

Record: 1

Title: Crowding in the Emergency Department: Challenges and Best Practices for the Care of Children.

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Source: Pediatrics. Mar2023, Vol. 151 Issue 3, p1-14. 14p.

Document Type: Article

Subject Terms: *MEDICAL quality control
*HOSPITAL emergency services
*HEALTH services accessibility
*CROWDS
*HEALTH facility administration
*LEADERSHIP
*PEDIATRICS
*EVIDENCE-based medicine
*EMERGENCY medical services
*PATIENT safety

Company/Entity: AMERICAN Academy of Pediatrics **DUNS Number:** 055399364

NAICS/Industry Codes: 624230 Emergency and Other Relief Services
913130 Municipal police services

Abstract: Emergency department (ED) crowding has been and continues to be a national concern. ED crowding is defined as a situation in which the identified need for emergency services outstrips available resources in the ED. Crowding is associated with higher morbidity and mortality, delayed pain control, delayed time to administration of antibiotics, increased medical errors, and less-than-optimal health care. ED crowding impedes a hospital's ability to achieve national quality and patient safety goals, diminishes the effectiveness of the health care safety net, and limits the capacity of hospitals to respond to a disaster and/or sudden surge in disease. Both children and adults seeking care in emergency settings are placed at risk. Crowding negatively influences the experience for patients, families, and providers, and can impact employee turnover and well-being. No single factor is implicated in creating the issue of crowding, but elements that influence crowding can be divided into those that affect input (prehospital and outpatient care), throughput (ED), and output (hospital and outpatient care). The degree of ED crowding is difficult to quantify but has been linked to markers such as hours on ambulance diversion, hours of inpatient boarding in the emergency setting, increasing wait times, and patients who leave without being seen. A number of organizations, including the American

College of Emergency Physicians, the Emergency Nurses Association, and the National Quality Forum, have convened to better define emergency metrics and definitions that help provide data for benchmarks for patient throughput performance. The Joint Commission has acknowledged that patient safety is tied to patient throughput and has developed guidance for hospitals to ensure that hospital leadership engages in the process of safe egress of the patient out of the ED and, most recently, to address efficient disposition of patients with mental health emergencies. It is important that the American Academy of Pediatrics acknowledges the potential impact on access to optimal emergency care for children in the face of ED crowding and helps guide health policy decision-makers toward effective solutions that promote the medical home and timely access to emergency care. [ABSTRACT FROM AUTHOR]

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Database: Academic Search Index

Record: 2

Title: Characteristics and patient impact of boarding in the pediatric emergency department, 2018–2022.

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Source: American Journal of Emergency Medicine. Mar2024, Vol. 77, p139-146. 8p.

Document Type: Article

Author-Supplied Keywords: Boarding
Crowding
Health services
Length-of-stay
Pediatric emergency department

Abstract: Boarding admitted patients in the emergency department is an important cause of throughput delays and safety risks in adults, though has been less studied in children. We assessed changes in boarding in a pediatric ED (PED) from 2018 to 2022 and modeled associations between boarding and select quality metrics. We performed a retrospective analysis of PED patients admitted to non-psychiatric services, broken into four periods: pre-COVID-19 (Period I, 01/2018–02/2020), early pandemic (II, 03/2020–06/2021), COVID-19 variants (III, 07/2021–06/2022), and non-COVID respiratory viruses (IV, 07/2022–12/2022). Patients were classified as critical (intensive care units (ICU)) or acute care (non-ICU inpatient services) based on their initial bed request. We compared median boarding times with Kruskal-Wallis tests. We assessed the relationship between boarding time and hospital length-of-stay (LOS) through hazard regression models, and the association between boarding time and PED return visit, readmission, and patient safety events through adjusted logistic regressions. Median PED boarding time significantly increased from Period I (acute : 2.4 h; critical : 3.0 h) to Period II (acute: 3.0 h, critical: 4.0 h) to Period III (acute: 4.4 h, critical: 6.6 h) to Period IV (acute: 6.2 h; critical: 9.5 h). On survival analysis, as boarding time increased, hospital LOS increased for acute admissions and decreased for critical admissions. Increased acute care boarding time was associated with higher odds of a filed safety report. Since July 2021, PED boarding time increased for admitted children across acute and critical admissions. The relationship between acute care boarding and longer hospital LOS suggests a resource-inefficient, self-perpetuating cycle that demands multi-disciplinary solutions. • ED boarding is associated with safety risks in adults but has been less studied in pediatrics. • Since July 2021, median ED boarding times of medical and surgical pediatric patients have increased. • Boarding increases occurred regardless of disposition service, patient demographics, or diagnosis. • For non-ICU patients, boarding was associated with longer hospital length of stay. [ABSTRACT FROM AUTHOR]

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Record: 3

Title: Emergency Department Volume and Delayed Diagnosis of Serious Pediatric Conditions.

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Source: JAMA Pediatrics (JAMA PEDIATR), Apr2024; 178(4): 362-368. (7p)

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Major Subjects: Diagnosis, Delayed

Pediatric Care

Emergency Service

Minor Subjects: Human; Male; Female; Child, Preschool; Child; Adolescence; Prospective Studies; Record Review; Retrospective Design; Confidence Intervals; Funding Source

Abstract: Key Points: Question: Is pediatric volume in the emergency department associated with possible delayed diagnosis in serious conditions? Findings: In this cohort study including 58 998 children with a wide range of conditions, possible delayed diagnosis occurred in 15.8% of children. Delay was 26.7% less common with each 2-fold increase in volume, a statistically significant association. Meaning: Possible delayed diagnosis is common and may be less likely in emergency departments with greater pediatric volume. This cohort study evaluates the association of annual pediatric volume in the emergency department with delayed diagnosis. Importance: Diagnostic delays are common in the emergency department (ED) and may predispose to worse outcomes. Objective: To evaluate the association of annual pediatric volume in the ED with delayed diagnosis. Design, Setting, and Participants: This retrospective cohort study included all children younger than 18 years treated at 954 EDs in 8 states with a first-time diagnosis of any of 23 acute, serious conditions: bacterial meningitis, compartment syndrome, complicated pneumonia, craniospinal abscess, deep neck infection, ectopic pregnancy, encephalitis, intussusception, Kawasaki disease, mastoiditis, myocarditis, necrotizing fasciitis, nontraumatic intracranial hemorrhage, orbital cellulitis, osteomyelitis, ovarian torsion, pulmonary embolism, pyloric stenosis, septic arthritis, sinus venous thrombosis, slipped capital femoral epiphysis, stroke, or testicular torsion. Patients were identified using the Healthcare Cost and Utilization Project State ED and Inpatient Databases. Data were collected from January 2015 to December 2019, and data were analyzed from July to December 2023. Exposure: Annual volume of children at the first ED

visited. Main Outcomes and Measures: Possible delayed diagnosis, defined as a patient with an ED discharge within 7 days prior to diagnosis. A secondary outcome was condition-specific complications. Rates of possible delayed diagnosis and complications were determined. The association of volume with delayed diagnosis across conditions was evaluated using conditional logistic regression matching on condition, age, and medical complexity. Condition-specific volume-delay associations were tested using hierarchical logistic models with log volume as the exposure, adjusting for age, sex, payer, medical complexity, and hospital urbanicity. The association of delayed diagnosis with complications by condition was then examined using logistic regressions. Results: Of 58 998 included children, 37 211 (63.1%) were male, and the mean (SD) age was 7.1 (5.8) years. A total of 6709 (11.4%) had a complex chronic condition. Delayed diagnosis occurred in 9296 (15.8%; 95% CI, 15.5-16.1). Each 2-fold increase in annual pediatric volume was associated with a 26.7% (95% CI, 22.5-30.7) decrease in possible delayed diagnosis. For 21 of 23 conditions (all except ectopic pregnancy and sinus venous thrombosis), there were decreased rates of possible delayed diagnosis with increasing ED volume. Condition-specific complications were 11.2% (95% CI, 3.1-20.0) more likely among patients with a possible delayed diagnosis compared with those without. Conclusions and Relevance: EDs with fewer pediatric encounters had more possible delayed diagnoses across 23 serious conditions. Tools to support timely diagnosis in low-volume EDs are needed.

Journal Subset: Biomedical; Editorial Board Reviewed; Expert Peer Reviewed; Peer Reviewed; USA

Special Interest: Pediatric Care

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Record: 4

Title: Pediatric Agitation in the Emergency Department: A Survey of Pediatric Emergency Care Coordinators.

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Subject Terms: Treatment of autism

National competency-based educational tests

Hospital emergency services

Confidence

Cross-sectional method

Agitation (Psychology)

Pediatrics

Surveys

Emergency medical services

Research funding

Clinical competence

Child development deviations

Children

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Author-Supplied Keywords: agitation

emergency department

mental and behavioral health

pediatric preparedness

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913130 Municipal police services

Abstract: OBJECTIVE: Acute agitation episodes in the emergency department (ED) can be distressing for patients, families, and staff and may lead to injuries. We aim to understand availability of ED resources to care for children with acute agitation, perceived staff confidence with agitation management, barriers to use of de-escalation techniques, and desired resources to enhance care. METHODS: We conducted a survey of

pediatric emergency care coordinators (PECCs) in EDs in Massachusetts, Rhode Island, and Los Angeles County, California. RESULTS: PECCs from 63 of 102 (61.8%) EDs responded. PECCs reported that ED staff feel least confident managing agitation due to developmental delay (DD) or autism spectrum disorder (ASD) (52.4%). Few EDs had a separate space to care for children with mental health conditions (22.5%), a standardized agitation scale (9.6%), an agitation management guideline (12.9%), or agitation management training (24.2%). Modification of the environment was not perceived possible for 42% of EDs. Participants reported that a barrier to the use of the de-escalation techniques distraction and verbal de-escalation was perceived lack of effectiveness (22.6% and 22.6%, respectively). Desired resources to manage agitation included guidelines for medications (82.5%) and sample care pathways (57.1%). CONCLUSIONS: ED PECCs report low confidence in managing agitation due to DD or ASD and limited pediatric resources to address acute agitation. Additional pediatric-specific resources and training, especially for children with DD or ASD, are needed to increase clinician confidence in agitation management and to promote high-quality, patient-centered care. Training programs can focus on the early identification of agitation and the effective use of non-invasive de-escalation strategies. [ABSTRACT FROM AUTHOR]

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Title: Racial and Ethnic Disparities in Emergency Department Wait Times for Children: Analysis of a Nationally Representative Sample.

Authors: Gorski, Jillian K.¹ jgorski@luriechildrens.org
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Source: Academic Pediatrics. Mar2023, Vol. 23 Issue 2, p381-386. 6p.

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Subject Terms: Racism
Statistics
Hospital emergency services
Confidence intervals
Health services accessibility
Cross-sectional method
Black people
Hispanic Americans
Pediatrics
Surveys
Descriptive statistics
Health equity
Metropolitan areas
White people
Proportional hazards models

Geographic Terms: United States

Author-Supplied Keywords: emergency medicine
health disparities
wait times

Abstract: OBJECTIVE: To evaluate the association of race and ethnicity with wait times for children in US emergency departments (ED). METHODS: We performed a cross-sectional study of ED encounters of children (<18 years) from 2014 to 2019 using a multistage survey of nonfederal US ED encounters. Our primary variable of interest was composite race and ethnicity: non-Hispanic White (NHW), non-Hispanic Black, Hispanic, and all others. Our outcome was ED wait time in minutes. We evaluated the association between race and ethnicity and wait time

in Weibull regression models that sequentially added variables of acuity, demographics, hospital factors, and region/urbanicity. RESULTS: We included 163,768,956 survey-weighted encounters. In univariable analysis, Hispanic children had a lower hazard ratio (HR) of progressing to evaluation (HR 0.84, 95% confidence interval [CI] 0.76-0.93) relative to NHW children, indicating longer ED wait times. This association persisted in serial multivariable models incorporating acuity, demographics, and hospital factors. This association was not observed when incorporating variables of hospital region and urbanicity (HR 0.91, 95% CI 0.83-1.00). In subgroup analysis, Hispanic ethnicity was associated with longer wait times in pediatric EDs (HR 0.76, 95% CI 0.63-0.92), non-metropolitan EDs (HR 0.75, 95% CI 0.64-0.89), and the Midwest region (HR 0.77, 95% CI 0.69-0.87). No differences in wait times were observed for children of Black race or other races. CONCLUSIONS: Hispanic children experienced longer ED wait times across serial multivariable models, with significant differences limited to pediatric, metropolitan, and Midwest EDs. These results highlight the presence of disparities in access to prompt emergency care for children. [ABSTRACT FROM AUTHOR]

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Accession Number: 174985143

Database: Supplemental Index

Record: 6

Title: Caring for Children With Autism in an Emergency Department Setting

Authors: Mannenbach, Mark S.
Passe, Rebecca L.
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Source: *Pediatric Emergency Care*. Dec 01, 2021 37(12):e977-e980

Publication Year: 2021

Description: OBJECTIVE: Patients with autism spectrum disorder (ASD) and other developmental delays represent a unique patient population. We described a cohort of children with ASD cared for in an emergency department (ED) setting and the specific health care resources used for their care. METHODS: This is an observational study of consecutive children (<18 years) with ASD presenting for ED care. Comparisons of interest were evaluated using Wilcoxon rank sum and χ tests. Odds ratios (ORs) are reported with 95% confidence intervals (CIs). RESULTS: There were 238 ED visits over a 9-month period among 175 children. Median age was 9 years, and 62% were male. Reasons for ED visit were medical (51%), psychiatric (18%), injury/assault/trauma (16%), neurological (11%), and procedure related (4%). Children with psychiatric complaints had longer lengths of stay than those with other chief complaints ($P < 0.0001$; OR, 5.8; CI, 2.8–11.9) and were more likely to have urine (OR, 8.5; CI, 3.9–18.3) and blood work ordered (OR, 2.5; CI, 1.2–4.9) and less likely to have x-rays ordered (OR, 0.10; CI, 0.02–0.44). Eighteen (8%) children received sedation. None required physical restraint. A total of 30% were admitted to the hospital. Those with psychiatric complaints were more likely to be admitted (54.8% vs 24.5%; OR, 3.7; CI, 1.9–7.4) than those with other chief complaints. CONCLUSIONS: The care for children with ASD varied with age and health care issues. There was a high prevalence of psychiatric complaints, and many of these children were boarded in the ED waiting for an inpatient psychiatric bed. Those with psychiatric complaints were more likely to have multiple tests ordered and were more likely to be admitted.

Language: English

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Database: Journals@OVID

Record: 7

Title: Emergency Department waiting times in a tertiary children's hospital in Israel: a retrospective cohort study

Authors:

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Ronit Leiba
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Source: Israel Journal of Health Policy Research, Vol 6, Iss 1, Pp 1-5 (2017)

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Collection: LCC:Medicine (General)

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Subject Terms: Emergency

Child

Waiting time

Ethnicity

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R5-920

Public aspects of medicine

RA1-1270

Description: Abstract Background The purpose of this study was to assess ethnic differences in Emergency Department (ED) waiting times between Jewish and Arab children in a tertiary childrens' hospital in Israel. Methods This was a retrospective cohort study of all children who were admitted to the pediatric ED of the largest hospital in northern Israel, between January 2011 and December 2015. Univariate and multivariate analyses were used to assess the strength of association between ethnicity category and waiting time. The following were tested as possible confounders: triage category, age, gender, time of arrival category. The effect of nurse-patient ethnic concordance was assessed. Results Full data were available in 82,883 patients, 55,497 (67.0%) Jews and 27,386 (33.0%) Arabs. Jews and Arabs had a similar median waiting time of 38 min (interquartile range [IQR] 22–63 and IQR 21–61, respectively). Ethnicity was not associated with a change in waiting time ($p = 0.36$). Factors that most influenced shorter waiting time were triage category 1 (change in waiting time: -25.5% ; 95% confidence interval [CI]: -29.3 to -21.7), or triage category 2 (change in waiting-time: -21.8% ; 95% CI: -23.7 to -20.05). Factors that most influenced longer waiting time were patient arrival during the morning shift period (change in waiting time: 5.45% ; 95% CI: 4.59 to 6.31), or during the evening shift period (change in waiting time: 4.46% ; 95% CI: 3.62 to 5.29). Ethnic discordance between triage nurses and patients did not yield longer waiting times. Conclusion In this large pediatric cohort, ethnic differences in ED waiting time were not found.

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Accession Number: edsdoj.073bf640294e52836db73a93554537

Database: Directory of Open Access Journals

Record: 8

Title: Delays to Antibiotics in the Emergency Department and Risk of Mortality in Children With Sepsis.

Authors: Lane, Roni D.; ¹Richardson, Troy; ²Scott, Halden F.; ³Paul, Raina M.; ⁴Balamuth, Fran; ⁵Eisenberg, Matthew A.; ^{6,7}Riggs, Ruth; ²Huskins, W. Charles; ⁸Horvat, Christopher M.; ⁹Keeney, Grant E.; ¹⁰Hueschen, Leslie A.; ¹¹Lockwood, Justin M.; ¹²Gunnala, Vishal; ¹³McKee, Bryan P.; ¹⁴Patankar, Nikhil; ¹⁵Pinto, Venessa Lynn; ¹⁶Sebring, Amanda M.; ¹⁷Sharron, Matthew P.; ¹⁸Treseler, Jennifer; ¹⁹Wilkes, Jennifer J.²⁰; et al

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Language: English

Major Subjects: Sepsis -- Complications -- In Infancy and Childhood

Emergency Service

Hospital Mortality -- Risk Factors -- United States

Risk Assessment

Antibiotics -- Administration and Dosage

Pediatric Care

Time Factors

Treatment Delay -- Adverse Effects

Minor Subjects: Human; Retrospective Design; Prospective Studies; Infant; Child, Preschool; Child; Adolescence; United States; Descriptive Statistics; Odds Ratio; Confidence Intervals; Logistic Regression; Data Analysis Software; Multicenter Studies; Intensive Care Units; Patient Admission; Respiration, Artificial; Catheterization, Central Venous; Length of Stay; Post Hoc Analysis; Bacteremia -- Complications; Vasoconstrictor Agents -- Therapeutic Use; Funding Source

Abstract: Key Points: Question: Is the timing of antibiotic administration associated with sepsis-attributable mortality in pediatric sepsis? Findings: In this multicenter cohort study of 19 515 pediatric patients with sepsis recognized within 1 hour of emergency department arrival, antibiotic administration beyond 330 minutes was associated with an increase in 3-day and 30-day sepsis-attributable mortality. Meaning: These findings suggest that long delays in antibiotic therapy are associated with increased risk of mortality among children with sepsis. This cohort study examines the association of the timing of antibiotic administration in the emergency department (ED) with the risk of sepsis-attributable mortality in children. Importance: Pediatric consensus guidelines recommend antibiotic administration within 1 hour for septic shock and within 3 hours for sepsis without shock. Limited studies exist identifying a specific time past which delays in antibiotic administration are

associated with worse outcomes. Objective: To determine a time point for antibiotic administration that is associated with increased risk of mortality among pediatric patients with sepsis. Design, Setting, and Participants: This retrospective cohort study used data from 51 US children's hospitals in the Improving Pediatric Sepsis Outcomes collaborative. Participants included patients aged 29 days to less than 18 years with sepsis recognized within 1 hour of emergency department arrival, from January 1, 2017, through December 31, 2021. Piecewise regression was used to identify the inflection point for sepsis-attributable 3-day mortality, and logistic regression was used to evaluate odds of sepsis-attributable mortality after adjustment for potential confounders. Data analysis was performed from March 2022 to February 2024. Exposure: The number of minutes from emergency department arrival to antibiotic administration. Main Outcomes and Measures: The primary outcome was sepsis-attributable 3-day mortality. Sepsis-attributable 30-day mortality was a secondary outcome. Results: A total of 19 515 cases (median [IQR] age, 6 [2-12] years) were included. The median (IQR) time to antibiotic administration was 69 (47-116) minutes. The estimated time to antibiotic administration at which 3-day sepsis-attributable mortality increased was 330 minutes. Patients who received an antibiotic in less than 330 minutes (19 164 patients) had sepsis-attributable 3-day mortality of 0.5% (93 patients) and 30-day mortality of 0.9% (163 patients). Patients who received antibiotics at 330 minutes or later (351 patients) had 3-day sepsis-attributable mortality of 1.2% (4 patients), 30-day mortality of 2.0% (7 patients), and increased adjusted odds of mortality at both 3 days (odds ratio, 3.44; 95% CI, 1.20-9.93; $P = .02$) and 30 days (odds ratio, 3.63; 95% CI, 1.59-8.30; $P = .002$) compared with those who received antibiotics within 330 minutes. Conclusions and Relevance: In this cohort of pediatric patients with sepsis, 3-day and 30-day sepsis-attributable mortality increased with delays in antibiotic administration 330 minutes or longer from emergency department arrival. These findings are consistent with the literature demonstrating increased pediatric sepsis mortality associated with antibiotic administration delay. To guide the balance of appropriate resource allocation with time for adequate diagnostic evaluation, further research is needed into whether there are subpopulations, such as those with shock or bacteremia, that may benefit from earlier antibiotics.

Special Interest: Pediatric Care

ISSN: 2574-3805

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Title: Undertriage for Children With Caregivers Preferring Languages Other Than English.

Authors: Rojas, Christina R.^{1,2}
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Cohen, Joanna S.^{1,2}
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Berkowitz, Deena^{1,2} *dberkowitz@childrensnational.org*

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*HOSPITAL emergency services
*CONFIDENCE intervals
*MULTILINGUALISM
*CROSS-sectional method
*LANGUAGE & languages
*RETROSPECTIVE studies
*DISEASES
*TREATMENT delay (Medicine)
*COMPARATIVE studies
*PSYCHOLOGY of caregivers
*HOSPITAL care
*NURSES
*DESCRIPTIVE statistics
*LOGISTIC regression analysis
*ODDS ratio
*CHILDREN

Abstract: OBJECTIVES: Undertriage, the underestimation of acuity, can result in delayed care and potential morbidity in the emergency department (ED). Although inequities in ED care based on language preference have been noted, little is known about its association with undertriage. We evaluated for differences in undertriage based on caregiver language preference. METHODS: This was a retrospective cross-sectional study of patients aged younger than 21 years, triaged as Emergency Severity Index (ESI) level 4 or 5 (nonurgent), to the pediatric ED from January 1, 2019, through January 31, 2021. Indicators of undertriage were defined as hospital admission, significant ED resource use, or return visits with admission. We used logistic regression with generalized estimating equations to measure the association of preferred language with undertriage. RESULTS: Of 114 266 ED visits included in the study, 22 525 (19.8%) represented patients with caregivers preferring languages other than English. These children were more likely to experience undertriage compared with those with caregivers preferring English (3.7% [English] versus 4.6% [Spanish] versus 5.9% [other languages]; Spanish versus English: odds ratio [OR], 1.3; 95% confidence interval [CI], 1.2-1.4) and other languages versus English: OR, 1.6; 95% CI, 1.2-2.2). Differences remained after adjusting for sex, insurance, mode of arrival, and clustering by triage nurse (Spanish versus English: adjusted OR, 1.3; 95% CI, 1.3-1.5) and other languages versus English: adjusted OR, 1.6; 95% CI, 1.2-2.2). CONCLUSIONS: Children accompanied by caregivers preferring languages other than English are more likely to be undertriaged in the pediatric ED. Efforts to improve the triage process are needed to promote equitable care for this population. [ABSTRACT FROM AUTHOR]

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Title: Parental decision-making for non-urgent emergency department presentations in Victoria, Australia.

