged later that day; 7% who received scheduled care in the day unit or minor surgery section; and 7% who received follow-up by telephone. Only 7% of patients required hospital admission.

After the implementation of the Fast-Track zone, the length of stay for patients with medical conditions (16.0 vs. 15.6 hours) and abdominal symptoms (12.7 vs. 13.7 hours) across the entire ED remained unchanged compared to the same period the previous year.

Discussion

In this study, we aimed to investigate the population and throughput in a Fast-Track zone and to explore differences in patient- and admission-related characteristics among patients with medical conditions or abdominal symptoms.

The analysis of patient contacts in the Fast-Track zone revealed significant insights into the demographics and medical conditions of the patients. One-third of these contacts were related to abdominal symptoms, which affected all age groups and genders more equally, while two-thirds involved patients with various medical conditions who were older and predominantly male, reflecting the higher frequency of ED visits among older patients with multiple comorbidities.

Our results indicate that Fast-Track patients with medical conditions have a significantly shorter length of stay

compared to patients with abdominal symptoms. However, medical patients tend to return to the Fast-Track zone more frequently than patients with abdominal symptoms. This shorter median length of stay for patients with medical conditions is probably due to the initial assessment by an emergency medicine consultant with extensive experience and knowledge, enabling quick diagnosis and treatment. The frequent return of patients with medical conditions may stem from the need for additional treatment, such as managing antibiotic therapy through an infusion pump in the ED, or follow-up visits and telephone consultations to provide results of acute blood tests, scans, or x-rays.

The extended length of stay for patients with abdominal symptoms could be attributed to several factors. First, a less-experienced intern from the Department of Gastrointestinal Surgery performed the initial diagnosis and treatment of patients with abdominal symptoms. Additionally, the intern and consultant belonged to different affiliations and organizations, with the consultant being on call while working in another zone. Moreover, diagnosing patients with abdominal symptoms took time, partly due to the waiting period for diagnostic scans and the challenges of diagnosing conditions like stomach pain. To improve throughput and reduce the length of stay for patients with abdominal symptoms, it is essential to focus on resource management and develop improved pathways, including more efficient scanning protocols.
The strategic decision to staff this Fast-Track zone with an emergency medicine consultant was made to enhance patient safety and accelerate the throughput. In other studies, some have emphasized the importance of using a senior physician to staff the Fast-Track, while others have demonstrated positive effects when less-experienced (junior) doctors or nurse practitioners were engaged to manage the Fast-Track. Therefore, it is likely that the concept of staffing and the level of seniority play a decisive role (15).

In this study, the length of stay for patients with medical conditions and abdominal symptoms across the entire ED (including Fast-Track) remained unchanged when comparing the periods before and after the Fast-Track implementation. However, it is important to note that results from a systematic review clearly demonstrated that the introduction of Fast-Track does not negatively affect treatment and waiting times of patients with more severe diseases and injuries (3).

WHAT DOES THIS STUDY ADD?

The article offers valuable insights into patient and admission characteristics within Fast Track Zone patient groups, addressing the limited knowledge of Fast Track solutions in a Danish context.

Referrals to the Fast-Track zone included a wide range of medical conditions and abdominal symptoms. The most frequent reasons for patients with medical conditions were infections, antibiotic treatment via pump, deep vein thrombosis, and telephone consultations. For patients with abdominal symptoms, the most common reasons were stomach pain, abscesses, anorectal problems, and requests for scans/x-rays. This raises the question of whether all of these reasons were truly acute and whether the patients required treatment in the ED. As a result, the management of antibiotic pumps, including changes and maintenance, was transferred to the municipalities. However, patients with conditions such as deep vein thrombosis, infections, acute stomach pain, and abscesses will most likely still be referred to the ED – Fast-Track or not – for specialist evaluation and rapid assessment. By diverting less severe patients to a Fast-Track solution, the ED's resources can be focused towards the most critical patients, thereby enhancing the quality of care for all patients (3, 11). Furthermore, a Fast-Track solution has been shown to increase patient satisfaction (7-10).
Overall, only 7% of all patient contacts resulted in admission, indicating that the chosen criteria effectively distinguished between patients with varying treatment needs. Moreover, including patients with low-acuity abdominal symptoms in a Fast-Track zone has proven to be relevant. When considering the importance of the physical framework in Fast-Track areas, several key factors emerge. The

strategic placement of these areas is crucial for ensuring efficient throughput. A well-positioned Fast-Track zone can significantly enhance patient processing and improve overall system efficiency. In contrast, poor placement can lead to delays and inefficiencies that negatively impact system performance. Therefore, careful consideration of both design and location is essential to minimize waiting times and optimize triage and treatment. Effective planning can enhance the patient experience and overall operational performance (3).

STRENGTHS AND LIMITATIONS

In this prospective cohort study, descriptive data were collected continuously for eight months, starting three months after the establishment of the Fast-Track zone. Data collection failed on only 9 out of 161 days due to the absence (sick leave or vacation) of the dedicated secretary responsible for collecting and recording the data. The data were recorded in an Excel sheet, ensuring consistency in the daily data collection and follow-up on patient data from the previous day. Yet, Excel sheets can be an unsafe way to store data due to the risk of human error, such as typing mistakes or accidental changes to existing data, which can lead to inaccuracies and compromised data integrity. Referral reasons were extracted from the text of a written medical referral. The systematic approach to data collection, registration of the referral reason (with the first listed reason chosen if more than one was provided), and the categorization of all referral reasons using the validated 5-level triage system, *Danish Emergency Process triage* (DEPT), contributed to improved data validity. Furthermore, each referral reason was validated by an emergency medicine consultant, a surgeon in Gastroenterology, and/or an ED nurse. If there were any doubts about the referral reasons or treatment/discharge information noted in the Excel sheet, a dedicated ED nurse made journal entries for the relevant patients.

PERSPECTIVES

This evidence can guide the development of more efficient protocols, better utilization of staff, and ultimately enhance the quality of care in Danish emergency departments.

Conclusion

In conclusion, the Fast-Track zone for low-acuity medical conditions and abdominal symptoms has streamlined throughput in the ED, allowing most patients to be discharged on the same day without extending the length of stay for the entire group of patients with medical conditions or abdominal symptoms. The Fast-Track criteria effectively differentiated patients with varying treatment needs. While one-third of contacts related to abdominal symptoms affected all age groups and genders equally, two-thirds involved older, predominantly male patients with various medical conditions and higher frequencies of ED visits.

Conflict of interest

The authors declare that they have no conflicts of interest.

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