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Abstract: Non-urgent paediatric Emergency Department presentations contribute to overcrowding, poor patient health outcomes, and burden acute healthcare services. A study was conducted to explore motivations and factors that influence decision-making processes of parents who presented their child to ED for non-urgent conditions. An exploratory study using a qualitative descriptive design was undertaken to address research aims. Semi-structured interviews were conducted with a purposive sample of eight parents who presented their child (birth to 14 years of age), to ED for non-urgent conditions. Parental decision-making regarding ED presentations were influenced by a constellation of factors; however, three main themes emerged. These included Parental Anxiety , There is Only One Place , and Mitigating Perceived Delay or Inaccessibility . As such, centred on how parents addressed their anxiety when a child was ill, accessibility and capacity of EDs to provide immediate relief to parents and children, and parents' perception that accessing other healthcare services impacted crucial time for treatment. EDs remain a preferred healthcare service to address non-urgent paediatric needs, despite adequate health literacy among participants. When improving models of care within EDs, non-urgent presentations must be considered, including management of parental anxiety, along with establishing non-urgent care adjacent to or integrated within an ED.

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Title: Clinical validity of the Pediatric Assessment Triangle in a pediatric emergency department.

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Abstract: **Competing Interests:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Objectives: This study aimed to evaluate the clinical validity of the Pediatric Assessment Triangle (PAT) in a pediatric emergency department (PED).

Methods: We conducted a retrospective analysis of 799 children who visited our PED and collected data on age, sex, disease severity, expense, and disposition. We analyzed the correlations between PAT and disease, age, waiting time, disposition, and cost.

Results: In total, 429 boys (53.7%) and 370 girls (46.3%), with an average age of 4.97 years, were enrolled. The number of children in levels 2, 3, and 4 was 5 (0.6%), 158 (19.8%), and 636 (79.6%), respectively. Respiratory system diseases comprised 78.7% of all disease cases. The top three highest proportions of critical cases were endocrine system diseases (100%), toxic exposure (50%), and circulatory system diseases (40%). Children aged 3-8 years accounted for 45.3% of the cases. The incidence of critical cases was most prevalent within the neonatal population (21.4%), followed by children aged 8-15 years (2.1%) and 3-8 years (0.6%). The area under the receiver operating characteristic curve for the PAT in predicting hospitalization was 0.966. The mean waiting time for level-2 children was 3.80 min.

Conclusions: As a tool used for PED triage, the PAT can specifically identify critical cases, particularly in recognition of pediatric respiratory emergencies and neonatal emergencies, and demonstrates significant superiority. Future multicenter studies should be conducted in pediatric emergency medical centers to investigate the effectiveness of PAT in PED triage further.

(© 2025 Zhu, Wu, Yu, Shen, Fang, Li and Xiang.)

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Scand J Trauma Resusc Emerg Med. 2009 Aug 27;17:38. (PMID: 19712467)

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Int Emerg Nurs. 2021 Sep;58:101041. (PMID: 34333333)

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Title: Emergency department crowding negatively influences outcomes for children presenting with asthma: a population-based retrospective cohort study.

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Adolescent ; Alberta ; Child ; Child, Preschool ; Databases, Factual ; Female ; Geography ; Hospitalization ; Humans ; Male ; Patient

Admission ; Retrospective Studies ; Severity of Illness Index ; Time Factors ; Treatment Outcome ; Triage

Abstract: **Background:** Emergency department (ED) crowding may delay assessment and management and compromise outcomes. The association between the crowding metric time to physician initial assessment (PIA) and outcomes for children presenting for acute asthma is examined. **Methods:** A population-based retrospective cohort of all presentations to 18 high-volume EDs during 2010-2014 in Alberta, Canada was created. Hourly, facility-specific median PIAs were calculated. Physician claims and hospitalizations data were linked for children (2-17 years) presenting for asthma. **Results:** Twenty-five thousand three hundred and eighty-three presentations (16,053 children) were made for asthma. Crowding was common in all hospitals and affected PIA more for lower acuity presentations. For every 1-h increase in median facility PIA, the individual-level PIA increased by 13 min (95% CI: 12, 14) for high, 43 min (95% CI: 42, 44) for moderate, and 60 min (95% CI: 58, 61) for the low acuity groups, when adjusted by predictors. Similarly, length of stay increased by 6, 36, and 45 min for the high, moderate, and low acuity groups, respectively. Increased PIA resulted in more departures prior to completion of care for the lower acuity groups. **Conclusions:** Crowding adversely affects short-term outcomes of less ill children more than those who are more ill. When EDs experience increased crowding, care to patients with asthma is delayed; effective strategies to reduce crowding and delays to care are urgently needed. **Impact:** For children presenting to EDs for asthma, increased time to physician initial assessment adversely affects short-term outcomes of patients with less severe presentations to a greater extent compared to those who are most severe. Times to physician initial assessment are below recommended benchmarks; however, delays in care exist that impact LOS, odds of admission, and premature patient departures. Pediatric patients with severe asthma are seen quickly and their outcomes are excellent. Since crowding adversely affects short-term outcomes of pediatric patients with asthma, efforts to reduce ED crowding and assess patients with asthma in a more timely manner are needed.

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Title: Crowding is the strongest predictor of left without being seen risk in a pediatric emergency department.

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Operations research

Overcrowding

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Abstract: <bold>Background: </bold>Emergency Department (ED) patients who leave without being seen (LWBS) are associated with adverse safety and medico-legal consequences. While LWBS risk has been previously tied to demographic and acuity related factors, there is limited

research examining crowding-related risk in the pediatric setting. The primary objective of this study was to determine the association between LWBS risk and crowding, using the National Emergency Department Overcrowding Score (NEDOCS) and occupancy rate as crowding metrics. **Methods:** We performed a retrospective observational study on electronic health record (EHR) data from the ED of a quaternary care children's hospital and trauma center during the 14-month study period. NEDOCS and occupancy rate were calculated for 15-min windows and matched to patient arrival time. We leveraged multiple logistic regression analyses to demonstrate the relationship between patient-level LWBS risk and each crowding metric, controlling for characteristics drawn from the pre-arrival state. We performed a chi-squared test to determine whether a difference existed between the receiver operating characteristic (ROC) curves in the two models. Finally, we executed a dominance analysis using McFadden's pseudo-R² to determine the relative importance of each crowding metric in the models. **Results:** A total of 54,890 patient encounters were studied, 1.22% of whom LWBS. The odds ratio for LWBS risk was 1.30 (95% CI 1.27-1.33) per 10-point increase in NEDOCS and 1.23 (95% CI 1.21-1.25) per 10% increase in occupancy rate. Area under the curve (AUC) was 86.9% for the NEDOCS model and 86.7% for the occupancy rate model. There was no statistically significant difference between the AUCs of the two models (p-value 0.27). Dominance analysis revealed that in each model, the most important variable studied was its respective crowding metric; NEDOCS accounted for 55.6% and occupancy rate accounted for 53.9% of predicted variance in LWBS. **Conclusion:** Not only was ED overcrowding positively and significantly associated with individual LWBS risk, but it was the single most important factor that determined a patient's likelihood of LWBS in the pediatric ED. Because occupancy rate and NEDOCS are available in real time, each could serve as a monitor for individual LWBS risk in the pediatric ED. [ABSTRACT FROM AUTHOR]

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Title: Real-Time Measurement of Crowding in Pediatric Emergency Department: Derivation and Validation Using Consensual Perception of Crowding (SOTU-PED).

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Emergency Service, Hospital*

Child ; Hospitalization ; Humans ; Perception

Abstract: **Competing Interests:** Disclosure: The authors declare no conflict of interest.

Abstract: Our study aimed to develop and validate a real-time crowding composite scale for pediatric emergency department (PED). The study took place in one teaching PED for 2 months. The outcome was the perception of crowding evaluated by triage nurses and pediatricians on a 10-level Likert scale. Triage nurses evaluated crowding at each moment of a child's admission and pediatrician at each moment of a child's discharge. The outcome was the hourly mean of all evaluations of crowding (hourly crowding perception). For analysis, originally, we only selected hours during which more than 2 nurses and more than 2 pediatricians evaluated crowding and, moreover, during which evaluations were the most consensual. As predictors, we used hourly means of 10 objective crowding indicators previously selected as consensual in a published French national Delphi study and collected automatically in our software system. The model (SOTU-PED) was developed over a 1-month data set using a backward multivariable linear regression model. Then, we applied the SOTU-PED model on a 1-month validation data set. During the study period, 7341 children were admitted in the PED. The outcome was available for 1352/1392 hours, among which 639 were included in the analysis as "consensual hours." Five indicators were included in the final model, the SOTU-PED (R2

= 0.718). On the validation data set, the correlation between the outcome (perception of crowding) and the SOTU-PED was 0.824. To predict crowded hours (hourly crowding perception ≥ 5), the area under the curve was 0.957 (0.933-0.980). The positive and negative likelihood ratios were 8.16 (3.82-17.43) and 0.153 (0.111-0.223), respectively. Using a simple model, it is possible to estimate in real time how crowded a PED is.

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DOI: 10.1097/PEC.0000000000001986

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Record: 15

Title: Emergency Department Crowding Is Associated With Decreased Quality of Care for Children With Acute Asthma

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Note: Please see page 192 for the Editor's Capsule Summary of this article. Provide feedback on this article at the journal's Web site, www.annemergmed.com. A podcast for this article is available at www.annemergmed.com.: Kathy N. Shaw, MD, MSCE: MRS, DF, and MGK conceived the study, designed the analytic plan, and obtained research funding. DR performed data extraction, data quality control, and database management. DF provided statistical advice on study design and analyzed the data. MRS drafted the article, and all authors contributed substantially to its revision. MRS takes responsibility for the paper as a whole.: By Annals policy, all authors are required to

disclose any and all commercial, financial, and other relationships in any way related to the subject of this article that might create any potential conflict of interest. The authors have stated that no such relationships exist. See the Manuscript Submission Agreement in this issue for examples of specific conflicts covered by this statement. Drs. Sills and Fairclough and Ms. Ranade received support from the Agency for Healthcare Research and Quality (5R03HS016418), the American Lung Association (SB-35832-N), and the Emergency Medicine Foundation. Reprints not available from the authors.: Available online October 29, 2010. Earn CME Credit: Continuing Medical Education is available for this article at: <http://www.ACEP-EMedHome.com>.

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Record: 16

Title: A Systematic Review of the Impact of Nursing Triage on Length of Stay in Paediatric Emergency Department.

Authors: Alzamel LG; Department of Nursing, Nursing Faculty, Applied Science Private University, Amman, Jordan.

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Alsaqer K; Community and Mental Health Department, Faculty of Nursing, Zarqa University, Zarqa, Jordan.

Source: Journal of clinical nursing [J Clin Nurs] 2025 Jun; Vol. 34 (6), pp. 1984-1992. *Date of Electronic Publication:* 2025 Mar 21.

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Language: English

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MeSH Terms: Triage*

Emergency Service, Hospital*

Length of Stay*/statistics & numerical data

Emergency Nursing*

Pediatrics*

Pediatric Nursing*

Humans ; Child

Abstract: **Background:** Paediatric emergency departments (PEDs) treat children in urgent medical situations, and nursing triage plays a crucial role in determining their length of stay (LOS), a key metric for evaluating healthcare efficiency. This systematic review investigates the impact of nursing triage on LOS in paediatric emergency departments.

Methods: Searching electronic databases identified relevant studies meeting inclusion criteria, focusing on nursing triage and length of stay in the paediatric emergency department. Utilising the Let Evidence Guide Every New Decision (LEGEND) approach, quality assessment and data extraction were conducted independently by two reviewers.

Results: Six studies met the inclusion criteria and were analysed. The review highlights multiple factors influencing LOS, including triage accuracy, patient acuity levels, nurse staffing and overcrowding. Inefficient triage processes and delays were identified as key contributors to prolonged LOS.

Discussion: This review underscores the critical role of efficient nursing triage in optimising patient flow and reducing LOS in paediatric emergency settings. Challenges such as nurse shortages, high patient volumes and inappropriate triage categorizations contribute to delays. Future research should focus on evaluating specific triage protocols, nurse training programmes, and integrating advanced technology to improve triage accuracy and efficiency. Implementing evidence-based strategies could significantly enhance patient outcomes and experiences in PEDs.

Reporting Method: The study adhered to the relevant EQUATOR reporting guidelines: the PRISMA Checklist for Systematic review was used.

Patient or Public Contribution: No patient or public contribution.

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Title: Emergency Department Crowding Is Associated with Decreased Quality of Analgesia Delivery for Children with Pain Related to Acute, Isolated, Long-bone Fractures.

Authors: Sills, Marion R.
Fairclough, Diane L.
Ranade, Daksha
Mitchell, Michael S.
Kahn, Michael G.

Source: Academic Emergency Medicine; Dec2011, Vol. 18 Issue 12, p1330-1338, 9p

Publication Year: 2011

Subject Terms: TREATMENT of fractures
EVALUATION of medical care
PAIN management
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ANALGESIA
CROWDS
DEMOGRAPHY
EMERGENCY medicine
BONE fractures
HOSPITAL admission & discharge
HOSPITAL emergency services
MEDICAL quality control
MEDICAL screening
MEDICAL practice
MEDICAL societies
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THERAPEUTICS

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Document Type: Article

Abstract: ACADEMIC EMERGENCY MEDICINE 2011; 18:1330-1338 © 2011 by the Society for Academic Emergency Medicine Abstract Objectives: The authors sought to determine which quality measures of analgesia delivery are most influenced by emergency department (ED) crowding for pediatric patients with long-bone fractures. Methods: This cross-sectional, retrospective study included patients 0-21 years seen for acute, isolated long-bone fractures, November 2007 to October 2008, at a children's hospital ED. Nine quality measures were studied: six were based on the timeliness (1-hour receipt) and effectiveness (receipt/nonreceipt) of three fracture-related processes: pain score, any analgesic, and opioid analgesic administration. Three equity measures were also tested: language, identified primary care provider (PCP), and insurance. The primary independent variable was a crowding measure: ED occupancy. Models were adjusted for age, language, insurance, identified PCP, triage level, ambulance arrival, and time of day. The adjusted risk of each timeliness or effectiveness quality measure was measured at five percentiles of crowding and compared to the risk at the 10th and 90th percentiles. The role of equity measures as moderators of the crowding-quality models was tested. Results: The study population included 1,229 patients. Timeliness and effectiveness quality measures showed an inverse association with crowding—an effect not moderated by equity measures. Patients were 4% to 47% less likely to receive timely care and were 3% to 17% less likely to receive effective care when each crowding measure was at the 90th than at the 10th percentile ($p < 0.05$). For three of the six quality measures, quality declined steeply between the 75th and 90th crowding percentiles. Conclusions: Crowding is associated with decreased timeliness and effectiveness, but not equity, of analgesia delivery for children with fracture-related pain. [ABSTRACT FROM AUTHOR]

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Record: 18**Title:** Factors Associated With Leaving-Without-Being-Seen in Pediatric Emergency Department Patients.

Authors: Nihira T; Department of Pediatric Emergency Care and Intensive Care Medicine, Tokyo Metropolitan Children's Medical Center, Tokyo, JPN.; Department of Emergency Medicine, Shonan Kamakura General Hospital, Kamakura, JPN.
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Imprint Name(s): *Original Publication:* Palo Alto, CA : Cureus, Inc.

Abstract: **Competing Interests:** Human subjects: Consent for treatment and open access publication was obtained or waived by all participants in this study. Tokyo Metropolitan Children's Medical Center's Institutional Review Board issued approval no. 2019b-101. Information about this study was disclosed on the institutional website with an opt-out clause. The data of any patient who declined participation were excluded from this study. Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue. Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Aim Preventing leaving-without-being-seen (LWBS) in children is crucial due to their inability to seek medical care independently. Because there are no studies of LWBS in Japan, the extent of this problem in Japan and its impacts on healthcare are uncertain. The present study seeks to fill this gap by investigating LWBS after triage and identifying the associated factors. Methods The present, retrospective cohort study was conducted using an electronic, administrative database at a tertiary pediatric medical center in Japan. All records of children aged 15 years or less presenting to the emergency department between April 1, 2014 and March 31, 2017 were included, and the factors associated with LWBS were analyzed. Results During the study period, 112,059 patients were registered, of whom 168 (0.15%) were identified as having LWBS. Several factors were associated with LWBS, including less urgent acuity (odds ratio [OR]: 2.33) and visits on weekends/holidays (OR: 1.71) and evenings (OR: 1.44). Increased emergency department length of stay (EDLOS) and wait time were also associated with increased LWBS (OR: 3.48 for EDLOS > one hour; OR: 41.93 for waiting time > one hour). Conclusion Low acuity; visits on weekends/holidays, and evenings; EDLOS of more than one hour; and waiting time of more than one hour were associated with

LWBS. These findings were in line with those of previous studies conducted in other countries, suggesting that they might be highly generalizable.

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Acad Emerg Med. 2006 Aug;13(8):848-52. (PMID: 16670258)
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Am J Emerg Med. 2021 Oct;48:73-78. (PMID: 33845424)
J Pers Med. 2022 Feb 14;12(2):. (PMID: 35207769)
CJEM. 2013 Sep;15(5):289-99. (PMID: 23972134)
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Ann Emerg Med. 1986 Jun;15(6):717-20. (PMID: 3706862)
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Database: MEDLINE Complete

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Title: "How long until I am seen, doc?" Modelling paediatric emergency department waiting times to make personalised predictions.

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Marlow R; Paediatric Emergency Department, Bristol Royal Hospital for Children, Bristol, UK.; Population Health Sciences, University of Bristol, Bristol, UK.

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Abstract: **Competing Interests:** Competing interests: All authors have completed the ICMJE uniform disclosure form at <http://www.icmje.org/disclosure6-of-interest/> and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Background: ED patient wait times have been progressively increasing leading to patient dissatisfaction in ED. Managing patient expectations towards wait times in ED may be more effective at decreasing dissatisfaction than shortening actual wait times. Models for predicting wait times have been made for general EDs but not for solely paediatric departments. We aimed to create a model that could predict the personalised wait time of a child presenting to paediatric ED after triage.

Methods: This was a single-centre retrospective study analysing all ED attendances to the Bristol Royal Hospital for Children between 1

January 2022 and 31 December 2022. From anonymised routinely collected administrative data, we created a multiple linear regression model to predict wait times. We developed the model by randomly assigning 80% of the data to a training set and used the remaining 20% as a validation set to assess the accuracy of our model. CIs were calculated using 500 bootstrap iterations sampled from the validation set. Understanding that patients are satisfied being seen sooner than their predicted wait time, we considered the result to be unsuccessful if their actual wait time was 30 min over their predicted wait time.

Results: From 40 828 ED presentations, the median patient wait time was 65 min (IQR 34-122). Our model was able to predict wait times for 84.2% (95% CI 83.42% to 84.91%) of attendances successfully. Triage category, number of patients waiting, number of patients in the department, time of presentation, length of wait of last patient and day of week all had a significant impact on prediction of wait times (all $p < 0.001$).

Conclusion: Tailored models created using routine data can be used to give individualised predictions for wait times in paediatric ED, which could be given to patients with the aim of managing expectations and improving patient satisfaction.

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Title: Emergency Department Flow Measures for Adult and Pediatric Patients in British Columbia and Ontario: A Retrospective, Repeated Cross-Sectional Study.

Authors: Georgio, Gregory¹
Guttmann, Astrid^{2,3,4}
Doan, Quynh H.¹

Source: Journal of Emergency Medicine (0736-4679). Sep2017, Vol. 53 Issue 3, p418-426. 9p.

Document Type: journal article

Subject Terms: *HEALTH policy
*HOSPITAL overcrowding
*LENGTH of stay in hospitals

- *MEDICAL care
- *JUVENILE diseases
- *HOSPITAL care
- *HOSPITAL emergency services
- *ORGANIZATIONAL effectiveness
- *PEDIATRICS
- *CROSS-sectional method
- *RETROSPECTIVE studies

Geographic Terms: UNITED States
CANADA
BRITISH Columbia
ONTARIO

Author-Supplied Keywords: emergency medical services
health care delivery
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NAICS/Industry Codes: 923120 Administration of Public Health Programs

Abstract: **Background:** Evidence suggests emergency department (ED) overcrowding is associated with poor health outcomes. Children comprise 20-25% of general ED visits, yet few studies have examined the differential impact of ED overcrowding on pediatric and adult populations. **Objective:** The primary objective of this study was to compare flow measures, such as wait time to see a physician, length of stay (LOS), and rate of patients leaving without being seen by a physician (LWBS) between adults and children in British Columbia and Ontario, clustered by province, and then stratified by acuity level during the study period. **Methods:** We conducted a retrospective, repeated cross-sectional study using administrative data from all community EDs in Ontario and 10 EDs in the Vancouver Lower Mainland, British Columbia. Visits from January 1, 2008 and December 31, 2012 were included. **Results:** Visit volumes increased 13.9% per year in British Columbia and 2.2% per year in Ontario, with a more pronounced rise in adult visits. Both groups displayed a shift toward higher-acuity presentations. Adults spent more time in the ED compared to children (36 to 53 min longer), and were more likely to be admitted. Children consistently spent a greater portion of their visit awaiting assessment compared to adults. **Conclusions:** In the context of system incentives to reduce overcrowding, ED LOS and the LWBS rate did not significantly change for either children or adults, despite increased visit volume and acuity. Our findings suggest that measures to improve patient flow might have provided EDs with the means to meet increased demands on departmental resources. [ABSTRACT FROM AUTHOR]

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Record: 21

Title: 'Be quick': a systems response to overcrowding in the pediatric emergency department.

Authors: Lebaron J; Culberson MC 3rd; Wiley JF 2nd; Smith SR

Affiliation: ¹From the *University of Connecticut, Storrs; and tDivision of Emergency Medicine, Connecticut Children's Medical Center, University of Connecticut School of Medicine, Hartford, CT.

Source: Pediatric Emergency Care (PEDIATR EMERG CARE), 2010 Nov; 26(11): 808-813. (6p)

Publication Type: Journal Article - research

Language: English

Major Subjects: Crowding
Emergency Service -- Administration
Hospitals, Pediatric -- Administration

Minor Subjects: Bed Occupancy; Human; Length of Stay -- Statistics and Numerical Data; Patient Record Systems; Patient Admission -- Statistics and Numerical Data; Patient Satisfaction; Quality Assurance; Retrospective Design; Triage; Waiting Lists

Abstract: **OBJECTIVE::** The purpose of this study was to evaluate the combined effects of focused system changes on several key measures of emergency department (ED) quality (length of stay, waiting time, rate of leaving without being seen, and patient satisfaction) in a children's hospital ED. **METHODS::** System-wide ED changes were made and implemented during a 6-month period. The combined changes are

called 'be quick'-BEQK. The components were bedside registration, the Bed-ahead program, electronic medical records and tracking board, quick triage, and Kids Express. Three study periods were evaluated: before BEQK (2005) and the 2 periods after BEQK (2006 and 2007). RESULTS:: The primary outcome measures, namely wait time, length of stay, and leaving without being seen rates, were all decreased during the 2 post-BEQK periods compared with the pre-BEQK period (2005). The mean waiting time was 46 minutes (95% confidence interval [CI], 39-53 minutes) in 2005 and this decreased to 22 minutes (95% CI, 21-23 minutes) and 14 minutes (95% CI, 13-15 minutes) in 2006 and 2007, respectively. The mean length of stay was 151 minutes (95% CI, 139-163 minutes) in 2005 and this decreased to 136 minutes (95% CI, 135-137 minutes) and 115 minutes (95% CI, 114-116 minutes) in 2006 and 2007, respectively. The rate of leaving without being seen was 2.45% of patient visits per month in 2005 and this decreased to 1.67% in 2006 and to 0.92% in 2007. CONCLUSIONS:: In our pediatric ED, focused system changes significantly decreased wait time, leaving without being seen, and length of stay and improved patient satisfaction.

Journal Subset: Biomedical; Blind Peer Reviewed; Editorial Board Reviewed; Expert Peer Reviewed; Peer Reviewed; USA

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Accession Number: 104940806

Database: CINAHL Plus with Full Text

Record: 22

Title: Characteristics and Admission Preferences of Pediatric Emergency Patients and Their Waiting Time Prediction Using Electronic Medical Record Data: Retrospective Comparative Analysis.

Authors: Guo, Lin Lin¹ (AUTHOR)
Guo, Lin Ying¹ (AUTHOR)
Li, Jiao² (AUTHOR)
Gu, Yao Wen² (AUTHOR)
Wang, Jia Yang² (AUTHOR)
Cui, Ying¹ (AUTHOR)
Qian, Qing² (AUTHOR)
Chen, Ting³ (AUTHOR)

Jiang, Rui⁴ (AUTHOR)

Zheng, Si^{2,3} (AUTHOR) *zheng.si@imicams.ac.cn*

Source: Journal of Medical Internet Research. 2023, Vol. 25 Issue 1, p1-16. 16p.

Document Type: Article

Subject Terms: *Machine learning

Emergency room visits

Medical quality control

Medical care

Medical care wait times

Pediatric emergency services

Pediatric emergencies

Author-Supplied Keywords: admission preferences

characteristics

electronic medical record

machine learning

pediatric emergency department

waiting time

Abstract: Background: The growing number of patients visiting pediatric emergency departments could have a detrimental impact on the care provided to children who are triaged as needing urgent attention. Therefore, it has become essential to continuously monitor and analyze the admissions and waiting times of pediatric emergency patients. Despite the significant challenge posed by the shortage of pediatric medical resources in China's health care system, there have been few large-scale studies conducted to analyze visits to the pediatric emergency room. Objective: This study seeks to examine the characteristics and admission patterns of patients in the pediatric emergency department using electronic medical record (EMR) data. Additionally, it aims to develop and assess machine learning models for predicting waiting times for pediatric emergency department visits. Methods: This retrospective analysis involved patients who were admitted to the emergency department of Children's Hospital Capital Institute of Pediatrics from January 1, 2021, to December 31, 2021. Clinical data from these admissions were extracted from the electronic medical records, encompassing various variables of interest such as patient demographics, clinical diagnoses, and time stamps of clinical visits. These indicators were collected and compared. Furthermore, we developed and evaluated several computational models for predicting waiting times. Results: In total, 183,024 eligible admissions from 127,368 pediatric patients were included. During the 12-month study period, pediatric emergency department visits were most frequent among children aged less than 5 years, accounting for 71.26% (130,423/183,024) of the total visits. Additionally, there was a higher proportion of male patients (104,147/183,024, 56.90%) compared with female patients (78,877/183,024, 43.10%). Fever (50,715/183,024, 27.71%), respiratory infection

(43,269/183,024, 23.64%), celiacgia (9560/183,024, 5.22%), and emesis (6898/183,024, 3.77%) were the leading causes of pediatric emergency room visits. The average daily number of admissions was 501.44, and 18.76% (34,339/183,204) of pediatric emergency department visits resulted in discharge without a prescription or further tests. The median waiting time from registration to seeing a doctor was 27.53 minutes. Prolonged waiting times were observed from April to July, coinciding with an increased number of arrivals, primarily for respiratory diseases. In terms of waiting time prediction, machine learning models, specifically random forest, LightGBM, and XGBoost, outperformed regression methods. On average, these models reduced the root-mean-square error by approximately 17.73% (8.951/50.481) and increased the R2 by approximately 29.33% (0.154/0.525). The SHAP method analysis highlighted that the features "wait.green" and "department" had the most significant influence on waiting times. Conclusions: This study offers a contemporary exploration of pediatric emergency room visits, revealing significant variations in admission rates across different periods and uncovering certain admission patterns. The machine learning models, particularly ensemble methods, delivered more dependable waiting time predictions. Patient volume awaiting consultation or treatment and the triage status emerged as crucial factors contributing to prolonged waiting times. Therefore, strategies such as patient diversion to alleviate congestion in emergency departments and optimizing triage systems to reduce average waiting times remain effective approaches to enhance the quality of pediatric health care services in China. [ABSTRACT FROM AUTHOR]

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Database: Library, Information Science & Technology Abstracts

Record: 23

Title: Long length of stay at the emergency department is mostly caused by organisational factors outside the influence of the emergency department: A root cause analysis.

Authors: Driesen, Babiche E. J. M.
van Riet, Bauke H. G.
Verkerk, Lisa
Bonjer, H. Jaap
Merten, Hanneke
Nanayakkara, Prabath W. B.

Source: PLoS ONE; 9/14/2018, Vol. 13 Issue 9, p1-15, 15p

Publication Year: 2018

Subject Terms: HOSPITAL emergency services
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ROOT cause analysis
HOSPITAL admission & discharge
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Author-Supplied Keywords: Critical care and emergency medicine
Europe
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General practitioners
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Health care
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Hospitals
Medical doctors
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Medicine and health sciences
Netherlands
People and places
Physicians
Population groupings
Professions
Radiology and imaging

Research Article

Surgical and invasive medical procedures

Document Type: Article

Abstract: Background: Emergency department (ED) crowding is common and associated with increased costs and negative patient outcomes. The aim of this study was to conduct an in-depth analysis to identify the root causes of an ED length of stay (ED-LOS) of more than six hours. Methods: An observational retrospective record review study was conducted to analyse the causes for ED-LOS of more than six hours during a one-week period in an academic hospital in the Netherlands. Basic administrative data were collected for all visiting patients. A root cause analysis was conducted using the PRISMA-method for patients with an ED-LOS > 6 hours, excluding children and critical care room presentations. Results: 568 patients visited the ED during the selected week (January 2017). Eighty-four patients (15%) had an ED-LOS > 6 hours and a PRISMA-analysis was performed in 74 (88%) of these patients. 269 root causes were identified, 216 (76%) of which were organisational and 53 (22%) patient or disease related. 207 (94%) of the organisational factors were outside the influence of the ED. Descriptive statistics showed a mean number of 2,5 consultations, 59% hospital admissions or transfers and a mean age of 57 years in the ED-LOS > 6 hours group. For the total group, there was a mean number of 1,9 consultations, 29% hospital admissions or transfers and a mean age of 43 years. Conclusions: This study showed that the root causes for an increased ED-LOS were mostly organisational and beyond the control of the ED. These results confirm that interventions addressing the complete acute care chain are needed in order to reduce ED-LOS and crowding in ED's. [ABSTRACT FROM AUTHOR]

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ISSN: 19326203**DOI:** 10.1371/journal.pone.0202751**Accession Number:** 131782991**Database:** Complementary Index

Record: 24**Title:** Racial and Ethnic Disparities in Emergency Department Wait Times for Children: Analysis of a Nationally Representative Sample.**Authors:** Gorski JK; Division of Emergency Medicine, Department of Pediatrics, Ann and Robert H. Lurie Children's Hospital (JK Gorski, ER Alpern, and S Ramgopal), Chicago, Ill. Electronic address: jgorski@luriechildrens.org.

Alpern ER; Division of Emergency Medicine, Department of Pediatrics, Ann and Robert H. Lurie Children's Hospital (JK Gorski, ER Alpern,

and S Ramgopal), Chicago, Ill.

Lorenz DJ; Department of Bioinformatics and Biostatistics, University of Louisville (DJ Lorenz), Louisville, Ky.

Ramgopal S; Division of Emergency Medicine, Department of Pediatrics, Ann and Robert H. Lurie Children's Hospital (JK Gorski, ER Alpern, and S Ramgopal), Chicago, Ill.

Source: Academic pediatrics [Acad Pediatr] 2023 Mar; Vol. 23 (2), pp. 381-386. *Date of Electronic Publication:* 2022 Oct 21.

Publication Type: Journal Article

Language: English

Journal Info: *Publisher:* Elsevier *Country of Publication:* United States *NLM ID:* 101499145 *Publication Model:* Print-Electronic *Cited Medium:* Internet
ISSN: 1876-2867 (Electronic) *Linking ISSN:* 18762859 *NLM ISO Abbreviation:* Acad Pediatr *Subsets:* MEDLINE

Imprint Name(s): *Original Publication:* New York : Elsevier

MeSH Terms: Ethnicity*

Waiting Lists*

Child ; Humans ; Cross-Sectional Studies ; Emergency Service, Hospital ; Healthcare Disparities ; Hispanic or Latino ; United States ; White ; Black or African American

Abstract: Objective: To evaluate the association of race and ethnicity with wait times for children in US emergency departments (ED).

Methods: We performed a cross-sectional study of ED encounters of children (<18 years) from 2014 to 2019 using a multistage survey of nonfederal US ED encounters. Our primary variable of interest was composite race and ethnicity: non-Hispanic White (NHW), non-Hispanic Black, Hispanic, and all others. Our outcome was ED wait time in minutes. We evaluated the association between race and ethnicity and wait time in Weibull regression models that sequentially added variables of acuity, demographics, hospital factors, and region/urbanicity.

Results: We included 163,768,956 survey-weighted encounters. In univariable analysis, Hispanic children had a lower hazard ratio (HR) of progressing to evaluation (HR 0.84, 95% confidence interval [CI] 0.76-0.93) relative to NHW children, indicating longer ED wait times. This association persisted in serial multivariable models incorporating acuity, demographics, and hospital factors. This association was not observed when incorporating variables of hospital region and urbanicity (HR 0.91, 95% CI 0.83-1.00). In subgroup analysis, Hispanic ethnicity was associated with longer wait times in pediatric EDs (HR 0.76, 95% CI 0.63-0.92), non-metropolitan EDs (HR 0.75, 95% CI 0.64-0.89), and the Midwest region (HR 0.77, 95% CI 0.69-0.87). No differences in wait times were observed for children of Black race or other races.

Conclusions: Hispanic children experienced longer ED wait times across serial multivariable models, with significant differences limited to pediatric, metropolitan, and Midwest EDs. These results highlight the presence of disparities in access to prompt emergency care for children.

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Contributed Indexing: *Keywords:* emergency medicine; health disparities; wait times

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DOI: 10.1016/j.acap.2022.10.013

PMID: 36280036

Database: MEDLINE Complete

Record: 25

Title: Adjacent Primary Care May Reduce Less Urgent Pediatric Emergency Department Visits

Authors: Julia Ellbrant

Jonas Åkeson

Helena Sletten

Jenny Eckner

Pia Karlsland Åkeson

Source: Journal of Primary Care & Community Health, Vol 11 (2020)

Publisher Information: SAGE Publishing, 2020.

Publication Year: 2020

Collection: LCC:Computer applications to medicine. Medical informatics

LCC:Public aspects of medicine

Subject Terms: Computer applications to medicine. Medical informatics

R858-859.7

Public aspects of medicine

RA1-1270

Description: Aims: Pediatric emergency department (ED) overcrowding is a challenge. This study was designed to evaluate if a hospital-integrated primary care unit (HPCU) reduces less urgent visits at a pediatric ED. Methods: This retrospective cross-sectional study was carried out at a university hospital in Sweden, where the HPCU, open outside office hours, had been integrated next to the ED. Children seeking ED care during 4-week high- and low-load study periods before (2012) and after (2015) implementation of the HPCU were included. Information on patient characteristics, ED management, and length of ED stay was obtained from hospital data registers. Results: In total, 3216 and 3074 ED patient visits were recorded in 2012 and 2015, respectively. During opening hours of the HPCU, the proportions of pediatric ED visits

(28% lower; $P < .001$), visits in the lowest triage group (36% lower; $P < .001$), patients presenting with fever ($P = .001$) or ear pain ($P < .001$), and nonadmitted ED patients ($P = .033$), were significantly lower in 2015 than in 2012, whereas the proportion of infants ≤ 3 months was higher in 2015 ($P < .001$). Conclusions: By enabling adjacent management of less urgent pediatric patients at adequate lower levels of medical care, implementation of a HPCU outside office hours may contribute to fewer and more appropriate pediatric ED visits.

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Accession Number: edsdoj.96717a2f415e4d2cb146c0000c6cd2ef

Database: Directory of Open Access Journals

Record: 26

Title: Emergency department overcrowding and children.

Authors: Hostetler MA; Department of Pediatrics, Section of Emergency Medicine, The University of Chicago, IL, USA.

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Mace S

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Finkler J

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Schamban N

Corporate Authors: Subcommittee on Emergency Department Overcrowding and Children, Section of Pediatric Emergency Medicine, American College of Emergency Physicians

Source: Pediatric emergency care [Pediatr Emerg Care] 2007 Jul; Vol. 23 (7), pp. 507-15.

Publication Type: Journal Article; Review

Language: English

Journal Info: *Publisher:* Lippincott Williams & Wilkins *Country of Publication:* United States *NLM ID:* 8507560 *Publication Model:* Print *Cited Medium:* Internet *ISSN:* 1535-1815 (Electronic) *Linking ISSN:* 07495161 *NLM ISO Abbreviation:* *Pediatr Emerg Care Subsets:* MEDLINE

Imprint Name(s): *Publication:* Hagerstown, MD : Lippincott Williams & Wilkins
Original Publication: Baltimore, Md. : Williams & Wilkins, [c1985-

MeSH Terms: Crowding*

Emergency Service, Hospital*/legislation & jurisprudence

Emergency Service, Hospital*/standards

Emergency Service, Hospital*/trends

Medicaid*/economics

Medicaid*/legislation & jurisprudence

Child Health Services/*supply & distribution

Child Health Services/trends ; Child, Preschool ; Health Services Needs and Demand ; Humans ; Joint Commission on Accreditation of Healthcare Organizations ; United States

Abstract: Emergency department (ED) overcrowding has been a serious issue on the national agenda for the past 2 decades and is rapidly becoming an increasingly significant problem for children. The goal of this report is to focus on the issues of overcrowding that directly impact children. Our findings reveal that although overcrowding seems to affect children in ways similar to those of adults, there are several important ways in which they differ. Recent reports document that more than 90% of academic emergency medicine EDs are overcrowded. Although inner-city, urban, and university hospitals have historically been the first to feel the brunt of overcrowding, community and suburban EDs are now also being affected. The overwhelming majority of children (92%) are seen in general community EDs, with only a minority (less than 10%) treated in dedicated pediatric EDs. With the exception of patients older than 65 years, children have higher visit rates than any other age group. Children may be at particularly increased risk for medical errors because of their inherent variability in size and the need for age-specific and weight-based dosing. We strongly recommend that pediatric issues be actively included in all future aspects of research and policy planning issues related to ED overcrowding. These include the development of triage protocols, clinical guidelines, research proposals, and computerized data monitoring systems.

Number of References: 111

Entry Date(s): *Date Created:* 20070802 *Date Completed:* 20070821 *Latest Revision:* 20070801

Update Code: 20250114

DOI: 10.1097/01.pec.0000280518.36408.74

PMID: 17666940

Database: MEDLINE Complete

Record: 27

Title: Correlation of measures of patient acuity with measures of crowding in a pediatric emergency department.

Authors: Graham J; Aitken ME; Shirm S

Affiliation: ¹From the Department of Pediatrics, University of Arkansas College of Medicine, Little Rock, AR.

Source: Pediatric Emergency Care (PEDIATR EMERG CARE), 2011 Aug; 27(8): 706-709. (4p)

Publication Type: Journal Article - research

Language: English

Major Subjects: Crowding

Emergency Service -- Statistics and Numerical Data

Triage -- Statistics and Numerical Data

Minor Subjects: Arkansas; Child; Health Services Accessibility; Quality of Health Care

Abstract: **OBJECTIVE:** : Emergency department (ED) crowding is an increasingly common problem in the United States. Crowding can lead to ED closure and diversion, poor patient satisfaction, and patient safety issues. The purpose of this study was to examine measures of ED census and measures of crowding to determine if a correlation exists in a pediatric ED setting. **METHODS:** : Arkansas Children's Hospital is a major pediatric referral center. Measures of ED acuity (including total census, admission rate, total number of admissions, and proportion of triage category nonurgent patients) and measures of throughput (left-without-being-seen [LWBS] rate and ED length of stay [LOS]) data for 11 years (1996-2006) were plotted, and correlation coefficients were calculated. **RESULTS:** : Annual ED census varied between 35,415 and 40,711 during the 11-year study period. The total number of admissions increased from 4179 in 1996 to 6539 in 2006. When total census was plotted against LWBS rate and ED LOS, a poor correlation was found ($R = 0.007$ for total census vs LWBS rate). However, a strong correlation was found when the relationship between the total number of admissions and LWBS rate was examined ($R = 0.89$). Similarly, a strong relationship between the admission rate and LWBS rate was seen ($R = 0.75$). In addition, a strong correlation was seen between admissions (total and percentage) versus ED LOS. **CONCLUSIONS:** : There is a strong correlation between the number of patients admitted and measures of overcrowding in this pediatric ED, but there is a poor correlation between the total census and overcrowding measures. Targeting process improvement on hospital-wide patient flow may help reduce ED crowding.

Journal Subset: Biomedical; Blind Peer Reviewed; Editorial Board Reviewed; Expert Peer Reviewed; Peer Reviewed; USA

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DOI: 10.1097/pec.0b013e318226c7dd

Accession Number: 108191631

Database: CINAHL Plus with Full Text

Record: 28

Title: Variation in emergency department wait times for children by race/ ethnicity and payment source
Children's Care and Coverage

Authors: Park, Christine Y.
Lee, Mary Alice
Epstein, Andrew J.

Source: Health Services Research. December 2009, Vol. 44 Issue 6, p2022, 18 p.

Publisher Information: Health Research and Educational Trust

Publication Year: 2009

Subject Terms: Surveys
Hospital emergency services -- Surveys
Patient satisfaction -- Surveys
Hospitals -- Emergency service

Description: Overcrowding in emergency departments (EDs) across the United States has gained attention among hospital administrators, public health officials, and policy makers. From 1994 to 2004, the number of ED visits [...]
Objective. To quantify the variation in emergency department (ED) wait times by patient race/ethnicity and payment source, and to divide the overall association into between- and within-hospital components. Data Source. 2005 and 2006 National Hospital Ambulatory Medical Care Surveys. Study Design. Linear regression was used to analyze the independent associations between race/ethnicity, payment source, and ED wait times in a pooled cross-sectional design. A hybrid fixed effects specification was used to measure the between- and within-hospital components. Data Extraction Methods. Data were limited to children under 16 years presenting at EDs. Principal Results. Unadjusted and adjusted ED wait times were significantly longer for non-Hispanic black and Hispanic children than for non-Hispanic white children. Children in EDs with higher shares of non-Hispanic black and Hispanic children waited longer. Moreover, Hispanic children waited 10.4 percent longer than non-Hispanic white children when treated at the same hospital. ED wait times for children did not vary significantly by payment source. Conclusions. There are sizable racial/ethnic differences in children's ED wait times that can be attributed to both the racial/ethnic mix

of children in EDs and to differential treatment by race/ethnicity inside the ED. Key Words. Race/ethnicity, insurance, emergency department, wait time

Document Type: Report

Language: English

ISSN: 0017-9124

DOI: 10.1111/j.1475-6773.2009.01020.x

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Database: Gale Health and Wellness

Record: 29

Title: Parental Perception of Waiting Time and its Influence on Parental Satisfaction in an Urban Pediatric Emergency Department: Are Parents Accurate in Determining Waiting Time?

Authors: Waseem, Muhammad¹ *waseemm2001@hotmail.com*
Ravi, Lalitha¹
Radeos, Michael¹
Ganti, Sandhya¹

Source: Southern Medical Journal. Sep2003, Vol. 96 Issue 9, p880-883. 4p.

Document Type: Article

Subject Terms: *HOSPITAL waiting lists
*SATISFACTION
*PARENTS
*PEDIATRIC emergency services
*CITIES & towns
*CHILD health services

Abstract: Objective: The objective of this study was to determine whether parental perception of waiting time in an urban pediatric emergency department (ED) is accurate and whether the actual waiting times or their perception of waiting times impact on parental satisfaction.
Methods: A prospective convenience sample study in which the on-duty emergency physicians randomly administered a questionnaire at the

time of the ED visit was used. During a 3-week period from December 15, 1999, through January 7, 2000, 500 parents or legal guardians of children who visited our ED were questioned about their perceived waiting time, and the responses were compared with the actual waiting time. The parents or guardians were also asked if they were satisfied with the waiting time. Results: The majority (84%) of parents overestimated waiting time in the ED (median difference, 26 min; interquartile range, 9-50 min). Parents with perceived or actual waiting times that exceeded 2 hours were significantly more likely to be dissatisfied than parents with actual or perceived waiting times that were 1 hour or less ($p < 0.001$). Satisfaction was not related to the age ($P = 0.35$), sex ($P = 0.30$), race/ethnicity ($P = 0.90$), or mode of arrival ($P = 0.28$). Conclusion: Parents tend to overestimate waiting time. Both perceived and actual waiting times that exceed 2 hours were associated with parental dissatisfaction. ED administrators may need to keep this in mind when arranging ED staffing patterns to match peak patient hours to achieve optimal parental satisfaction. [ABSTRACT FROM AUTHOR]

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Accession Number: 11420265

Database: Academic Search Index

Record: 30

Title: Children's Mental Health Visits to the Emergency Department: Factors Affecting Wait Times and Length of Stay

Authors: Amanda S. Newton

Sachin Rathee

Simran Grewal

Nadia Dow

Rhonda J. Rosychuk

Source: Emergency Medicine International, Vol 2014 (2014)

Publisher Information: Wiley, 2014.

Publication Year: 2014

Collection: LCC:Medical emergencies. Critical care. Intensive care. First aid

Subject Terms: Medical emergencies. Critical care. Intensive care. First aid
RC86-88.9

Description: Objective. This study explores the association of patient and emergency department (ED) mental health visit characteristics with wait time and length of stay (LOS). Methods. We examined data from 580 ED mental health visits made to two urban EDs by children aged ≤ 18 years from April 1, 2004, to March 31, 2006. Logistic regressions identified characteristics associated with wait time and LOS using hazard ratios (HR) with 95% confidence intervals (CIs). Results. Sex (male: HR=1.48, 95% CI=1.20–1.84), ED type (pediatric ED: HR=5.91, 95% CI=4.16–8.39), and triage level (Canadian Triage and Acuity Scale (CTAS) 2: HR=3.62, 95% CI=2.24–5.85) were statistically significant predictors of wait time. ED type (pediatric ED: HR=1.71, 95% CI=1.18–2.46), triage level (CTAS 5: HR=2.00, 95% CI=1.15–3.48), number of consultations (HR=0.46, 95% CI=0.31–0.69), and number of laboratory investigations (HR=0.75, 95% CI=0.66–0.85) predicted LOS. Conclusions. Based on our results, quality improvement initiatives to reduce ED waits and LOS for pediatric mental health visits may consider monitoring triage processes and the availability, access, and/or time to receipt of specialty consultations.

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Record: 31

Title: Parental satisfaction with waiting time in a Swiss tertiary paediatric emergency department.

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Source: Emergency medicine journal : EMJ [Emerg Med J] 2021 Aug; Vol. 38 (8), pp. 617-623. *Date of Electronic Publication:* 2020 Dec 21.

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MeSH Terms: Personal Satisfaction*

Waiting Lists*

Emergency Service, Hospital/*statistics & numerical data

Parents/*psychology

Adult ; Female ; Humans ; Male ; Surveys and Questionnaires ; Switzerland ; Tertiary Care Centers

Abstract: **Competing Interests:** Competing interests: None declared.

Introduction: Patient numbers in paediatric emergency departments (PED) are steadily increasing. Parental perception of waiting time and reasons for attending a PED with non-emergencies have been investigated in the UK, Australia, Korea, Canada and the USA. We sought to examine which factors influence parental satisfaction with waiting time in a tertiary Swiss PED and whether these differed from other countries.

Methods: Paper surveys were administered to parents of children presenting to our interdisciplinary PED from February to May 2015. Primary outcome was parental satisfaction with waiting time, secondary outcomes were satisfaction with treatment, parental reasons for presentation with non-emergencies, parental perception of times to triage, first physician contact and disposition from ED, level of physician training, understanding of various anticrowding strategies and comparison of perceived and true waiting times to triage and physician contact.

Results: 739 out of 750 surveys were returned (57 complete, 298 with 1 or 2 missing answers). Satisfaction with waiting time (on a 5-point-Likert-scale; 1 being the best possible answer) was higher in groups with shorter waiting time until triage (+0.41, $p=0.001$), first physician contact (+1.43, $p<0.001$) and discharge (+0.71, $p<0.001$), higher triage category urgency (+0.47, $p=0.044$) and available entertainment (+0.82, $p<0.001$). Early first physician contact (+0.33, $p=0.008$) and time to discharge less than 4 hours (+0.37, $p<0.001$) was associated with greater satisfaction with treatment ($p<0.05$). The most frequent reasons for presentation were parental impression that the child had an emergency ($n=265$, 35.9%) and referral by the family doctor ($n=245$, 33.2%).

Conclusion: To counteract parental dissatisfaction associated with waiting time, we suggest the implementation of feasible measures including entertainment while waiting, early first medical review and timely discharge from the PED.

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Contributed Indexing: *Keywords:* efficiency; emergency care systems; emergency department; emergency department management; emergency departments; triage

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Record: 32

Title: Children Who Leave the Emergency Department Without Being Seen: Why Did They Leave and What Would Make Them Stay?

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Publication Year: 2018

Collection: LCC:Medicine

LCC:Medicine (General)

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Outcome Assessment (Health Care)

Patient Acceptance of Health Care

Patient Dropouts

Portugal
Waiting Lists
Medicine
Medicine (General)
R5-920

Description: Introduction: Children who visit emergency departments and leave without being seen represent a multifactorial problem. We aimed to compare the sociodemographic characteristics of children who left and of those who did not leave, as well as to evaluate parental reasoning, subsequent use of medical care and patient outcome. Material and Methods: This was a prospective case-control study of a random sample of children who left without being seen and their matched controls from an emergency department during a three-month period. We performed a phone questionnaire to obtain information concerning reasons for leaving, patient outcomes and general feedback. Results: During the study period, 18 200 patients presented to the emergency department, of whom 92 (0.5%) left without being seen. Fifty-five (59.8%) completed the questionnaire and there were 82 controls. The most common reasons for leaving were 'excessive waiting time' (92.7%) and 'problem could wait' (21.8%). A significantly higher number of patients who left sought further medical care (78.2% vs 11%) but they did not experience higher levels of unfavourable outcomes. Discussion: The waiting time seems to be the major factor that drives the decision to leave. The fact that parents felt safe in leaving and the low level of adverse outcomes highlights the low-acuity nature of the majority of patients who leave. Conclusion: Reducing the waiting times may be the logical strategic mean to decrease the rates of patients who leave without being seen. However, our data seems to indicate that the concerns surrounding clinical outcome after leaving may be partly unwarranted.

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Database: Directory of Open Access Journals

Record: 33

Title: Emergency department crowding and younger age are associated with delayed corticosteroid administration to children with acute asthma.

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Source: Pediatric emergency care [Pediatr Emerg Care] 2013 Oct; Vol. 29 (10), pp. 1075-81.

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Language: English

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MeSH Terms: Crowding*

Emergency Service, Hospital*

Adrenal Cortex Hormones/*therapeutic use

Anti-Asthmatic Agents/*therapeutic use

Asthma/*drug therapy

Acute Disease ; Adolescent ; Adrenal Cortex Hormones/administration & dosage ; Age Factors ; Anti-Asthmatic Agents/administration & dosage ; Asthma/blood ; Bronchodilator Agents/administration & dosage ; Bronchodilator Agents/therapeutic use ; Child ; Child, Preschool ; Drug Administration Schedule ; Drug Therapy, Combination ; Electronic Health Records ; Female ; Guideline Adherence ; Humans ; Hypoxia/etiology ; Infant ; Male ; Practice Guidelines as Topic ; Retrospective Studies ; Severity of Illness Index ; Tachypnea/etiology ; Time Factors ; Triage ; Young Adult

Abstract: **Objective:** This study aimed to identify factors associated with delayed or omission of indicated steroids for children seen in the emergency department (ED) for moderate-to-severe asthma exacerbation.

Methods: This was a retrospective study of pediatric (age ≤ 21 years) patients treated in a general academic ED from January 2006 to September 2011 with a primary diagnosis of asthma (International Classification of Diseases, Ninth Revision code 493.xx) and moderate-to-severe exacerbations. A moderate-to-severe exacerbation was defined as requiring 2 or more (or continuous) bronchodilators. We

determined the proportion of visits in which steroids were inappropriately omitted or delayed (>1 hour from arrival). Multivariable logistic regression models were used to identify patient, physician, and system factors associated with delayed or omitted steroids.

Results: Of 1333 pediatric asthma ED visits, 817 were for moderate-to-severe exacerbation; 645 (79%) received steroids. Patients younger than 6 years (odds ratio [OR], 2.25; 95% confidence interval [CI], 1.19-4.24), requiring more bronchodilators (OR, 2.82; 95% CI, 2.10-3.79), initially hypoxic (OR, 2.78; 95% CI, 1.33-5.83), or tachypneic (OR, 1.52; 95% CI, 1.05-2.20) were more likely to receive steroids. Median time to steroid administration was 108 minutes (interquartile range, 65-164 minutes). Steroid administration was delayed in 502 visits (78%). Patients with hypoxia (OR, 1.91; 95% CI, 1.11-3.27) or tachypnea (OR, 1.82; 95% CI, 1.17-2.84) were more likely to receive steroids 1 hour or less of arrival, whereas children younger than 2 years (OR, 0.16; 95% CI, 0.07-0.35) and those arriving during periods of higher ED volume (OR, 0.79; 95% CI, 0.67-0.94) were less likely to receive timely steroids.

Conclusions: In this ED, steroids were underprescribed and frequently delayed for pediatric ED patients with moderate-to-severe asthma exacerbation. Greater ED volume and younger age are associated with delays. Interventions are needed to expedite steroid administration, improving adherence to National Institutes of Health asthma guidelines.

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0 (Anti-Asthmatic Agents)

0 (Bronchodilator Agents)

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Fairclough D
Ranade D
Kahn MG**Source:** Pediatric emergency care [Pediatr Emerg Care] 2011 Sep; Vol. 27 (9), pp. 837-45.**Publication Type:** Comparative Study; Journal Article; Research Support, N.I.H., Extramural; Research Support, Non-U.S. Gov't**Language:** English**Journal Info:** *Publisher:* Lippincott Williams & Wilkins *Country of Publication:* United States *NLM ID:* 8507560 *Publication Model:* Print *Cited Medium:* Internet *ISSN:* 1535-1815 (Electronic) *Linking ISSN:* 07495161 *NLM ISO Abbreviation:* Pediatr Emerg Care *Subsets:* MEDLINE**Imprint Name(s):** *Publication:* Hagerstown, MD : Lippincott Williams & Wilkins
Original Publication: Baltimore, Md. : Williams & Wilkins, [c1985-**MeSH Terms:** Crowding*

Emergency Service, Hospital*/standards

Emergency Service, Hospital*/statistics & numerical data

Quality of Health Care*

Acute Disease ; Adolescent ; Analgesics/therapeutic use ; Anti-Asthmatic Agents/therapeutic use ; Asthma/drug therapy

; Asthma/epidemiology ; Child ; Child, Preschool ; Cross-Sectional Studies ; Female ; Fractures, Bone/complications ; Fractures,

Bone/epidemiology ; Hospitals, University/standards ; Hospitals, University/statistics & numerical data ; Humans ; Infant ; Infant, Newborn

; Male ; Narcotics/therapeutic use ; Pain/drug therapy ; Pain/epidemiology ; Pain/etiology ; Quality Indicators, Health Care ; Retrospective Studies ; Time Factors ; Young Adult

Abstract: Objective: We sought to determine which of several simple indicators of emergency department crowding are most predictive of quality of care in 2 pediatric disease models: acute asthma and pain associated with long-bone fractures.

Methods: We performed a retrospective, cross-sectional study of patients 2 to 21 years old seen for acute asthma and patients 0 to 21 years old seen for acute, isolated long-bone fractures from November 1, 2007, to October 31, 2008, at a single, academic children's hospital emergency department. The main outcome measures were quality measures based on 3 asthma care-related processes-asthma score, β -agonist, and corticosteroid-and 2 fracture-related processes-analgesic and opioid analgesic. Good quality care was defined as receipt of an indicated process within 1 hour of arrival. Poor quality care was defined as nonreceipt or delayed receipt of an indicated process. Nine crowding measures were assigned based on conditions at each patient's arrival. We calculated the adjusted risk of receiving good quality care for each quality measure at 5 percentiles of crowding for each crowding measure.

Results: The asthma population included 927 patients, and the fracture population included 1229 patients. Among the 5 quality measures, we found rates of good quality care ranging from 23% to 64%. In adjusted models, we found an inverse association between crowding and quality. The 2 crowding measures with a consistently inverse association with the 5 quality measures across both populations were total patient-care hours and number arriving in prior 6 hours. Across the 10 models combining 1 of 2 key crowding variables with 1 of 5 quality measures, patients in the 2 populations were 0.40 (95% confidence interval, 0.27-0.55) to 0.78 (confidence interval, 0.71-0.85) times as likely to receive the indicated care process within 1 hour when each crowding measure was at the 75th than at the 25th percentile.

Conclusions: Two measures of ED crowding are consistently associated with lower-quality asthma- and fracture-specific care in the ED for pediatric patients.

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Title: The impact of pediatric emergency department crowding on patient and health care system outcomes: a multicentre cohort study.

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Abstract: **Competing Interests:** Competing interests: Quynh Doan reports a Scholars Award from the Michael Smith Foundation for Health Research during the conduct of the study. No other competing interests were declared.

Background: Emergency department overcrowding has been associated with increased odds of hospital admission and mortality after discharge from the emergency department in predominantly adult cohorts. The objective of this study was to evaluate the association between crowding and the odds of several adverse outcomes among children seen at a pediatric emergency department.

Methods: We conducted a retrospective cohort study involving all children visiting 8 Canadian pediatric emergency departments across 4 provinces between 2010 and 2014. We analyzed the association between mean departmental length of stay for each index visit and hospital admission within 7 days or death within 14 days of emergency department discharge, as well as hospital admission at index visit and return visits within 7 days, using mixed-effects logistic regression modelling.

Results: A total of 1 931 465 index visits occurred across study sites over the 5-year period, with little variation in index visit hospital admission or median length of stay. Hospital admission within 7 days of discharge and 14-day mortality were low across provinces (0.8%-1.5% and < 10 per 100 000 visits, respectively), and their association with mean departmental length of stay varied by triage categories and across sites but was not significant. There were increased odds of hospital admission at the index visit with increasing departmental crowding among visits triaged to Canadian Triage and Acuity Scale (CTAS) score 1-2 (odds ratios [ORs] ranged from 1.01 to 1.08) and return visits among patients with a CTAS score of 4-5 discharged at the index visit at some sites (ORs ranged from 1.00 to 1.06).

Interpretation: Emergency department crowding was not significantly associated with hospital admission within 7 days of the emergency department visit or mortality in children. However, it was associated with increased hospital admission at the index visit for the sickest children, and with return visits to the emergency department for those less sick.

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The impact of pediatric emergency department crowding on patient and health care system outcomes: a multicentre cohort study

BACKGROUND: Emergency department overcrowding has been associated with increased odds of hospital admission and mortality after discharge from the emergency department in predominantly adult cohorts. The objective of this study was to evaluate the association between crowding and the odds of several adverse outcomes among children seen at a pediatric emergency department. **METHODS:** We conducted a retrospective cohort study involving all children visiting 8 Canadian pediatric emergency departments across 4 provinces between 2010 and 2014. We analyzed the association between mean departmental length of stay for each index visit and hospital admission within 7 days or death within 14 days of emergency department discharge, as well as hospital admission at index visit and return visits within 7 days, using mixed-effects logistic regression modelling. **RESULTS:** A total of 1 931 465 index visits occurred across study sites over the 5-year period, with little variation in index visit hospital admission or median length of stay. Hospital admission within 7 days of discharge and 14-day mortality were low across provinces (0.8%–1.5% and < 10 per 100 000 visits, respectively), and their association with mean departmental length of stay varied by triage categories and across sites but was not significant. There were increased odds of hospital admission at the index visit with increasing departmental crowding among visits triaged to Canadian Triage and Acuity Scale (CTAS) score 1–2 (odds ratios [ORs] ranged from 1.01 to 1.08) and return visits among patients with a CTAS score of 4–5 discharged at the index visit at some sites (ORs ranged from 1.00 to 1.06). **INTERPRETATION:** Emergency department crowding was not significantly associated with hospital admission within 7 days of the emergency department visit or mortality in children. However, it was associated with increased hospital admission at the index visit for the sickest children, and with return visits to the emergency department for those less sick.

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Emergency department overcrowding is a complex systems problem and an important health services and public health concern. Although the magnitude of emergency department overcrowding varies regionally, the Canadian Association of Emergency Physicians has identified overcrowding as a serious problem across Canada, particularly at trauma and tertiary care centres.[1] In North America, emergency department overcrowding has been associated with reduced quality of care, negative clinical outcomes (mortality and morbidity), and decreased patient and physician satisfaction.[2]–[8] Some studies suggest an increased risk of in-patient mortality, prolonged hospital admissions and increased costs associated with increased emergency department volume.[9] A population-based Ontario study found that emergency department visits during shifts with a longer departmental mean length of stay were associated with higher odds of hospital admission and mortality within 7 days of discharge from the emergency department.[10]

Although delay in transfer of admitted patients (i.e., "boarded" patients) in the emergency department[6] is the primary cause of overcrowding in general emergency departments, increasing visit volumes and operational inefficiencies appear to drive overcrowding in pediatric emergency departments.[11],[12] Studies of overcrowding in pediatric emergency departments have identified important effects on quality of care, including delays in timely use of pain assessment scores for injuries, antibiotic administration for febrile neonates, analgesia for sickle cell crises or long bone fracture, and timely treatment of asthma.[13]–[15] Evidence supporting an association between measures of crowding in the pediatric emergency department and patient outcomes or impact on health care use, however, is lacking.

This study explores the association between crowding in the pediatric emergency department at the time of patient arrival and hospital admission within 7 days or death within 14 days of discharge from an index visit, as well as rates of hospital admission at index visit and return visits to the emergency department within 7 days of emergency department discharge across 8 pediatric emergency departments in Canada.

Methods

Study design, population and setting

We conducted a retrospective cohort study of all patient visits to 8 Canadian pediatric emergency departments from Jan. 1, 2010, to Dec. 31, 2014, inclusive. All study sites are tertiary care pediatric emergency departments (study sites are listed in Appendix 1, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.181426/-/DC1) in 4 provinces (British Columbia, Alberta, Manitoba and Ontario) that treat an average of 30 000–60 000 children annually. We included all emergency department visits of patients younger than 18 years, without exclusion. Of note, data for pediatric emergency departments in Ontario included only visits associated with an Ontario Health Insurance Plan number. We obtained de-identified visit-level data (visitors from abroad or surrounding provinces were not captured).

We defined an index visit as one with no prior visit within 7 days. For each index visit, we obtained demographic information (age in years and sex), visit characteristics (acuity level categorized by the pediatric Canadian Triage and Acuity Scale [CTAS],[16] date and time of arrival), emergency department disposition (admitted or discharged), and outcomes after emergency department discharge (return visits to the emergency department, hospital admission and death).

Exposure variable

Our measure of crowding in the pediatric emergency department was the mean departmental length of stay, defined for each index visit to the pediatric emergency department as the mean length of stay for all patients who arrived at the pediatric emergency department within 8 hours before the index patient's arrival, excluding those who left without being seen. Length of stay was defined as the period from earliest recorded arrival time to the pediatric emergency department (registration or triage based on each site's recording practice) until departure. Although many factors contribute to overcrowding, length of stay is commonly used as a measure of crowding because it reflects the combined results of volume surges, increased resource demands and throughput delays.[10],[11],[17]–[19]

Outcome measures

The primary measure of adverse outcomes was either hospital admission within 7 days to one of the study sites or death within 14 days of an index visit among those discharged home or who left without being seen. Secondary measures of adverse outcomes included (a) hospital admission at the index visit and (b) return visits to the emergency department (scheduled or unscheduled) within 7 days of the index visit if the patient was discharged or left without being seen. We also reported measures of use at each study site over the 5-year study period (total volumes stratified by acuity level). All outcomes were evaluated by triage acuity, grouped as high (CTAS score 1–2), medium (CTAS score 3) and low (CTAS score 4–5). The CTAS is a validated scale used for triage in emergency departments across Canada to stratify patient acuity, risk and care needs based on presenting signs and symptoms.[15] Categories of the CTAS include 1 (resuscitation; e.g., cardiac arrest), 2 (emergent; e.g., severe asthma), 3 (urgent; e.g., abdominal pain), 4 (less urgent; e.g., upper respiratory tract infection) and 5 (nonurgent; e.g., benign rash).

Data sources

Province-level administrative databases were available for 3 (Alberta, Manitoba and Ontario) of the 4 provinces, which allowed us to capture outcomes within the regions even if they did not occur at the original site. In BC, data were limited to the single pediatric emergency department, thus return visits to the emergency department, hospital admission and death at another site within the region were not captured. Data differed among provinces with regard to mortality: in Ontario, complete vital statistics data (death anywhere, not just in hospital) were used, whereas only in-hospital mortality data were available from the other 3 provinces. Further details regarding data sources are available in Appendix 2, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.181426/-/DC1.

Statistical analysis

We used descriptive statistics to summarize visit characteristics and health care use by province. We used mixed-effects logistic regression to test the association between departmental length of stay before arrival and our outcomes for patients with low-, medium- and high-acuity visits. Models treated patients arriving during the same shift in each pediatric emergency department as a cluster and included a random intercept for each cluster. Based on empirical observations (spike in event rates in the group aged < 1 yr), a nonlinear adjustment for age was included in the models. For each study hospital, we analyzed the odds of hospital admission within 7 days or death within 14 days of discharge from the pediatric emergency department, odds and 95% confidence intervals (CIs) of hospital admission at the index visit, and odds of return visits to the emergency department within 7 days of discharge from the pediatric emergency department, with each hour increase in mean departmental length of stay before the index visit's arrival. For Alberta and Ontario, we pooled results from the multiple sites within each province using weights proportioned to the number of visits to obtain summary results for each province. Similarly, analyses combining provinces used weights proportional to the number of visits analyzed in each province. Age, sex, acuity (CTAS score), shift of arrival (day, evening or night) and season of arrival were included as potential confounders. The inclusion of season, however, led to problems with convergence during model fitting, and in cases where convergence was not a problem, it did not change the results. Hence, we excluded season in the final models. Only available data for each variable were analyzed. Given the large pool of data, and the low rate of missing data, we did not conduct sensitivity analyses. We did not adjust for multiple comparisons.

Ethics approval

Research ethics board reviews were conducted, and approvals were obtained for all participating sites.

Of note, because BC and Manitoba have only 1 pediatric emergency department each, data from these sites were identifiable. We engaged pediatric emergency department leadership from both sites, and neither had reservations about publishing the results.

Results

During the study period, a total of 1 931 465 index visits occurred across study sites. The 4 provinces had an annual average of 386 293 index visits to pediatric emergency departments, and almost 90% were triaged as CTAS 3 or 4 (equally divided). We noted missing data in less than 2% of visits in each province. We observed modest variations in the proportion of visits resulting in hospital admission or the patient leaving without being seen at the index visit, with no clear pattern in median length of stay. Details by province

and year are reported in Appendix 3, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.181426/-/DC1. The mean departmental length of stay varied both across and within provinces (Table 1). Across provinces, the mean length of stay ranged from 2.9 hours to 3.6 hours; within provinces, standard deviations ranged from 0.9 to 1.3 hours.

Table 1: Distribution of departmental length of stay during 8-hour periods before arrival index within and across provinces (2010–2014)

Province	Length of stay, hr	
	Mean ± SD	Median (IQR)
Ontario	3.6 ± 1.1	3.5 (2.9–4.2)
Manitoba	2.9 ± 1.3	2.8 (2.3–3.4)
Alberta	3.4 ± 0.9	3.2 (2.7–3.9)
British Columbia	3.5 ± 0.9	3.5 (2.9–4.1)

1 Note: IQR = interquartile range, SD = standard deviation.

Overall, the prevalence of adverse outcomes was low: 0.8% to 1.5% of index visits to the emergency department resulted in hospital admission within 7 days of emergency department discharge. Mortality within 14 days of emergency department discharge was rare at less than 10 per 100 000 visits to the pediatric emergency department (Table 2). Figure 1 depicts the crude rate of all outcomes by level of exposure to overcrowding in the pediatric emergency department.

Table 2: Outcomes of pediatric emergency department visits

Outcome	No. (%) [*]			
	Ontario	Manitoba	Alberta	British Columbia
No. of index visits† (2010–2014)	830 950	224 977	508 234	192 555
No. discharged at index visits	756 034	207 902	466 479	176 833
Index hospital admission	74 845 (9.0)	16 895 (7.5)	41 679 (8.2)	15 717 (8.2)
Hospital admission within 7 days of ED discharge	12 579 (1.5)	2018 (1.0)	4319 (0.8)	1957 (1.1)
Mortality within 14 days of ED discharge (per 100 000)	39 (4.7)	< 6‡	25 (4.9)	13 (7.4)
Return ED visit within 7 days of ED discharge	75 343 (9.1)	20 992 (10.1)	43 473 (8.6)	15 680 (8.9)

- 2 Note: ED = emergency department.
- 3 ^{*}Unless stated otherwise.
- 4 †Includes only the first visit within a 7-day period.
- 5 ‡No rates reported for low counts.

Graph: Figure 1: Crude rate of outcomes by mean departmental length of stay (LOS) in the 8 hours before index arrival. Note: CTAS = Canadian Triage and Acuity Scale.

The association between crowding in the pediatric emergency department and the odds of hospital admission within 7 days or mortality within 14 days of discharge from the index visit varied by acuity of the index visit and between sites. Nine of the 12 analyses (4 provinces $\times$ 3 acuity groups) yielded point estimates showing a positive association between crowding in the pediatric emergency department and hospital admission within 7 days or death within 14 days of discharge from the index visit. However, the magnitudes of the odds ratios (ORs) were relatively modest (from 1.02 to 1.03 per hour across provinces for high-acuity visits, from 0.99 to 1.02 per hour for medium-acuity visits, and from 0.98 to 1.11 per hour for low-acuity visits) and all of the 95% CIs touched or crossed 1.0 (Figure 2). In further analysis using only hospital admission within 7 days as the outcome (i.e., excluding mortality), the results were nearly identical, likely because deaths were rare and contributed negligibly to the total number of composite outcomes.

Graph: Figure 2: Odds of hospital admission within 7 days or mortality within 14 days of discharge from the pediatric emergency department, by triage acuity, with increasing departmental mean length of stay in the 8 hours before arrival. Note: CI = confidence interval, CTAS = Canadian Triage and Acuity Scale.

Ten of the 12 analyses yielded point estimates showing a positive association between crowding in the pediatric emergency department and admission at the index visit. The magnitude of the ORs varied substantially across provinces, from 1.01 to 1.08 per hour in the high-acuity group to 0.99 to 1.04 per hour in the medium-acuity group (Figure 3). Similarly, 10 of the 12 analyses yielded point estimates showing a positive association between crowding in the pediatric emergency department and a return visit within 7 days of the index visit. The magnitude of these associations overall was also modest and significant only in the low-acuity group (Figure 4).

Graph: Figure 3: Odds of hospital admission at index visit to the pediatric emergency department with increasing departmental mean length of stay in the 8 hours before arrival. Note: CI = confidence interval, CTAS = Canadian Triage and Acuity Scale.

Graph: Figure 4: Odds of returning to the pediatric emergency department within 7 days of discharge with increasing departmental mean length of stay in the 8 hours before arrival. Note: CI = confidence interval, CTAS = Canadian Triage and Acuity Scale.

Interpretation

In our multicentre cohort study of visits to the pediatric emergency department, we found no significant association between measures of crowding and either hospital admission within 7 days or mortality within 14 days after discharge. We did, however, observe an increase in the odds of hospital admission at the index visit with increasing departmental length of stay among the sickest children (CTAS score 1–3) and in return visits to the emergency department in the low-acuity group.

This study's main strength is its use of large data sets from multiple health regions in Canada. The multiprovincial data set provides an opportunity to explore the consistency, strength and variability of associations between emergency department crowding and adverse effects on measures of patient outcomes across different environments.

Studies in mixed or adult emergency departments have shown an association between crowding and increased mortality or excess hospital admission.[2],[9],[20]–[22] The most comparable previous studies are those of Guttmann and colleagues from Ontario and our group's earlier single-centre study in BC.[10],[23] In their study of emergency department visits in a mostly adult sample (including children, but without separate analyses), Guttmann and colleagues observed ORs of 1.8 to 2.0 for hospital admission and mortality among patients discharged during shifts with a mean length of stay of 6 hours or longer compared with those with a mean length of stay of less than 1 hour.[10] The total sample of that study was larger than our individual provincial samples, and mortality in their mixed population study was 14-fold higher than in our pediatric emergency department population (70/100 000 v. 5/100 000). Owing to the low mortality rate in children in general, our primary outcome was driven by hospital admission after discharge, which was also lower than that of the Ontario study, though more comparable (1.3% v. 1.8%), rather than mortality. In our group's prior single-centre pediatric emergency department study, we found an association between measures of crowding and odds of hospital admission at the index visit.[23]

The 2 earlier studies used a different measure of crowding that introduced the possibility of reverse causality. Although both used departmental mean length of stay, this was derived for the shift of the index patient's arrival, excluding that patient's own length of stay. The potential flaw in using this definition and the challenge it creates for interpreting causality relates to the timing of the index patient arrival within that shift and the resources required for that individual patient. For example, if index patient A arrived at the beginning of an uncrowded shift and required substantial resources, the mean shift length of stay for all others arriving after patient A would increase, and some patients might leave without being seen. In this example, the measures of crowding assigned to patient A (mean shift length of stay, left without being seen) are inflated by their own contribution to emergency department resource use. Moreover, if patient A was eventually admitted to the intensive care unit (an adverse outcome), the observed positive association between exposure and outcome might represent reverse causality. To address this problem, our current study used mean length of stay of all patients in the pediatric emergency department for the 8 hours preceding the index visitor's arrival to ensure the exposure was measured in a consistent way for all index visits irrespective of arrival time and to mitigate the potential for reverse causality.

Whereas recent literature on pediatric emergency care describing the impact of emergency department crowding has focused largely on quality-of-care measures,[13]–[15],[24],[25] our study adds new findings related to health care use. We observed an association between crowding in the pediatric emergency department and the odds of hospital admission at the index visit among high-acuity patients (CTAS-1 and CTAS-2) across 3 of 4 provinces. Possible explanations include a delay in timely initiation of medical interventions that could lead to deterioration requiring hospital admission; alternatively, clinicians may respond to emergency department crowding with rising levels of caution in their disposition decision-making. Although the underlying cause of this association cannot be determined from this study, this association represents a previously undescribed impact of crowding on health care use with substantial cost implications.

Finally, although the volume of emergency department visits increased annually across the 5-year study period, the overall length of stay remained stable. Potential explanations include operational and staffing adjustments during the study period. Some sites, for example, increased emergency department capacity and others enrolled in provincial fee-for-performance programs targeting length of stay or waiting time. In Alberta, a second emergency department staffed by clinicians from the pediatric emergency department opened in Calgary in 2013, resulting in additional staffing that may have affected the length of stay at the existing hospitals. In Ontario, 3 of the 4 sites participated in the Emergency Room Wait Time Strategy program (starting in 2009/10),[26] which provided funding to increase emergency departments' capacity to meet specific length-of-stay benchmarks. The sites in BC and Manitoba were not involved in any provincial initiatives to increase emergency department capacity and had only minimal changes in staffing coverage during the study period.

Limitations

The main limitations of the study are the retrospective design and use of administrative databases, which depend on the accuracy of entered data and are limited in detail. Administrative databases do not capture other exposure variables that may confound the association between crowding and negative patient outcomes. For example, variability in emergency department clinicians' adherence to available evidence-based clinical guidelines, risk tolerance, clinical decision-making and efficiency may affect both emergency department crowding and patient outcomes.[27]–[29] Another variable of interest, which we could not access for this study, was inpatient hospital occupancy rates at the time of emergency department index arrival. The impact of not including these variables as potential confounders is difficult to estimate, as no prior studies have reported on their association with emergency department length of stay and clinical outcome measures.

Although we report pooled estimates, differences in health care systems, populations served, and variations in practice and data elements across provinces raise concerns about whether the models estimate a common parameter across sites, and use of a single summary estimate of association may not be appropriate given this heterogeneity.

We acknowledge that the data we used are old and varied in availability across provinces; this reflects challenges and time required to obtain multiprovince data in light of specific privacy and ethics requirements at each site and health authority. However, limited epidemiologic studies have not shown a change in the rate of pediatric emergency department

use or CTAS distribution (as a measure of acuity) in the last decade.

Conclusion

Although we did not find a significant association between crowding in the pediatric emergency department and hospital admission within 7 days or mortality within 14 days after discharge, we identified an association between hospital admission at index emergency department visit among high-acuity visits, as well as return visits within 7 days among low-acuity visits with increasing emergency department crowding. Prior reports of the association between emergency department crowding and poor patient outcomes have been limited to the adult population. Our observed associations suggest that crowding in the pediatric emergency department has implications for use of health services.

Acknowledgements

This study made use of de-identified data from the ICES Data Repository, which is managed by ICES with support from its funders and partners: Canada's Strategy for Patient-Oriented Research (SPOR), the Ontario SPOR SUPPORT (Support for People and Patient-Oriented Research and Trials) Unit, the Canadian Institutes of Health Research and the Government of Ontario. The opinions, results and conclusions reported are those of the authors. No endorsement by ICES or any of its funders or partners is intended or should be inferred. Parts of this material are based on data and information compiled and provided by the Canadian Institute for Health Information (CIHI). However, the analyses, conclusions, opinions and statements expressed herein are those of the authors, and not necessarily those of CIHI. The authors would also like to acknowledge the contribution of the data analysts and custodians from all 4 provinces as outlined in Appendix 2.

Footnotes

1 Competing interests: Quynh Doan reports a Scholars Award from the Michael Smith Foundation for Health Research during the conduct of the study. No other competing interests were declared.

2 This article has been peer reviewed.

3 Contributors: All authors contributed to the study design (exposure and outcome measure conceptualization). Quynh Doan, Antonia Stang, Andrew Dixon, Scott Sawyer, Tania Principi, April Kam and Astrid Guttmann contributed to the data acquisition. Hubert Wong performed the data analysis. Quynh Doan, Hubert Wong, Garth Meckler, David Johnson, Antonia Stang, Andrew Dixon, Scott Sawyer, Tania Principi, Gary Joubert, Jocelyn Gravel, Mona Jabbour and Astrid Guttmann contributed to the data interpretation. Quynh Doan drafted the manuscript, which all authors revised. All of the authors approved the final version to be published and agreed to be accountable for all aspects of the work.

4 Funding: This project was supported by an establishment award provided to Quynh Doan by the BC Children's Hospital Research Institute.

5 Data sharing: None of the data used in this study can be shared by the investigators. However, access to the Ontario data may be requested from ICES by other researchers by following the procedures detailed at www.ices.on.ca/DAS/Submitting-your-request.

6 Disclaimer: This study was supported by ICES, which is funded by an annual grant from the Ontario Ministry of Health and Long-Term Care (MOHLTC). The opinions, results and conclusions reported in this paper are those of the authors and are independent from the funding sources. No endorsement by ICES or the Ontario MOHLTC is intended or should be inferred.

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By Quynh Doan; Hubert Wong; Garth Meckler; David Johnson; Antonia Stang; Andrew Dixon; Scott Sawyer; Tania Principi; April J. Kam; Gary Joubert; Jocelyn Gravel; Mona Jabbour and Astrid Guttmann

Reported by Author; Author; Author; Author; Author; Author; Author; Author; Author; Author; Author; Author

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**Source:** CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne, 2019 Jun 10, Vol. 191 Issue 23, pE627

**Item:** 31182457

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## Record: 36

**Title:** A Comprehensive View of Parental Satisfaction With Pediatric Emergency Department Visits.

**Authors:** Byczkowski, Terri L.<sup>1</sup> [terri.byczkowski@cchmc.org](mailto:terri.byczkowski@cchmc.org)

Fitzgerald, Michael<sup>1</sup>

Kennebeck, Stephanie<sup>1</sup>

Vaughn, Lisa<sup>1</sup>  
Myers, Kurt<sup>1</sup>  
Kachelmeyer, Andrea<sup>1</sup>  
Timm, Nathan<sup>1</sup>

**Source:** Annals of Emergency Medicine. Oct2013, Vol. 62 Issue 4, p340-350. 11p.

**Document Type:** Article

**Abstract:** Study objective: We develop a comprehensive view of aspects of care associated with parental satisfaction with pediatric emergency department (ED) visits, using both quantitative and qualitative data. Methods: This was a retrospective observational study using data from an institution-wide system to measure patient satisfaction. For this study, 2,442 parents who brought their child to the ED were interviewed with telephone survey methods. The survey included closed-ended (quantitative) and open-ended (qualitative data) questions, in addition to a cognitive interview–style question. Results: Overall parental satisfaction was best predicted by how well physicians and nurses work together, followed by wait time and pain management. Issues concerning timeliness of care, perceived quality of medical care, and communication were raised repeatedly by parents in response to open-ended questions. A cognitive interview–style question showed that physicians and nurses sharing information with each other, parents receiving consistent and detailed explanations of their child's diagnosis and treatments, and not having to answer the same question repeatedly informed parent perceptions of physicians and nurses working well together. Staff showing courtesy and respect through compassion and caring words and behaviors and paying attention to nonmedical needs are other potential satisfiers with emergency care. Conclusion: Using qualitative data to augment and clarify quantitative data from patient experience of care surveys is essential to obtaining a complete picture of aspects of emergency care important to parents and can help inform quality improvement work aimed at improving satisfaction with care. [Copyright &y& Elsevier]

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**Author Affiliations:** <sup>1</sup>Division of Emergency Medicine, Cincinnati Children's Hospital Medical Center, University of Cincinnati College of Medicine, Cincinnati, OH

**ISSN:** 0196-0644

**DOI:** 10.1016/j.annemergmed.2013.04.025

**Accession Number:** 90273541

**Database:** Supplemental Index

**Title:** Children's Mental Health Visits to the Emergency Department: Factors Affecting Wait Times and Length of Stay.

**Authors:** Newton, Amanda S.

Rathee, Sachin

Grewal, Simran

Dow, Nadia

Rosychuk, Rhonda J.

**Source:** Emergency Medicine International; 2014, p1-10, 10p

**Publication Year:** 2014

**Document Type:** Article

**Abstract:** Objective. This study explores the association of patient and emergency department (ED) mental health visit characteristics with wait time and length of stay (LOS). Methods. We examined data from 580 ED mental health visits made to two urban EDs by children aged  $\leq 18$  years from April 1, 2004, to March 31, 2006. Logistic regressions identified characteristics associated with wait time and LOS using hazard ratios (HR) with 95% confidence intervals (CIs). Results. Sex (male: HR = 1.48, 95% CI = 1.20-1.84), ED type (pediatric ED: HR = 5.91, 95% CI = 4.16-8.39), and triage level (Canadian Triage and Acuity Scale (CTAS) 2: HR = 3.62, 95% CI = 2.24-5.85) were statistically significant predictors of wait time. ED type (pediatric ED: HR = 1.71, 95% CI = 1.18-2.46), triage level (CTAS 5: HR = 2.00, 95% CI = 1.15-3.48), number of consultations (HR = 0.46, 95% CI = 0.31-0.69), and number of laboratory investigations (HR = 0.75, 95% CI = 0.66-0.85) predicted LOS. Conclusions. Based on our results, quality improvement initiatives to reduce ED waits and LOS for pediatric mental health visits may consider monitoring triage processes and the availability, access, and/or time to receipt of specialty consultations. [ABSTRACT FROM AUTHOR]

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**ISSN:** 20902840

**DOI:** 10.1155/2014/897904

**Accession Number:** 100519543

**Database:** Complementary Index

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**Record: 38**

**Title:** Leaving the paediatric emergency department without being seen: Understanding the patient and the risks.

**Authors:** Ng, Yvonne<sup>1</sup>  
Lewena, Stuart<sup>2</sup>

**Source:** Journal of Paediatrics & Child Health. Jan2012, Vol. 48 Issue 1, p10-15. 6p. 1 Diagram, 1 Chart, 1 Graph.

**Document Type:** Article

**Subject Terms:** \*PEDIATRIC emergency services  
\*HEALTH risk assessment  
\*CHILDREN'S health  
\*JUVENILE diseases  
\*HOSPITAL emergency services

**NAICS/Industry Codes:** 923120 Administration of Public Health Programs

**Abstract:** Aim: The aim of this study is to examine the left-without-being-seen (LWBS) patient population of a tertiary paediatric emergency department (ED) to provide quality assurance and risk management data. Methods: This is a prospective observational study of patients who LWBS after presenting to the Royal Children's Hospital Melbourne ED between July and November 2005. Information was collected from electronic databases and follow-up telephone interviews performed by the principal investigator 3-5 days after the presentation. Results: Over the 17-week study period, 7.6% of attendances were recorded as having LWBS. These patients and their presentations resembled the general ED population in many respects. However, there were several significant differences, particularly in relation to age, insurance status, mode of arrival, referral status, arrival time and illness severity. Most families (74%) indicated they would have been equally happy to visit a general practitioner instead had one been available. Prolonged waiting times and recognition that their child's illness was not severe were the most frequent reasons for leaving. Most parents subsequently accessed alternate health care or were planning to do so, and the majority stated their child's illness was improving. Parents maintained a surprisingly positive attitude to their ED presentation. Conclusion: The individual risks associated with leaving the ED before a child has been medically assessed are small. However, when multiplied several thousandfold as a function of the frequency of LWBS patients, the chance of serious adverse events becomes real. Potential risk management strategies include decreasing absolute LWBS numbers by addressing ED overcrowding and providing alternate sources for non-urgent care.  
[ABSTRACT FROM AUTHOR]

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**Author Affiliations:** <sup>1</sup>St Vincent's Hospital

<sup>2</sup>Royal Children's Hospital, Murdoch Children's Research Institute and The University of Melbourne, Melbourne, Victoria, Australia

**ISSN:** 1034-4810**DOI:** 10.1111/j.1440-1754.2011.02187.x**Accession Number:** 70360104**Database:** Academic Search Index

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**Record: 39****Title:** Racial/Ethnic Differences in Pediatric Emergency Department Wait Times**Authors:** Johnson, Tiffani J.

Goyal, Monika K.

Lorch, Scott A.

Chamberlain, James M.

Bajaj, Lalit

Alessandrini, Evaline A.

Simmons, Timothy

Casper, T. Charles

Olsen, Cody S.

Grundmeier, Robert W.

Alpern, Elizabeth R.

**Source:** *Pediatric Emergency Care*. Feb 01, 2022 38(2):e929-e935**Publication Year:** 2022

**Description:** OBJECTIVES: Wait time for emergency care is a quality measure that affects clinical outcomes and patient satisfaction. It is unknown if there is racial/ethnic variability in this quality measure in pediatric emergency departments (PEDs). We aim to determine whether racial/ethnic differences exist in wait times for children presenting to PEDs and examine between-site and within-site differences. METHODS: We conducted a retrospective cohort study for PED encounters in 2016 using the Pediatric Emergency Care Applied Research Network Registry, an aggregated deidentified electronic health registry comprising 7 PEDs. Patient encounters were included among all patients 18 years or younger at the time of the ED visit. We evaluated differences in emergency department wait time (time from arrival to first medical evaluation) considering patient race/ethnicity as the exposure. RESULTS: Of 448,563 visits, median wait time was 35 minutes (interquartile range, 17–71 minutes). Compared with non-Hispanic White (NHW) children, non-Hispanic Black (NHB), Hispanic, and other race children waited 27%, 33%, and 12% longer, respectively. These differences were attenuated after adjusting for triage acuity level, mode of arrival, sex, age, insurance, time of day, and month [adjusted median wait time ratios (95% confidence intervals): 1.11 (1.10–1.12) for NHB, 1.12 (1.11–1.13)

for Hispanic, and 1.05 (1.03–1.06) for other race children compared with NHW children]. Differences in wait time for NHB and other race children were no longer significant after adjusting for clinical site. Fully adjusted median wait times among Hispanic children were longer compared with NHW children [1.04 (1.03–1.05)]. CONCLUSIONS: In unadjusted analyses, non-White children experienced longer PED wait times than NHW children. After adjusting for illness severity, patient demographics, and overcrowding measures, wait times for NHB and other race children were largely determined by site of care. Hispanic children experienced longer within-site and between-site wait times compared with NHW children. Additional research is needed to understand structures and processes of care contributing to wait time differences between sites that disproportionately impact non-White patients.

**Language:** English

**Author Affiliations:** From the \*University of California, Davis Medical Center, Sacramento, CA †Children's National Health System, The George Washington University, Washington, DC ‡Children's Hospital of Philadelphia, University of Pennsylvania, Philadelphia, PA §University of Colorado, Children's Hospital, Aurora, CO ||Cincinnati Children's Hospital Medical Center, UC Health, Cincinnati, OH ¶University of Utah # Myriad Genetics, Inc, Salt Lake City, UT \*\*Ann & Robert H. Lurie Children's Hospital of Chicago, Northwestern University, Chicago, IL.

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[T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=%2210.1097/PEC.0000000000002483%22.di](http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=%2210.1097/PEC.0000000000002483%22.di)

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**Accession Number:** edsovi.10.1097.PEC.0000000000002483

**Database:** Journals@OVID

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## Record: 40

**Title:** The impact of pediatric emergency department crowding on patient and health care system outcomes: a multicentre cohort study.

**Authors:** Doan, Quynh

Wong, Hubert

Meckler, Garth

Johnson, David

Stang, Antonia

Dixon, Andrew

Sawyer, Scott

Principi, Tania  
Kam, April J.  
Joubert, Gary  
Gravel, Jocelyn  
Jabbour, Mona  
Guttmann, Astrid  
for Pediatric Emergency Research Canada (PERC)

**Source:** Canadian Medical Association Journal (CMAJ); 6/10/2019, Vol. 191 Issue 23, pE627-E635, 9p, 5 Charts, 1 Graph

**Publication Year:** 2019

**Subject Terms:** HOSPITAL emergency services  
PEDIATRIC emergencies  
MEDICAL care  
COHORT analysis  
CHILD mortality

**Document Type:** journal article

**Abstract:** **Background:** Emergency department overcrowding has been associated with increased odds of hospital admission and mortality after discharge from the emergency department in predominantly adult cohorts. The objective of this study was to evaluate the association between crowding and the odds of several adverse outcomes among children seen at a pediatric emergency department. **Methods:** We conducted a retrospective cohort study involving all children visiting 8 Canadian pediatric emergency departments across 4 provinces between 2010 and 2014. We analyzed the association between mean departmental length of stay for each index visit and hospital admission within 7 days or death within 14 days of emergency department discharge, as well as hospital admission at index visit and return visits within 7 days, using mixed-effects logistic regression modelling. **Results:** A total of 1 931 465 index visits occurred across study sites over the 5-year period, with little variation in index visit hospital admission or median length of stay. Hospital admission within 7 days of discharge and 14-day mortality were low across provinces (0.8%-1.5% and < 10 per 100 000 visits, respectively), and their association with mean departmental length of stay varied by triage categories and across sites but was not significant. There were increased odds of hospital admission at the index visit with increasing departmental crowding among visits triaged to Canadian Triage and Acuity Scale (CTAS) score 1-2 (odds ratios [ORs] ranged from 1.01 to 1.08) and return visits among patients with a CTAS score of 4-5 discharged at the index visit at some sites (ORs ranged from 1.00 to 1.06). **Interpretation:** Emergency department crowding was not significantly associated with hospital admission within 7 days of the emergency department visit or mortality in children. However, it was associated with increased hospital admission at the index visit for the sickest children, and with return visits to the emergency department for those less sick. [ABSTRACT FROM AUTHOR]

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**Accession Number:** 136986220

**Database:** Complementary Index

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## Record: 41

**Title:** PATIENT REFERRAL PATHWAYS TO ACCIDENT AND EMERGENCY DEPARTMENT AND ITS IMPACT ON PATIENT WAITING TIME.

**Authors:** Ghias, M.  
Varghese, M.

**Source:** CHEST; 2020 Supplement, Vol. 157, pA324-A324, 1p

**Publication Year:** 2020

**Subject Terms:** MEDICAL care wait times  
MEDICAL referrals  
HOSPITAL emergency services

**Document Type:** Article

**Abstract:** B TYPE: b Abstract Publication B TOPIC: b Pediatrics B PURPOSE: b Number of children attending the paediatric accident and emergency (A&E) department has seen an increase over the years. To study patient referral pathways in Accident & Emergency(A&E) department and their impact on patient waiting time. [Extracted from the article]

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**ISSN:** 00123692

**DOI:** 10.1016/j.chest.2020.05.393

**Accession Number:** 144622214

**Database:** Complementary Index

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**Record: 42**

**Title:** The Waiting Room Assessment to Virtual Emergency Department pathway: Initiating video-based telemedicine in the pediatric emergency department.

**Authors:** Osmanlliu, Esli  
Gagnon, Isabelle  
Weber, Saskia  
Bach, Chi Quan  
Turnbull, Jennifer  
Seguin, Jade

**Source:** Journal of Telemedicine & Telecare; Jul2022, Vol. 28 Issue 6, p452-457, 6p

**Publication Year:** 2022

**Author-Supplied Keywords:** Emergency medicine  
pediatrics  
telehealth  
telemedicine

**Document Type:** Article

**Abstract:** The COVID-19 pandemic has presented pediatric emergency departments with unique challenges, resulting in a heightened demand for adapted clinical pathways. In response to this need, the Montreal Children's Hospital pediatric emergency department introduced the WAVE (Waiting Room Assessment to Virtual Emergency Department) pathway, a video-based telemedicine pathway for selected non-critical patients, aiming to reduce safety issues related to emergency department overcrowding, while providing timely care to all children presenting and registering at our emergency department. The objective of the WAVE pilot phase was to evaluate the feasibility and acceptability of telemedicine in our pediatric emergency department, which was previously unfamiliar with this mode of care delivery. During the six-week, three-evening per week deployment, we conducted 18 five-hour telemedicine shifts. In total, 27 patients participated in the WAVE pathway. Results from this pilot phase met four of five a priori feasibility and acceptability criteria. Overall, participating families were satisfied with this novel care pathway and reported no disruptive technological barriers. [ABSTRACT FROM AUTHOR]

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**ISSN:** 1357633X

**DOI:** 10.1177/1357633X211044038

**Accession Number:** 156993712

**Database:** Complementary Index

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## Record: 43

**Title:** An Analysis of Waiting Times in a Pediatric Emergency Department.

**Authors:** Liptak, Gregory S.

Super, Dennis M.

Baker, Nancy

Roghmann, Klaus J.

**Source:** Clinical Pediatrics; Apr1985, Vol. 24 Issue 4, p202-209, 8p

**Publication Year:** 1985

**Subject Terms:** PEDIATRIC emergency services

HOSPITAL emergency services

EMERGENCY medical services

CHILD health services

WAITING rooms

MEDICAL centers

**NAICS/Industry Codes:** NAICS/Industry Codes 624230 Emergency and Other Relief Services

913130 Municipal police services

621498 All Other Outpatient Care Centers

621491 HMO Medical Centers

**Document Type:** Article

**Abstract:** Waiting times in a pediatric emergency department were studied using direct observations of patients and health providers on 14 separate days. The mean waiting time (from entry to first physician contact) of the 216 children studied was 49 minutes. Time spent in the waiting room was increased by both the nonavailability of a nurse and the nonavailability of an examining room, and was decreased by the severity of the patient's illness. Time spent in the examination room waiting for the physician was related to the availability of the physician and the

number of patients concurrently registered in the emergency department as well as the severity of their complaint. Recommendations for decreasing waiting time, based on the observations, are made. Although each setting is unique, the study provides a model for the analysis of waiting patterns in similar facilities. [ABSTRACT FROM AUTHOR]

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**ISSN:** 00099228

**DOI:** 10.1177/000992288502400405

**Accession Number:** 16810757

**Database:** Complementary Index

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## Record: 44

**Title:** Patient experience in the pediatric emergency department: do parents and children feel the same?

**Authors:** Parra C; Pediatric Emergency Department, Hospital Sant Joan de Déu Barcelona, Passeig Sant Joan de Déu, 2, 08950 Esplugues de Llobregat, Barcelona, Spain. cparra@hsjdbcn.org.

Vidiella N; Pediatric Emergency Department, Hospital Sant Joan de Déu Barcelona, Passeig Sant Joan de Déu, 2, 08950 Esplugues de Llobregat, Barcelona, Spain.

Marin I; Pediatric Emergency Department, Hospital Sant Joan de Déu Barcelona, Passeig Sant Joan de Déu, 2, 08950 Esplugues de Llobregat, Barcelona, Spain.

Trenchs V; Pediatric Emergency Department, Hospital Sant Joan de Déu Barcelona, Passeig Sant Joan de Déu, 2, 08950 Esplugues de Llobregat, Barcelona, Spain.

Luaces C; Pediatric Emergency Department, Hospital Sant Joan de Déu Barcelona, Passeig Sant Joan de Déu, 2, 08950 Esplugues de Llobregat, Barcelona, Spain.

**Source:** European journal of pediatrics [Eur J Pediatr] 2017 Sep; Vol. 176 (9), pp. 1263-1267. *Date of Electronic Publication:* 2017 Jul 01.

**Publication Type:** Journal Article

**Language:** English

**Journal Info:** *Publisher:* Springer Verlag *Country of Publication:* Germany *NLM ID:* 7603873 *Publication Model:* Print-Electronic *Cited Medium:* Internet  
*ISSN:* 1432-1076 (Electronic) *Linking ISSN:* 03406199 *NLM ISO Abbreviation:* Eur J Pediatr *Subsets:* MEDLINE

**Imprint Name(s):**

*Publication:* Berlin : Springer Verlag

*Original Publication:* Berlin, New York, Springer-Verlag.

**MeSH Terms:** Health Care Surveys\*

Emergency Service, Hospital/\*statistics & numerical data

Parents/\*psychology

Patient Satisfaction/\*statistics & numerical data

Adolescent ; Child ; Female ; Humans ; Male ; Patient-Centered Care ; Time-to-Treatment

**Abstract:** The objectives are to describe the experience of children and parents in a pediatric emergency service (PED) and to determine whether there are differences of opinion between the two groups. This was a descriptive study. A questionnaire was designed based on the Picker questionnaire on the patient experience. From July through December 2015, a survey was made of the children aged 8-18 treated in the PED, as well as of their parents. The proportion of dissatisfaction was determined. A total of 514 questionnaires (257 children, 257 parents) were completed. The most poorly rated aspects according to the children and parents were the entertainment activities (43.2%), the waiting time (23.7%), and the treatment for pain (10.5%). Differences were detected in the experiences of the children and the parents regarding the overlong waiting time (28.0% children vs 19.5% parents;  $p = 0.023$ ), inadequate explanations (7.0 vs 1.6%,  $p = 0.002$ ), inadequate treatment for pain (14.4 vs 6.6%;  $p = 0.004$ ), and insufficient privacy (11.7 vs 2.7%;  $p < 0.001$ ).

**Conclusion:** The entertainment activities during the wait and the waiting time are the two elements viewed most negatively by the children and the parents. The children tend to evaluate certain aspects of their experience as patients more negatively, which needs to be borne in mind in order to improve the attention provided. What is Known: • Studying the experience of patients is a key point in patient-centered medicine. • The experience of the pediatric patient has been little studied to date. The experience of the children is often inferred from that of their parents. Nevertheless, the experience of the children as patients might be different. What is New: • Overall, the experience of children and parents in the pediatric emergency department in the study is positive. Some aspects of the experience in emergency are poorly rated by the children, such as the waiting time, the information provided, treatment for pain, and privacy during the visit. • The experience of the children (and not merely that of their parents) needs to be studied in order to improve those areas that are rated poorly do as to enrich the experience in the emergency department.

**References:** J Adolesc Health. 2010 Jul;47(1):92-8. (PMID: 20547297)  
Acad Emerg Med. 2000 Jun;7(6):695-709. (PMID: 10905652)  
Int J Qual Health Care. 2002 Oct;14(5):353-8. (PMID: 12389801)  
J Pediatr Health Care. 2005 Jul-Aug;19(4):221-9. (PMID: 16010261)  
Ann Emerg Med. 2013 Oct;62(4):340-50. (PMID: 23787210)  
Pediatr Emerg Care. 2010 Apr;26(4):257-73. (PMID: 20401971)  
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Arch Dis Child. 2013 Apr;98(4):247. (PMID: 23343521)  
Pediatr Emerg Care. 2012 Jul;28(7):633-9. (PMID: 22743752)  
Ann Emerg Med. 1996 Dec;28(6):657-65. (PMID: 8953956)  
Acad Pediatr. 2011 May-Jun;11(3 Suppl):S59-67. (PMID: 21570018)

**Contributed Indexing:** *Keywords:* Children; Emergency department; Patient experience; Satisfaction

**Entry Date(s):** *Date Created:* 20170703 *Date Completed:* 20180514 *Latest Revision:* 20181113

**Update Code:** 20250114

**DOI:** 10.1007/s00431-017-2954-4

**PMID:** 28669089

**Database:** MEDLINE Complete

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## Record: 45

**Title:** Preventing or accelerating emergency care for children with complex healthcare needs

**Authors:** Sutton, David  
Stanley, Paul  
Babl, Franz E  
Phillips, Fiona

**Source:** *Archives of Disease in Childhood*. Jan 01, 2008 93(1):17-22

**Publication Year:** 2008

**Description:** **OBJECTIVE::** A subgroup of children with special health care needs (CSHCN) have chronic and complex medical conditions and frequently attend the emergency department (ED). Some of these ED visits could be prevented through appropriate clinician advice or, if an ED visit is unavoidable, the management time could be decreased. We set out to determine whether an ED-based advice and coordination programme was feasible and could prevent or accelerate ED care for these patients. **METHODS, SETTING AND PATIENTS::** We identified CSHCN who frequently attended the ED at a large tertiary children's hospital. These patients were enrolled in an ED-based coordination programme, the Accelerated Care through Emergency (ACE) programme providing 24-hour mobile-phone access to experienced ED nurses. We prospectively tracked usage patterns and determined the rate of ED visits after receiving phone advice and the waiting time for patients to be seen in ED. Parental satisfaction and cost of the programme were also assessed. **RESULTS::** After a pilot phase in 2002, enrollment in the programme increased from 125 in 2003 to 220 patients in 2006. Patients had a broad range of medical conditions. All had two or more and up to 22 medical services involved in their care. 80% of patients used a technical device or implant. Phone calls increased from an initial average of 31 per month in 2003 (0.24 calls per participant) to 66 per month in 2006 (0.3 calls per participant), 60% of which were after

hours. The percentage of ED reviews per phone call dropped from an initial 74.2% (95% CI 55.2%–88.1%) in 2003 to 50.0% (95% CI 37.4%–62.5%) in 2006 ( $p = 0.02$ ). However, decreases in ED visits and admissions as a percentage of enrolled patients and as a percentage of phone calls to ACE staff were not statistically significant. Mean waiting time for enrolled patients remained below 30 minutes. Parent satisfaction with the programme was rated 8.3 on a 0–10 scale (0 meaning poor, 10 meaning excellent). The approximate cost of the programme per child was AU\$750 (£292) per year. **CONCLUSION::** We have developed a coordinated approach towards the provision of healthcare for a group of families with diverse severe chronic medical conditions who frequently present to the ED. Through a comprehensive programme including the development of patient-care plans, care coordination and 24-hour mobile-phone access we were able to enhance families' capacities to manage their children's conditions in the community.

**Language:** English

**Author Affiliations:** 1Emergency Department, Royal Children's Hospital, Melbourne, Victoria, Australia 2Murdoch Childrens Research Institute and University of Melbourne, Melbourne, Victoria, Australia

**ISSN:** 0003-9888

**DOI:** 10.1136/adc.2007.117960

**Availability:** <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=00000740-200801000-00008.an>

**Rights:** © 2008 BMJ Publishing Group Ltd and Royal College of Paediatrics and Child Health

**Accession Number:** edsovi.00000740.200801000.00008

**Database:** Journals@OVID

## Record: 46

**Title:** Patient dissatisfaction in a paediatric accident and emergency department.

**Authors:** Hanson R; Royal Alexandra Hospital for Children, Camperdown, NSW, Australia.  
Clifton-Smith B  
Fasher B

**Source:** Journal of quality in clinical practice [J Qual Clin Pract] 1994 Sep; Vol. 14 (3), pp. 137-43.

**Publication Type:** Journal Article

**Language:** English

**Journal Info:** *Publisher:* Published by Blackwell Scientific Publications on behalf of the Australian Council on Healthcare Standards [and] Australian Medical Association *Country of Publication:* Australia *NLM ID:* 9430670 *Publication Model:* Print *Cited Medium:* Print *ISSN:* 1320-5455 (Print) *Linking ISSN:* 13205455 *NLM ISO Abbreviation:* J Qual Clin Pract *Subsets:* MEDLINE

**Imprint Name(s):** *Original Publication:* [Carlton, Vic., Australia] : Published by Blackwell Scientific Publications on behalf of the Australian Council on Healthcare Standards [and] Australian Medical Association, c1994-

**MeSH Terms:** Emergency Service, Hospital/\*standards  
Hospitals, Pediatric/\*standards  
Patient Satisfaction/\*statistics & numerical data  
Quality of Health Care/\*standards  
Child ; Emergency Service, Hospital/statistics & numerical data ; Hospitals, Pediatric/statistics & numerical data ; Humans ; Infant ; New South Wales ; Seasons ; Time Factors

**Abstract:** This paper presents a review of the patient complaints and those who walked out prior to receiving care in the Accident and Emergency (A&E) Department of the Children's Hospital, Camperdown. The walkout rate was 1.7% (424/27,082) in 1992. Walkouts were greatest in winter when the department was busiest, peak period being between 2000 and 0200 hours. The waiting time was presented as the main reason for walking out. Most parents were prepared to wait the advertised waiting time before leaving. The presenting complaints of children who were not seen covered a spectrum of illnesses with the potential for significant morbidity. The majority, however, were triaged as non-urgent cases. Despite attempts to follow up on walkouts, the outcome for 53% of patients was unknown. Written complaints were fewer in number and tended to focus more on the quality of care (66.6%). There were few recorded compliments. With the increasing customer focus on health, greater attention needs to be given to system failures.

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**Update Code:** 20250114

**PMID:** 7981933

**Database:** MEDLINE Complete

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## Record: 47

**Title:** Association of Race/Ethnicity with Emergency Department Wait Times.

**Authors:** James, Catherine A.  
Bourgeois, Florence T.  
Shannon, Michael W.

**Source:** Pediatrics. Mar2005, Vol. 115 Issue 3, pe310-e315. 6p. 4 Charts.

**Document Type:** Article

**Subjects:** Emergency medical services  
Children of minorities

Child health services  
Ethnicity  
Hospital emergency services  
Medical care

**Geographic Terms:** United States

**Abstract:** Objective. To determine whether wait times for children treated in emergency departments (EDs) nationally are associated with patient race/ethnicity. Methods. Data were obtained from the National Hospital Ambulatory Medical Care Survey, which collects information on patient visits to EDs throughout the United States. We examined data for patients <15 years of age who presented to EDs during the 4-year period of 1997-2000. Sample weights were applied to the identified patient records to yield national estimates. For the purposes of this study, race/ethnicity was analyzed for 3 major groups, ie, non-Hispanic white (NHW), non-Hispanic black (NHB), and Hispanic white (HW). Results. During the 4-year study period, 20 633 patient visits were surveyed, representing a national sample of 92.9 million children <15 years of age. The race/ ethnicity distribution included 9019 NHW children (59.5%), 3910 NHB children (23.9%), and 2991 HW children (16.6%). The wait time for all groups was 43.6 = 1.7 minutes (mean = SEM). There were significant unadjusted intergroup differences in wait times (38.5 = 1.6 minutes, 48.7 = 0.5 minutes, and 54.5 = 0.1 minutes for NHW, NHB, and HW children, respectively). Visit immediacy (triage status), when reported, was categorized as <15 minutes for 2203 children (17.1%), 15 to 60 minutes for 5324 (41.4%), 1 to 2 hours for 3010 (25.1%), and >2 to 24 hours for 1910 (16.4%). There were significant un-adjusted differences in triage status according to race, with 14.6% of NHW patients being placed in the >2-hour immediacy range, compared with 18.8% of NHB patients and 20.0% of HW patients. In a linear regression analysis with logarithmically transformed wait time as a dependent variable and with adjustment for potential confounders, including hospital location, geographic region, and payer status, both NHB and HW patients waited longer than NHW patients, although the results were statistically significant only for HW patients.... [ABSTRACT FROM AUTHOR]

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**ISSN:** 0031-4005

**DOI:** 10.1542/peds.2004-1541

**Accession Number:** 16125430

**Database:** Psychology and Behavioral Sciences Collection

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**Record: 48**

**Title:** Patient-Reported Experience in the Pediatric Emergency Department: What Matters Most?

**Authors:** Barbarian M; From the Pediatric Emergency Medicine, Montreal Children's Hospital, Montreal, Quebec.

Bishop A; IWK Health Centre, Halifax, Nova Scotia.

Alfaro P

Biron A

Brody DA; From the Pediatric Emergency Medicine, Montreal Children's Hospital, Montreal, Quebec.

Cunningham-Allard G; McGill University Health Center, Montreal, Quebec, Canada.

Dubrovsky AS; From the Pediatric Emergency Medicine, Montreal Children's Hospital, Montreal, Quebec.

**Source:** Journal of patient safety [J Patient Saf] 2021 Dec 01; Vol. 17 (8), pp. e1166-e1170.

**Publication Type:** Journal Article

**Language:** English

**Journal Info:** *Publisher:* Lippincott Williams & Wilkins *Country of Publication:* United States *NLM ID:* 101233393 *Publication Model:* Print *Cited Medium:* Internet *ISSN:* 1549-8425 (Electronic) *Linking ISSN:* 15498417 *NLM ISO Abbreviation:* J Patient Saf *Subsets:* MEDLINE

**Imprint Name(s):** *Original Publication:* Philadelphia, Pa. : Lippincott Williams & Wilkins, c2005-

**MeSH Terms:** Emergency Service, Hospital\*

Quality of Health Care\*

Canada ; Child ; Humans ; Parents ; Patient Reported Outcome Measures

**Abstract:** **Competing Interests:** The authors disclose no conflict of interest.

**Introduction:** Although the Child Hospital Consumer Assessment of Healthcare Providers and Systems is a validated tool for the inpatient experience, it may not address features unique to the pediatric emergency department (PED). There is currently no publicly available validated patient-reported experience survey for the PED, and what matters most in this setting remains unknown.

**Methods:** Twelve semistructured interviews were conducted with a convenience sample of parents of children younger than 14 years at a Canadian PED. Data analysis was performed using inductive thematic analysis to identify aspects of patient-reported experiences that matter most to parents in the PED.

**Results:** Five themes were identified: (1) making waiting a positive experience, (2) taking the time to provide care, (3) forging a positive partnership, (4) speak up for safe care, and (5) making the environment feel safer. Parents highlighted that while waiting for care is not desirable, it is made more acceptable through the communication of wait time estimates and the presence of child activities in the waiting room. Furthermore, although interactions with providers are brief, parents emphasized the importance of creating an environment of partnership with open communication, taking the time to examine their child, and actively demonstrating the provision of safe, quality care.

**Conclusions:** Results from this study suggest that a patient-reported experience survey in the PED may need to embed elements not

currently captured in Child Hospital Consumer Assessment of Healthcare Providers and Systems, such as waiting room experience, comprehensiveness of health assessments, and observations of safety measures. Future studies can use these findings to develop a patient-reported experience survey for use in the PED.

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**Entry Date(s):** *Date Created:* 20180213 *Date Completed:* 20220217 *Latest Revision:* 20230930

**Update Code:** 20250114

**DOI:** 10.1097/PTS.0000000000000472

**PMID:** 29432338

**Database:** MEDLINE Complete

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## Record: 49

**Title:** Characteristics and Admission Preferences of Pediatric Emergency Patients and Their Waiting Time Prediction Using Electronic Medical Record Data: Retrospective Comparative Analysis

**Authors:** Lin Lin Guo  
Lin Ying Guo  
Jiao Li  
Yao Wen Gu  
Jia Yang Wang  
Ying Cui  
Qing Qian  
Ting Chen  
Rui Jiang  
Si Zheng

**Source:** Journal of Medical Internet Research, Vol 25, p e49605 (2023)

**Publisher Information:** JMIR Publications, 2023.

**Publication Year:** 2023

**Collection:** LCC:Computer applications to medicine. Medical informatics  
LCC:Public aspects of medicine

**Subject Terms:** Computer applications to medicine. Medical informatics  
R858-859.7  
Public aspects of medicine  
RA1-1270

**Description:** BackgroundThe growing number of patients visiting pediatric emergency departments could have a detrimental impact on the care provided to children who are triaged as needing urgent attention. Therefore, it has become essential to continuously monitor and analyze the admissions and waiting times of pediatric emergency patients. Despite the significant challenge posed by the shortage of pediatric medical resources in China's health care system, there have been few large-scale studies conducted to analyze visits to the pediatric emergency room. ObjectiveThis study seeks to examine the characteristics and admission patterns of patients in the pediatric emergency department using electronic medical record (EMR) data. Additionally, it aims to develop and assess machine learning models for predicting waiting times for pediatric emergency department visits. MethodsThis retrospective analysis involved patients who were admitted to the emergency department of Children's Hospital Capital Institute of Pediatrics from January 1, 2021, to December 31, 2021. Clinical data from these admissions were extracted from the electronic medical records, encompassing various variables of interest such as patient demographics, clinical diagnoses, and time stamps of clinical visits. These indicators were collected and compared. Furthermore, we developed and evaluated several computational models for predicting waiting times. ResultsIn total, 183,024 eligible admissions from 127,368 pediatric patients were included. During the 12-month study period, pediatric emergency department visits were most frequent among children aged less than 5 years, accounting for 71.26% (130,423/183,024) of the total visits. Additionally, there was a higher proportion of male patients (104,147/183,024, 56.90%) compared with female patients (78,877/183,024, 43.10%). Fever (50,715/183,024, 27.71%), respiratory infection (43,269/183,024, 23.64%), celiacgia (9560/183,024, 5.22%), and emesis (6898/183,024, 3.77%) were the leading causes of pediatric emergency room visits. The average daily number of admissions was 501.44, and 18.76% (34,339/183,204) of pediatric emergency department visits resulted in discharge without a prescription or further tests. The median waiting time from registration to seeing a doctor was 27.53 minutes. Prolonged waiting times were observed from April to July, coinciding with an increased number of arrivals, primarily for respiratory diseases. In terms of waiting time prediction, machine learning models, specifically random forest, LightGBM, and XGBoost, outperformed regression methods. On average, these models reduced the root-mean-square error by approximately 17.73% (8.951/50.481) and increased the R<sup>2</sup> by approximately 29.33% (0.154/0.525). The SHAP method analysis highlighted that the features "wait.green" and "department" had the most significant influence on waiting times. ConclusionsThis study offers a contemporary exploration of pediatric emergency room visits, revealing significant variations in admission rates across different periods and uncovering certain admission patterns. The machine learning models, particularly ensemble methods, delivered more dependable waiting time predictions. Patient volume awaiting consultation or treatment and the triage status emerged as crucial factors contributing to prolonged waiting times. Therefore, strategies such

as patient diversion to alleviate congestion in emergency departments and optimizing triage systems to reduce average waiting times remain effective approaches to enhance the quality of pediatric health care services in China.

**Document Type:** article

**File Description:** electronic resource

**Language:** English

**ISSN:** 1438-8871

**Relation:** <https://www.jmir.org/2023/1/e49605>; <https://doaj.org/toc/1438-8871>

**DOI:** 10.2196/49605

**Access URL:** <https://doaj.org/article/c97f863f38d24c0f9442af2072a96eb2>

**Accession Number:** edsdoj.97f863f38d24c0f9442af2072a96eb2

**Database:** Directory of Open Access Journals

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## Record: 50

**Title:** Using the Delphi method to establish pediatric emergency triage criteria in a grade A tertiary women's and children's hospital in China

**Authors:** Yingying Zhao

Liqing He

Juan Hu

Jing Zhao

Mingxuan Li

Lisha Huang

Qiu Jin

Lan Wang

Jianxiong Wang

**Source:** BMC Health Services Research, Vol 22, Iss 1, Pp 1-9 (2022)

**Publisher Information:** BMC, 2022.

**Publication Year:** 2022

**Collection:** LCC:Public aspects of medicine

**Subject Terms:** Pediatric emergency department

Triage criteria

Delphi

Public aspects of medicine

RA1-1270

**Description:** Abstract Background We aimed to establish simplified and quantifiable triage criteria in pediatric emergency care, improving the efficiency of pediatric emergency triage and ensuring patient safety. Methods We preliminarily determined the pediatric emergency triage criteria with references to pediatric emergency department characteristics and internationally recognized triage tools after literature review and discussion. The final determination of the triage criteria was reached after two rounds of Delphi surveys completed by 18 experts from 3 hospitals in China. Results Both round 1 and round 2 surveys had a 100% response rate. The overall expert authority coefficient in the two rounds of surveys was 0.872. The experts had 100% enthusiasm for participating in the surveys. Kendall's coefficients of concordance for conditions/symptoms in patients triaged to level 1, 2, 3, and 4 were 0.149, 0.193, 0.102, and 0.266, respectively. All p-values were less than 0.05. The coefficients of variation in conditions/symptoms, vital signs, and the Pediatric Early Warning Score (PEWS) ranged between 0.00 and 0.205, meeting the inclusion criteria. The pediatric emergency triage criteria containing conditions/symptoms, vital signs, PEWS scores, and other 4 level 1 indicators, 51 level 2 indicators and 23 level 3 indicators were built. The maximum waiting time to treatment for the patients triaged to level 1, 2, 3, and 4 was immediate, within 10 min, within 30 min, and within 240 min, respectively. Conclusion The pediatric emergency triage criteria established in this study was scientific and reliable. It can be used to quickly identify the patients requiring urgent and immediate care, thereby ensuring the priorities for the care of critically ill patients.

**Document Type:** article

**File Description:** electronic resource

**Language:** English

**ISSN:** 1472-6963

**Relation:** <https://doaj.org/toc/1472-6963>

**DOI:** 10.1186/s12913-022-08528-8

**Access URL:** <https://doaj.org/article/5d99fba5ce11404e929b622d169305e0>

**Accession Number:** edsdoj.5d99fba5ce11404e929b622d169305e0

**Database:** Directory of Open Access Journals

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## Record: 51

**Title:** The Effectiveness of Pediatric Triage Training Course for Emergency Room Nurses at Siriraj Hospital

**Authors:** Chayanuj Chaiyaratana  
Chulathida Chomchai

**Source:** Siriraj Medical Journal, Vol 53, Iss 10 (2020)

**Publisher Information:** Faculty of Medicine Siriraj Hospital, 2020.

**Publication Year:** 2020

**Collection:** LCC:Medicine

**Subject Terms:** Effectiveness

Pediatric Triage Training

Emergency Room Nurses

Medicine

**Description:** Objective : The recognition of an acutely ill child is considered to be of vital importance in an emergency situation. Fast and timely intervention can prevent significant morbidity from occurring. The skill of assessing ill children in order to identify those that need immediate attention is often the task of experienced pediatric nurses. However, when availability of such personnel is limited, simplified triage criteria may be taught to novice nurses in order that they can quickly and efficiently identify those patients needing urgent care. Method : We conducted a pilot triage training project with 30 volunteer, non-pediatric nurses and assessed the effectiveness of the training course through the use of a pre and post-Pediatric Triage Knowledge Test (PTKT), as well as by the accuracy of the participants' triage performance on 439 pediatric patients. Results : The participants, on average, showed significant improvement on the Pediatric Triage Knowledge Assessment Test ( $p = 0.01$ ; paired t-test), as well as being able to perform accurate triage after training on 88.3% of patients. Moreover, the existence of triage significantly reduced the waiting time of urgent patients by a total of 7 minutes ( $p = 0.05$ ; t-test), while the waiting time for non-urgent patients was not affected. Conclusion : The pilot triage training project effectively increased non-pediatric nurses' knowledge of pediatric triage and their performance of triage, and is associated with a significant reduction in the waiting time of urgent pediatric patients in the Emergency Department at Siriraj Hospital.

**Document Type:** article

**File Description:** electronic resource

**Language:** English

**ISSN:** 2228-8082

**Relation:** <https://he02.tci-thaijo.org/index.php/sirirajmedj/article/view/245116>; <https://doaj.org/toc/2228-8082>

**Access URL:** <https://doaj.org/article/7ad4b22f43fd4f28b947228c38aa2d00>

**Accession Number:** edsdoj.7ad4b22f43fd4f28b947228c38aa2d00

**Database:** Directory of Open Access Journals

**Record: 52**

**Title:** G35(P) The impact of an urgent care centre on patient flow with musculoskeletal (MSK) injuries in a paediatric emergency department

**Authors:** Birahinduka, D  
Stewart, C

**Source:** *Archives of Disease in Childhood*. Apr 01, 2014 99(Suppl\_1 Suppl 1):A15-A16

**Publication Year:** 2014

**Description:** BACKGROUND: In paediatric accident and emergency there is a tendency to prioritise patients with medical problems over musculoskeletal injury. To more appropriately serve our low acuity MSK population, a GP led urgent care centre (UCC) was set up in 2011. Our aim was to evaluate whether a dual patient tracking system would improve the management of patients with MSK injuries requiring non urgent imaging. METHODS: A retrospective review of 200 attendances over four separate months with MSK injuries was carried out using an electronic patient record (50 patients for January and July) before and after the new UCC tracking system (Adatastra). This study compares data on the time from triage to requesting imaging and the total time from triage to discharge. RESULTS: Children waited 28 mins longer for imaging to be requested in January 2012 compared to January 2010: [58.5 mins 95% CI (46.1, 70.8) vs 30.9 mins 95% CI (21.4, 40.4), p-value 0.01]. Results show a similar pattern comparing July to July before and after UCC [33.1 mins 95% CI (20.2, 46.1) vs 62 mins 95% CI (47, 77.1) p <0.01]. The length of time from assessment to discharge was nearly 20 minutes longer in January 2012 compared to January 2010: 69.35 mins 95% CI (50.62, 88.08) vs 50.77 mins 95% CI (38.1, 63.3), p value 0.05. CONCLUSION: The new UCC patient tracking system is associated with a significant delay in imaging children presenting with low acuity MSK injuries. This leads to overcrowding and inefficiency, and not the improved service for which UCC was originally devised. A review of the entire patient journey may improve the management of children with MSK requiring non immediate imaging.

**Language:** English

**Author Affiliations:** 1Paediatric Department, Northwick Park Hospital, London, UK 2Paediatric Emergency Department, Chelsea and Westminster Hospital, London, UK

**ISSN:** 0003-9888

**DOI:** 10.1136/archdischild-2014-306237.35

**Availability:** <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=00000740-201404001-00035.an>

**Rights:** © 2014 BMJ Publishing Group Ltd and Royal College of Paediatrics and Child Health

**Accession Number:** edsovi.00000740.201404001.00035

**Database:** Journals@OVID

**Record: 53**

**Title:** Identifying Key Metrics for Reducing Premature Departure from the Pediatric Emergency Department

**Authors:** Cross, Keith P.  
Gracely, Edward  
Stevenson, Michelle D.  
Woods, Charles R.

**Source:** *Academic Emergency Medicine*. Nov 01, 2010 17(11):1197-1206

**Publication Year:** 2010

**Description:** OBJECTIVES:: Approximately 2% to 5% of children presenting to pediatric emergency departments (PEDs) leave prior to a complete evaluation. This study assessed risk factors for premature departure (PD) from a PED to identify key metrics and cutoffs for reducing the PD rate. METHODS:: A 3-year cohort (June 2004-May 2007) of children presenting to a PED was evaluated. Children were excluded if they presented for psychiatric issues, were held awaiting hospital admission in the PED due to a lack of inpatient beds, were more than 21 years old, or died before disposition. Univariate analyses, multivariable logistic regression, and recursive partitioning were used to identify factors associated with PD. A fourth year of data (June 2007-May 2008) was used for validation and sensitivity analysis. RESULTS:: There were 132,324 patient visits in the 3-year derivation data set with a 3.8% PD rate, and 45,001 visits in the fourth-year validation data set with a 4.3% PD rate. PDs were minimized when average wait time was below 110 minutes, concurrent PDs were fewer than two, and average length of stay (LOS) was less than 224 minutes in the derivation set, with similar results in the validation set. When these metrics were exceeded, PD rates were over 10% among low-acuity patients. These findings were robust across a broad range of assumptions during sensitivity analysis. CONCLUSIONS:: The authors identified five key metrics associated with PD in the PED: average wait time, average LOS, acuity, concurrent PDs, and arrival rate. Operational cutoffs for these metrics, determined by recursive partitioning, may be useful to physicians and administrators when selecting specific interventions to address PDs from the PED.

**Language:** English

**Author Affiliations:** From the Department of Pediatrics, University of Louisville, Kosair Children's Hospital (KPC, MDS, CRW), Louisville, KY; and the Department of Family, Community, and Preventive Medicine, Drexel University College of Medicine (EG), Philadelphia, PA.

**ISSN:** 1069-6563

**DOI:** 10.1111/j.1553-2712.2010.00908.x

**Availability:** <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=00043480-201011000-00007.an>

**Rights:** © 2010? The Society for Academic Emergency Medicine

**Accession Number:** edsovi.00043480.201011000.00007

**Database:** Journals@OVID

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**Record: 54**

**Title:** Efficiency of Using Pediatrics Emergency Services and Triage Evaluation

**Authors:** El Desoky, Sherif  
Mashat, Suleiman  
Bana, Suliman  
Alama, Mohamed  
Dhabab, Nawaf  
Malibari, Ghassan M.  
Halwani, Manal  
Albanna, Amr S.  
Kari, Jameela A.

**Source:** *Pediatric Emergency Care*. Jun 01, 2018 34(6):417-421

**Publication Year:** 2018

**Description:** OBJECTIVE: The aim of the study was to evaluate the pediatric emergency department (PED) in a main teaching hospital. METHODS: Retrospective review of all children presented to PED at King Abdulaziz University Hospital from September to November 2014 was performed. We classified priority into the following 5 stages: 1, need resuscitation; 2, emergent; 3, urgent; 4, less urgent; and 5, nonurgent. RESULTS: A total of 2567 children (58.9% boys) attended PED for 3 months. Toddler age group was the highest. Respiratory complaints were the commonest (36%), followed by gastrointestinal complaints (20%). The majority were classified as priority 3 (52.3%) and priority 4 (30.7%). The admission rate was 12.3% and the mean (range) length of stay (LOS) was 5.85 (0.2-25) hours. Saudi nationals were less likely to wait for 5 hours or longer, less likely to be admitted, but more likely to leave PED without being evaluated. There was a negative correlation between higher priorities and time from triage to PED. There was a positive correlation between the higher priorities and LOS. CONCLUSIONS: Most children who were seen in PED were priority 3 and therefore needed to be seen. However, a considerable percentage of priority 4 and 5 could have been seen in ambulatory clinics. Most lower priorities were Saudi nationals who were most likely to leave without being seen. Prolonged LOS, overcrowding, and high percentage of admission are the main challenges

**Language:** English

**Author Affiliations:** From the Department of Pediatrics and / From the Department of Pediatrics and / From the Department of Pediatrics and / From the Department of Pediatrics and / From the Department of Pediatrics and / From the Department of Pediatrics and / Emergency Department,

King Abdulaziz University Hospital / King Abdullah International Medical Research Center, King Saud Bin Abdulaziz University for Health Sciences

**ISSN:** 0749-5161

**DOI:** 10.1097/PEC.0000000000000754

**Availability:** [http://ovidsp.ovid.com/ovidweb.cgi?](http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=%2210.1097/PEC.0000000000000754%22.di)

[T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=%2210.1097/PEC.0000000000000754%22.di](http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&CSC=Y&NEWS=N&SEARCH=%2210.1097/PEC.0000000000000754%22.di)

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**Accession Number:** edsovi.10.1097.PEC.0000000000000754

**Database:** Journals@OVID

## Record: 55

**Title:** Discrete event simulation modelling to evaluate the impact of a quality improvement initiative on patient flow in a paediatric emergency department.

**Authors:** McKinley KW; Emergency Medicine Section of Data Analytics, Children's National, Washington, DC, USA [kmckinley@childrensnational.org](mailto:kmckinley@childrensnational.org).  
Babineau J; Department of Emergency Medicine, New York-Presbyterian Hospital/Columbia University Medical Center, New York, NY, USA.  
Roskind CG; Department of Emergency Medicine, New York-Presbyterian Hospital/Columbia University Medical Center, New York, NY, USA.  
Sonnott M; Department of Emergency Medicine, New York-Presbyterian Hospital/Columbia University Medical Center, New York, NY, USA.  
Doan Q; Department of Pediatrics, British Columbia Children's Hospital, Vancouver, BC, Canada.

**Source:** Emergency medicine journal : EMJ [Emerg Med J] 2020 Apr; Vol. 37 (4), pp. 193-199. *Date of Electronic Publication:* 2020 Jan 08.

**Publication Type:** Journal Article

**Language:** English

**Journal Info:** *Publisher:* BMJ Pub. Group *Country of Publication:* England *NLM ID:* 100963089 *Publication Model:* Print-Electronic *Cited Medium:* Internet  
*ISSN:* 1472-0213 (Electronic) *Linking ISSN:* 14720205 *NLM ISO Abbreviation:* Emerg Med J *Subsets:* MEDLINE

**Imprint Name(s):** *Original Publication:* London : BMJ Pub. Group, c2001-

**MeSH Terms:** Computer Simulation/\*standards

Efficiency, Organizational/\*standards

Length of Stay/\*statistics & numerical data

Quality Improvement/\*statistics & numerical data

Computer Simulation/statistics & numerical data ; Crowding ; Efficiency, Organizational/statistics & numerical data ; Emergency Service,

Hospital/organization & administration ; Emergency Service, Hospital/statistics & numerical data ; Humans ; Models, Organizational ; New York City ; Pediatric Emergency Medicine/methods ; Prospective Studies ; Retrospective Studies

**Abstract:** **Competing Interests:** Competing interests: None declared.

**Objective:** We developed a discrete event simulation model to evaluate the impact on system flow of a quality improvement (QI) initiative that included a time-specific protocol to decrease the time to antibiotic delivery for children with cancer and central venous catheters who present to a paediatric ED with fever.

**Methods:** The model was based on prospective observations and retrospective review of ED processes during the maintenance phase of the QI initiative between January 2016 and June 2017 in a large, urban, academic children's hospital in New York City, USA. We compared waiting time for full evaluation (WT) and length of stay (LOS) between a model with and a model without the protocol. We then gradually increased the proportion of patients receiving the protocol in the model and recorded changes in WT and LOS.

**Results:** We validated model outputs against administrative data from 2016, with no statistically significant differences in average WT or LOS for any emergency severity index (ESI). There were no statistically significant differences in these flow metrics between the model with and the model without the protocol. By increasing the proportion of total patients receiving this protocol, from 0.2% to 1.3%, the WT increased by 2.8 min (95% CI: 0.6 to 5.0) and 7.6 min (95% CI: 2.0 to 13.2) for ESI 2 and ESI 3 patients, respectively. This represents a 14.0% increase in WT for ESI 3 patients.

**Conclusions:** Simulation modelling facilitated the testing of system effects for a time-specific protocol implemented in a large, urban, academic paediatric ED, showing no significant impact on patient flow. The model suggests system resilience, demonstrating no detrimental effect on WT until there is a 7-fold increase in the proportion of patients receiving the protocol.

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**Contributed Indexing:** *Keywords:* emergency department; paediatrics, paediatric emergency medicine; quality improvement; research, operational

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**Update Code:** 20250114

**DOI:** 10.1136/emmermed-2019-208667

**PMID:** 31915264

**Database:** MEDLINE Complete

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## Record: 56

**Title:** Experience developing a pediatric medical chatbot in Singapore: a digital innovation for improved emergency care.

**Authors:** Min, Choo

Lim, Rong Xiu Cynthia

Tan, Sek Wan

Ganapathy, Sashikumar

**Source:** Frontiers in Digital Health; 2025, p1-9, 9p

**Publication Year:** 2025

**Subject Terms:** HEALTH services accessibility  
HEALTH literacy  
DIGITAL technology  
INTERPROFESSIONAL relations  
SELF-efficacy  
DIGITAL health  
EMERGENCY medical services  
HELP-seeking behavior  
DECISION making  
CONTINUUM of care  
TELEMEDICINE  
PEDIATRICS  
PATIENT-centered care  
CAREGIVERS  
MEDICAL appointments  
TRUST  
SOFTWARE architecture  
PSYCHOLOGY of parents  
CHATBOTS  
USER interfaces  
MEDICAL triage  
HEALTH care teams

**Geographic Terms:** SINGAPORE

**Author-Supplied Keywords:** caregiver empowerment  
digital health  
medical chatbot

pediatric acute care

pre-hospital triage

**NAICS/Industry Codes:** NAICS/Industry Codes 624230 Emergency and Other Relief Services

913130 Municipal police services

541514 Computer systems design and related services (except video game design and development)

**Document Type:** Article

**Abstract:** This community case study explores the lessons learnt from the development of the Urgent Paediatric Advice Line (UPAL), a medical chatbot designed to address key challenges in pediatric healthcare, including emergency department (ED) overcrowding, health-seeking behavior, and health literacy. The chatbot was developed by pediatric specialists in collaboration with an AI-driven technology partner to provide caregivers with timely, accurate, and accessible guidance for managing pediatric health concerns. By helping parents assess the severity of their child's symptoms and navigate appropriate care pathways, UPAL aims to reduce unnecessary ED visits and improve health literacy. The development process employed an iterative, user-centered approach to refine the algorithm and enhance the user experience, with key challenges including balancing clinical reliability with user empathy. By offering evidence-based advice tailored to individual symptoms, UPAL empowers caregivers to make more informed decisions about their child's care. This case study highlights the potential of digital health solutions to empower caregivers, improve patient engagement, and increase healthcare access, particularly in pediatric settings. The study underscores the lessons for the field—namely the importance of interdisciplinary collaboration, continuous iterative development, patient-centered design, and active stakeholder engagement in creating effective digital health tools. Looking forward, future developments will include the incorporation of generative AI to provide more humanistic and personalized responses, as well as the creation of a post-discharge outreach module to provide proactive post-discharge support to caregivers, further enhancing healthcare delivery in a rapidly evolving digital landscape. [ABSTRACT FROM AUTHOR]

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**DOI:** 10.3389/fdgth.2025.1557804

**Accession Number:** 184175379

**Database:** Complementary Index

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**Record: 57**

**Title:** The role of family health centres in preventing paediatric emergency department usage of parents of children with non-urgent conditions.

**Authors:** Butun, Ahmet

**Source:** BMC Primary Care; 12/19/2024, Vol. 25 Issue 1, p1-14, 14p

**Publication Year:** 2024

**Subject Terms:** COMMUNITY health services  
PARENTS  
MEDICAL care use  
CROSS-sectional method  
HEALTH literacy  
RESEARCH funding  
PRIMARY health care  
STATISTICAL sampling  
HOSPITAL emergency services  
TERTIARY care  
HELP-seeking behavior  
PEDIATRICS  
CROWDS  
RESEARCH methodology  
DATA analysis software

**Geographic Terms:** TURKEY

**Author-Supplied Keywords:** Emergency department  
Family health centres  
GP practice  
Health literacy  
Medical and Health Sciences Public Health and Health Services Psychology and Cognitive Sciences Psychology  
Non-urgent  
Paediatric emergency department  
Primary care  
Utilisation  
Visit

**NAICS/Industry Codes:**

NAICS/Industry Codes 621494 Community health centres

621498 All Other Outpatient Care Centers

623220 Residential Mental Health and Substance Abuse Facilities

624190 Other Individual and Family Services

913910 Other local, municipal and regional public administration

541910 Marketing Research and Public Opinion Polling

622310 Specialty (except Psychiatric and Substance Abuse) Hospitals

**Document Type:** Article

**Abstract:** Background: Overcrowding in paediatric emergency departments (PEDs) has become a global public health issue, reducing healthcare quality, increasing dissatisfaction, and driving up costs. Overcrowding in PEDs not only affects patient satisfaction and healthcare costs but also can lead to burnout among healthcare professionals. This burnout could potentially result in suboptimal care for truly severe cases, ultimately increasing morbidity and mortality rates among patients requiring urgent attention. This study aims to determine how family health centres can reduce paediatric visits to PEDs and provide recommendations for alleviating overcrowding. Methods: This study is a descriptive cross-sectional study. Participants were parents whose children were admitted to the PED at a tertiary hospital located in southeast Turkey. The data were collected between 15/05/2024–26/08/2024. This study was completed with 657 parents. A convenience sampling method was used to recruit participants. SPSS 11.5 software was used for data analysis. Results: The mean age of the parents and children brought to the PED was  $31.99 \pm 8.51$  years and  $4.20 \pm 4.08$  years, respectively. Of the children, 32.1% were admitted to the PED due to fever. Majority of parents (65%) visited the PED outside working hours. 8.8% of parents considered their child's health condition as "very urgent", 54.5% of them considered it as "urgent". The majority of parents thought that the PEDs were overcrowded (82.2%). 50.4% of the parents stated that they trusted the PED, and 52.7% stated that they were satisfied with the PED. More than half of the parents (61.8%) stated that they did not visit their family health centre before visiting the PED. 10.8% of parents reported that they had never visited a family health centre in the last year. Majority of parents (62.7%) stated that they will visit the PED again if their children have the same health problems in the future. Conclusion: Improving the use of family health centres, introducing out-of-hours services, and enhancing parents' health literacy could shift non-urgent visits from PEDs to primary care settings. In addition, making parents more aware of services provided in family health centres could affect parents' health-seeking behaviours and choose to use their GP rather than PED for their children with non-urgent conditions. [ABSTRACT FROM AUTHOR]

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**ISSN:** 27314553

**DOI:** 10.1186/s12875-024-02673-1

**Accession Number:** 181829775

**Database:** Complementary Index

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**Record: 58**

**Title:** University of Bristol Reports Findings in Pediatrics ("How long until I am seen, doc?" Modelling paediatric emergency department waiting times to make personalised predictions).

**Source:** Pediatrics Week; 5/23/2025, p541-541, 1p

**Publication Year:** 2025

**Subject Terms:** MEDICAL care wait times  
PATIENT satisfaction  
PEDIATRICS  
MEDICAL care research  
CLASSIFICATION algorithms  
FORECASTING  
HOSPITAL emergency services

**Author-Supplied Keywords:** Bristol  
Europe  
Health and Medicine  
Pediatrics  
United Kingdom

**Company/Entity:** UNIVERSITY of Bristol

**Document Type:** Article

**Abstract:** The University of Bristol conducted a study to create a model that predicts personalized wait times for children in pediatric emergency departments. The research found that managing patient expectations towards wait times may be more effective in reducing dissatisfaction than shortening actual wait times. Factors such as triage category, number of patients waiting, time of presentation, and day of the week significantly impact wait time predictions. This tailored model aims to improve patient satisfaction by providing individualized predictions for wait times in pediatric emergency departments. [Extracted from the article]

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**ISSN:** 19442637

**Accession Number:** 185191611

**Database:** Complementary Index

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## Record: 59

**Title:** Parental satisfaction with waiting time in a Swiss tertiary paediatric emergency department.

**Authors:** Löflath, Viola

Hau, Eva-Maria

Garcia, Daniel

Berger, Steffen

Löllgen, Ruth

**Source:** Emergency Medicine Journal (EMJ); Aug2021, Vol. 38 Issue 8, p617-623, 7p

**Publication Year:** 2021

**Author-Supplied Keywords:** efficiency

emergency care systems

emergency department

emergency department management

emergency departments

triage

**Document Type:** journal article

**Abstract:** **Introduction:** Patient numbers in paediatric emergency departments (PED) are steadily increasing. Parental perception of waiting time and reasons for attending a PED with non-emergencies have been investigated in the UK, Australia, Korea, Canada and the USA. We sought to examine which factors influence parental satisfaction with waiting time in a tertiary Swiss PED and whether these differed from other countries. **Methods:** Paper surveys were administered to parents of children presenting to our interdisciplinary PED from February to May 2015. Primary outcome was parental satisfaction with waiting time, secondary outcomes were satisfaction with treatment, parental reasons for presentation with non-emergencies, parental perception of times to triage, first physician contact and disposition from ED, level of physician training, understanding of various anticrowding strategies and comparison of perceived and true waiting times to triage and physician contact. **Results:** 739 out of 750 surveys were returned (57 complete, 298 with 1 or 2

missing answers). Satisfaction with waiting time (on a 5-point-Likert-scale; 1 being the best possible answer) was higher in groups with shorter waiting time until triage (+0.41,  $p=0.001$ ), first physician contact (+1.43,  $p<0.001$ ) and discharge (+0.71,  $p<0.001$ ), higher triage category urgency (+0.47,  $p=0.044$ ) and available entertainment (+0.82,  $p<0.001$ ). Early first physician contact (+0.33,  $p=0.008$ ) and time to discharge less than 4 hours (+0.37,  $p<0.001$ ) was associated with greater satisfaction with treatment ( $p<0.05$ ). The most frequent reasons for presentation were parental impression that the child had an emergency ( $n=265$ , 35.9%) and referral by the family doctor ( $n=245$ , 33.2%).

**Conclusion:** To counteract parental dissatisfaction associated with waiting time, we suggest the implementation of feasible measures including entertainment while waiting, early first medical review and timely discharge from the PED. [ABSTRACT FROM AUTHOR]

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**ISSN:** 14720205

**DOI:** 10.1136/emered-2019-208616

**Accession Number:** 151768932

**Database:** Complementary Index

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## Record: 60

**Title:** Improvement of the Emergency service of an Ecuadorian children's hospital through Lean Six Sigma.

**Authors:** Buestán Benavides, Marcos  
Pérez, Cinthia C.  
García Burgos, Andrea  
Cantos Sandoza, Bryan

**Source:** Proceedings of the International Conference on Industrial Engineering & Operations Management; 07/16/2022, p1007-1019, 13p

**Publication Year:** 2022

**Subject Terms:** SIX Sigma  
LEAN management  
MEDICAL care  
METHODOLOGY

**Geographic Terms:** SOUTH America

**Author-Supplied Keywords:**

Emergency Department  
Healthcare  
Lean  
Six Sigma  
South America

**Document Type:** Article

**Abstract:** During the last decade, Lean Six Sigma (LSS) in healthcare organizations has increased; however, most cases are registered in developing countries. We aim to show a detailed implementation of Lean Six Sigma in the Emergency Department of an Ecuadorian Children's Hospital to evaluate the applicability of LSS in a South American country and identify barriers, success factors, and tools applied. Following the Define-Measure-Analyze-Improve-Control (DMAIC) methodology, the waiting time in front of the register and treatment section decreased by 79.5% and 53.2%. The total service time was reduced by 55.6%, and the total waiting time decreased by 57%. An external team of experts led the implementation, which resulted in one of the critical success factors. Together with the leadership of the Hospital Director, it helped to reduce the most common barriers found in developing countries, such as lack of training, resistance among the staff, and lack of available data. [ABSTRACT FROM AUTHOR]

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**ISSN:** 21698767**Accession Number:** 161074907**Database:** Complementary Index

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**Record: 61**

**Title:** Emergency department crowding negatively influences outcomes for children presenting with asthma: a population-based retrospective cohort study.

**Authors:** Sagaidak, Sofia  
Rowe, Brian H.  
Ospina, Maria B.  
Rosychuk, Rhonda J.

**Source:** Pediatric Research; Feb2021, Vol. 89 Issue 3, p679-685, 7p

**Publication Year:** 2021

**Document Type:** journal article

**ISSN:** 00313998

**DOI:** 10.1038/s41390-020-0918-2

**Accession Number:** 149371679

**Database:** Complementary Index

---

## Record: 62

**Title:** Crowding in the Emergency Department: Challenges and Best Practices for the Care of Children.

**Authors:** Gross, Toni K.

Lane, Natalie E.

Timm, Nathan L.

**Source:** Pediatrics; Mar2023, Vol. 151 Issue 3, p1-14, 14p

**Publication Year:** 2023

**Document Type:** Article

**ISSN:** 00314005

**DOI:** 10.1542/peds.2022-060972

**Accession Number:** 164235366

**Database:** Complementary Index

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## Record: 63

**Title:** Family members' satisfaction with the care flow in the Pediatric Emergency Department.

**Authors:** Macedo GPOS; Universidade Federal de São Paulo, Escola Paulista de Enfermagem. São Paulo-SP, Brasil.

D'Innocenzo M; Universidade Federal de São Paulo, Escola Paulista de Enfermagem. São Paulo-SP, Brasil.

**Source:** Revista brasileira de enfermagem [Rev Bras Enferm] 2019 Mar-Apr; Vol. 72 (2), pp. 435-441. *Date of Electronic Publication:* 2019 Apr 18.

**Publication Type:** Journal Article

**Language:** English; Portuguese

**Journal Info:** *Publisher:* Associacao Brasileira de Enfermagem *Country of Publication:* Brazil *NLM ID:* 7910105 *Publication Model:* Print-Electronic *Cited Medium:* Internet *ISSN:* 1984-0446 (Electronic) *Linking ISSN:* 00347167 *NLM ISO Abbreviation:* Rev Bras Enferm

**Imprint Name(s):** *Publication:* Brasilia : Associacao Brasileira de Enfermagem  
*Original Publication:* Brasilia [s.n.]

**MeSH Terms:** Patient Satisfaction\*

Family/\*psychology

Pediatrics/\*standards

Child ; Child, Preschool ; Cross-Sectional Studies ; Emergency Service, Hospital/organization & administration ; Emergency Service, Hospital/standards ; Emergency Service, Hospital/statistics & numerical data ; Female ; Humans ; Male ; Pediatrics/trends ; Prospective Studies ; Quality of Health Care ; Surveys and Questionnaires

**Abstract:** **Objective:** To evaluate the satisfaction index of the pediatric patient's caregiver (person responsible for the child) regarding the waiting time for the care flow in an emergency service.

**Method:** A prospective, cross-sectional, quantitative study with 300 family members in the Pediatric Emergency Department of a general hospital. An instrument was used to analyze the service flow, waiting time and satisfaction evaluation. Descriptive statistical analysis was performed.

**Results:** The satisfaction index of caregivers was statistically significant ( $p < 0.05$ ) the lower was the waiting time for patient screening, care by the doctors and for receiving the prescribed medication. Caregivers who took their children to the emergency department because of the disease ( $p = 0.029$ ) or because they did not find doctors in other hospitals ( $p = 0.021$ ) were satisfied with the waiting time for this service.

**Conclusion:** The quality of care is evaluated as satisfactory by caregivers when children are treated quickly in the Pediatric Emergency Department.

**Entry Date(s):** *Date Created:* 20190425 *Date Completed:* 20190624 *Latest Revision:* 20190624

**Update Code:** 20250114

**DOI:** 10.1590/0034-7167-2018-0388

**PMID:** 31017207

**Database:** MEDLINE Complete

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## Record: 64

**Title:** Discrete event simulation modelling to evaluate the impact of a quality improvement initiative on patient flow in a paediatric emergency department.

**Authors:**

McKinley, Kenneth W.

Babineau, John

Roskind, Cindy G.

Sonnett, Meridith

Doan, Quynh

**Source:** Emergency Medicine Journal (EMJ); Apr2020, Vol. 37 Issue 4, p193-199, 7p, 1 Diagram, 3 Charts, 1 Graph

**Publication Year:** 2020

**Author-Supplied Keywords:** emergency department  
paediatrics, paediatric emergency medicine  
quality improvement  
research, operational

**Document Type:** journal article

**Abstract:** **Objective:** We developed a discrete event simulation model to evaluate the impact on system flow of a quality improvement (QI) initiative that included a time-specific protocol to decrease the time to antibiotic delivery for children with cancer and central venous catheters who present to a paediatric ED with fever. **Methods:** The model was based on prospective observations and retrospective review of ED processes during the maintenance phase of the QI initiative between January 2016 and June 2017 in a large, urban, academic children's hospital in New York City, USA. We compared waiting time for full evaluation (WT) and length of stay (LOS) between a model with and a model without the protocol. We then gradually increased the proportion of patients receiving the protocol in the model and recorded changes in WT and LOS. **Results:** We validated model outputs against administrative data from 2016, with no statistically significant differences in average WT or LOS for any emergency severity index (ESI). There were no statistically significant differences in these flow metrics between the model with and the model without the protocol. By increasing the proportion of total patients receiving this protocol, from 0.2% to 1.3%, the WT increased by 2.8 min (95% CI: 0.6 to 5.0) and 7.6 min (95% CI: 2.0 to 13.2) for ESI 2 and ESI 3 patients, respectively. This represents a 14.0% increase in WT for ESI 3 patients. **Conclusions:** Simulation modelling facilitated the testing of system effects for a time-specific protocol implemented in a large, urban, academic paediatric ED, showing no significant impact on patient flow. The model suggests system resilience, demonstrating no detrimental effect on WT until there is a 7-fold increase in the proportion of patients receiving the protocol. [ABSTRACT FROM AUTHOR]

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**ISSN:** 14720205

**DOI:** 10.1136/emered-2019-208667

**Accession Number:** 143108118

**Database:** Complementary Index

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**Record: 65**

**Title:** Using the Delphi method to establish pediatric emergency triage criteria in a grade A tertiary women's and children's hospital in China.

**Authors:** Zhao, Yingying

He, Liqing

Hu, Juan

Zhao, Jing

Li, Mingxuan

Huang, Lisha

Jin, Qiu

Wang, Lan

Wang, Jianxiong

**Source:** BMC Health Services Research; 9/12/2022, Vol. 22 Issue 1, p1-9, 9p, 2 Diagrams, 4 Charts

**Publication Year:** 2022

**Subject Terms:** MEDICAL triage

HOSPITAL emergency services

CHILDREN'S hospitals

EMERGENCY medical services

RESEARCH funding

DELPHI method

**Author-Supplied Keywords:** Delphi

Pediatric emergency department

Triage criteria

**NAICS/Industry Codes:** NAICS/Industry Codes 622110 General Medical and Surgical Hospitals

622112 Paediatric hospitals

622310 Specialty (except Psychiatric and Substance Abuse) Hospitals

624230 Emergency and Other Relief Services

913130 Municipal police services

**Document Type:** Article

**Abstract:** <bold>Background: </bold>We aimed to establish simplified and quantifiable triage criteria in pediatric emergency care, improving the efficiency of pediatric emergency triage and ensuring patient safety.<bold>Methods: </bold>We preliminarily determined the pediatric emergency triage criteria with references to pediatric emergency department characteristics and internationally recognized triage tools after literature review and discussion. The final determination of the triage criteria was reached after two rounds of Delphi surveys completed by 18 experts from 3 hospitals in China.<bold>Results: </bold>Both round 1 and round 2 surveys had a 100% response rate. The overall expert authority coefficient in the two rounds of surveys was 0.872. The experts had 100% enthusiasm for participating in the surveys. Kendall's coefficients of concordance for conditions/symptoms in patients triaged to level 1, 2, 3, and 4 were 0.149, 0.193, 0.102, and 0.266, respectively. All p-values were less than 0.05. The coefficients of variation in conditions/symptoms, vital signs, and the Pediatric Early Warning Score (PEWS) ranged between 0.00 and 0.205, meeting the inclusion criteria. The pediatric emergency triage criteria containing conditions/symptoms, vital signs, PEWS scores, and other 4 level 1 indicators, 51 level 2 indicators and 23 level 3 indicators were built. The maximum waiting time to treatment for the patients triaged to level 1, 2, 3, and 4 was immediate, within 10 min, within 30 min, and within 240 min, respectively.<bold>Conclusion: </bold>The pediatric emergency triage criteria established in this study was scientific and reliable. It can be used to quickly identify the patients requiring urgent and immediate care, thereby ensuring the priorities for the care of critically ill patients. [ABSTRACT FROM AUTHOR]

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**ISSN:** 14726963**DOI:** 10.1186/s12913-022-08528-8**Accession Number:** 159053810**Database:** Complementary Index

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**Record: 66****Title:** Type of facility influences lengths of stay of children presenting to high volume emergency departments.**Authors:** Rosychuk, Rhonda J.

Rowe, Brian H.

**Source:** BMC Pediatrics; 11/2/2020, Vol. 20 Issue 1, pN.PAG-N.PAG, 1p

**Publication Year:** 2020

**Subject Terms:** HOSPITAL emergency services  
PEDIATRIC emergency services  
PEDIATRIC emergencies  
ACADEMIC departments  
TEACHING hospitals  
CROWDS

**Geographic Terms:** ALBERTA

**Author-Supplied Keywords:** Administrative data  
Emergency department  
Length of stay  
Time to physician initial assessment  
Wait times

**NAICS/Industry Codes:** NAICS/Industry Codes 611310 Colleges, Universities, and Professional Schools

**Document Type:** journal article

**Abstract:** <bold>Background: </bold>Emergency department crowding may impact patient and provider outcomes. We describe emergency department crowding metrics based on presentations by children to different categories of high volume emergency departments in Alberta, Canada.<bold>Methods: </bold>This population-based retrospective study extracted all presentations made by children (age < 18 years) during April 2010 to March 2015 to 15 high volume emergency departments: five regional, eight urban, and two academic/teaching. Time to physician initial assessment, and length of stay for discharges and admissions were calculated based on the start of presentation and emergency department facility. Multiple metrics, including the medians for hourly, facility-specific time to physician initial assessment and length of stay were obtained.<bold>Results: </bold>About half (51.2%) of the 1,124,119 presentations were made to the two academic/teaching emergency departments. Males presented more than females (53.6% vs 46.4%) and the median age was 5 years. Pediatric presentations to the three categories of emergency departments had mostly similar characteristics; however, urban and academic/teaching emergency departments had more severe triage scores and academic/teaching emergency departments had higher admissions. Across all emergency departments, the medians of the metrics for time to physician initial assessment, length of stay for discharges and for admission were 1h11min, 2h21min, and 6h29min, respectively. Generally, regional hospitals had shorter times than urban and academic/teaching hospitals.<bold>Conclusions: </bold>Pediatric presentations to high volume emergency departments in this province suggest similar delays to see providers; however, length of stay for discharges and admissions were shorter in regional emergency

departments. Crowding is more common in urban and especially academic emergency departments and the impact of crowding on patient outcomes requires further study. [ABSTRACT FROM AUTHOR]

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**ISSN:** 14712431

**DOI:** 10.1186/s12887-020-02400-6

**Accession Number:** 146752240

**Database:** Complementary Index

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## Record: 67

**Title:** Family-centered, high quality primary care is linked to fewer nonurgent emergency department visits by children

**Source:** ISNA Bulletin. Feb-April, 2008, Vol. 34 Issue 2, p11.

**Publisher Information:** Indiana State Nurses Association, 2008.

**Publication Year:** 2008

**Subject Terms:** Company business management  
Emergency medical services -- Management -- Services  
Family nursing -- Services

**Subject Geographic:** United States

**Description:** From 37 to 60 percent of children's visits to the emergency department (ED) each year are for nonurgent conditions. This causes ED crowding as well as fragmented care for children. [...]

**Document Type:** Report  
Brief article

**Language:** English

**ISSN:** 2575-2146

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COPYRIGHT 2008 Indiana State Nurses Association

**Accession Number:** edsgcl.178452251

**Database:** Gale OneFile: Health and Medicine

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**Record: 68**

**Title:** Artificial intelligence-driven forecasting and shift optimization for pediatric emergency department crowding

**Authors:** Akbasli, Izzet Turkalp  
Birbilen, Ahmet Ziya  
Teksam, Ozlem

**Source:** JAMIA Open. April, 2025, Vol. 8 Issue 2

**Publisher Information:** Oxford University Press, 2025.

**Publication Year:** 2025

**Subject Terms:** Market trend/market analysis  
Artificial intelligence  
Artificial intelligence -- Forecasts and trends  
Pediatric emergencies -- Forecasts and trends  
Hospitals -- Emergency service  
Machine learning -- Forecasts and trends

**Description:** Objective: This study aimed to develop and evaluate an artificial intelligence (AI)-driven system for forecasting Pediatric Emergency Department (PED) overcrowding and optimizing physician shift schedules using machine learning operations (MLOps). Materials and Methods: Data from 352 843 PED admissions between January 2018 and May 2023 were analyzed. Twenty time-series forecasting models--including classical methods and advanced deep learning architectures like Temporal Convolutional Network, Time-series Dense Encoder and Reversible Instance Normalization, Neural High-order Time Series model, and Neural Basis Expansion Analysis--were developed and compared using Python 3.8. Starting in January 2023, an MLOps simulation automated data updates and model retraining. Shift schedules were optimized based on forecasted patient volumes using integer linear programming. Results: Advanced deep learning models outperformed traditional models, achieving initial [R.sup.2] scores up to 75%. Throughout the simulation, the median [R.sup.2] score for all models was 44% after MLOps-based model selection, the median [R.sup.2] improved to 60%. The MLOps architecture facilitated continuous model updates, enhancing forecast accuracy. Shift optimization adjusted staffing in 69 out of 84 shifts, increasing physician allocation by up to 30.4% during peak hours. This adjustment reduced the patient-to-physician ratio by an average of 4.32 patients during the 8-16 shift and 4.40 patients during the 16-24 shift. Discussion: The integration of advanced deep learning models with MLOps architecture allowed for continuous model updates, enhancing the accuracy of PED overcrowding forecasts and outperforming traditional methods. The AI-driven system demonstrated resilience against data drift caused by events like the COVID-19 pandemic, adapting to changing conditions.

Optimizing physician shifts based on these forecasts improved workforce distribution without increasing staff numbers, reducing patient load per physician during peak hours. However, limitations include the single-center design and a fixed staffing model, indicating the need for multicenter validation and implementation in settings with dynamic staffing practices. Future research should focus on expanding datasets through multicenter collaborations and developing forecasting models that provide longer lead times without compromising accuracy.

**Conclusions:** The AI-driven forecasting and shift optimization system demonstrated the efficacy of integrating AI and MLOps in predicting PED overcrowding and optimizing physician shifts. This approach outperformed traditional methods, highlighting its potential for managing overcrowding in emergency departments. Future research should focus on multicenter validation and real-world implementation to fully leverage the benefits of this innovative system.

**Lay Summary** Overcrowding in Pediatric Emergency Departments (PEDs) can lead to long wait times and reduced quality of care for children. This study developed an artificial intelligence (AI) system to predict when overcrowding might occur and adjust doctors' work schedules accordingly. By analyzing data from over 350 000 past patient visits, the AI learned patterns of when more children are likely to come to the emergency department. The system used advanced machine learning techniques and a process called machine learning operations to continuously update and improve its predictions. With these forecasts, the hospital could plan ahead, assigning more doctors during busy times and fewer during slower periods. This adjustment increased doctor availability during peak hours by up to 30%, reducing the number of patients each doctor had to see. This approach helped balance the workload among doctors and improved the patient-to-doctor ratio during busy times. The study found that the AI system was effective in forecasting busy periods and optimizing staffing, outperforming traditional methods. Implementing such an AI-driven system could enhance patient care, reduce wait times, and improve overall efficiency in PEDs. Future steps include testing this system in multiple hospitals and integrating it into real-world settings to fully realize its benefits.

**Key words:** Pediatric Emergency Department; forecasting; artificial intelligence; machine learning operations; time-series analysis; shift optimization; overcrowding.

**Introduction** Artificial intelligence (AI) usage for assessing electronic health records (EHRs) has been increasing significantly in recent years. The latest advancements in AI hold significant potential and are primarily centered [...]

**Document Type:** Report

**Language:** English

**ISSN:** 2574-2531

**DOI:** 10.1093/jamiaopen/ooae138

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**Accession Number:** edsgcl.841117265

**Database:** Gale OneFile: Health and Medicine

**Record: 69**

**Title:** Triage: a working solution to over crowding in the emergency department.

**Authors:** Shah CP  
Carr LM

**Source:** Canadian Medical Association journal [Can Med Assoc J] 1974 May 04; Vol. 110 (9), pp. 1039 passim.

**Publication Type:** Journal Article

**Language:** English

**Journal Info:** *Publisher:* Canadian Medical Association *Country of Publication:* Canada *NLM ID:* 0414110 *Publication Model:* Print *Cited Medium:* Print  
*ISSN:* 0008-4409 (Print) *Linking ISSN:* 00084409 *NLM ISO Abbreviation:* Can Med Assoc J *Subsets:* MEDLINE

**Imprint Name(s):** *Original Publication:* Ottawa : Canadian Medical Association

**MeSH Terms:** Diagnosis\*  
Emergency Service, Hospital/\*statistics & numerical data  
Hospital Administration ; Ontario

**Abstract:** Recently, emergency departments across the continent have become crowded with patients requiring non-urgent care. To alleviate this situation at The Hospital for Sick Children in Toronto, receptionists in the emergency department direct patients requiring urgent care to the emergency room and those requiring non-urgent care to a screening clinic (triage). During a two-month period, 13,551 patients visited the emergency department. The triage receptionist sent 8368 patients to the emergency room and 5183 to the screening clinic. About 45% of patients visiting the emergency room had suffered accidents and injuries, and 19% had respiratory illness; 15% of patient visits resulted in admission to hospital. In contrast to this, 49% of patients sent to the screening clinic had respiratory illness and 18% had infective disease; less than 1% of patients needed hospitalization.

**References:** Can Med Assoc J. 1967 May 13;96(19):1304-8. (PMID: 6023997)  
Am J Public Health Nations Health. 1966 Jul;56(7):1037-56. (PMID: 5949767)  
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Am J Dis Child. 1962 Jul;104:36-44. (PMID: 13867731)  
Can Med Assoc J. 1972 Feb 5;106(3):249-56. (PMID: 5057960)

**Entry Date(s):** *Date Created:* 19740504 *Date Completed:* 19740617 *Latest Revision:* 20181130

**Update Code:** 20250114

**PubMed Central ID:** PMC1947722

**PMID:** 4823110

**Database:** MEDLINE Complete

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**Record: 70**

**Title:** Emergency department overcrowding and children.

**Authors:** Hostetler MA

Mace S

Brown K

Finkler J

Hernandez D

Krug SE

Schamban N

**Source:** Pediatric Emergency Care; 2007 Jul, Vol. 23 Issue 7, p507-515, 9p

**Publication Year:** 2007

**Document Type:** Journal Article

**ISSN:** 07495161

**DOI:** 10.1097/01.pec.0000280518.36408.74

**Accession Number:** 106171472

**Database:** Complementary Index

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**Record: 71**

**Title:** Factors associated with admission to bed-based care: observational prospective cohort study in a multidisciplinary same day emergency care unit (SDEC).

**Authors:** Elias TCN; Wolfson Centre for Prevention of Stroke and Dementia, Nuffield Department of Clinical Neurosciences, John Radcliffe Hospital, and the University of Oxford, Wolfson Building, Oxford, OX3 9DU, England.; Departments of Acute Internal Medicine and Geratology, Oxford University Hospitals NHS Foundation Trust, John Radcliffe Hospital, Oxford, OX3 9DU, England.

Bowen J; Departments of Acute Internal Medicine and Geratology, Oxford University Hospitals NHS Foundation Trust, John Radcliffe Hospital, Oxford, OX3 9DU, England.

Hassanzadeh R; Departments of Acute Internal Medicine and Geratology, Oxford University Hospitals NHS Foundation Trust, John Radcliffe Hospital, Oxford, OX3 9DU, England.

Lasserson DS; PIONEER Health Data Research Hub, Institute for Applied Health Research, University of Birmingham, Birmingham, B15

2TT, England.; Department of Acute Medicine, City Hospital, Sandwell and West Birmingham Hospitals NHS Trust, Birmingham, B18 7QH, England.

Pendlebury ST; Wolfson Centre for Prevention of Stroke and Dementia, Nuffield Department of Clinical Neurosciences, John Radcliffe Hospital, and the University of Oxford, Wolfson Building, Oxford, OX3 9DU, England. sarah.pendlebury@ndcn.ox.ac.uk.; Departments of Acute Internal Medicine and Geratology, Oxford University Hospitals NHS Foundation Trust, John Radcliffe Hospital, Oxford, OX3 9DU, England. sarah.pendlebury@ndcn.ox.ac.uk.; NIHR Oxford Biomedical Research Centre, John Radcliffe Hospital, Oxford, OX3 9DU, England. sarah.pendlebury@ndcn.ox.ac.uk.

**Source:** BMC geriatrics [BMC Geriatr] 2021 Jan 06; Vol. 21 (1), pp. 8. *Date of Electronic Publication:* 2021 Jan 06.

**Publication Type:** Journal Article; Observational Study; Research Support, Non-U.S. Gov't

**Language:** English

**Journal Info:** *Publisher:* BioMed Central *Country of Publication:* England *NLM ID:* 100968548 *Publication Model:* Electronic *Cited Medium:* Internet *ISSN:* 1471-2318 (Electronic) *Linking ISSN:* 14712318 *NLM ISO Abbreviation:* BMC Geriatr *Subsets:* MEDLINE

**Imprint Name(s):** *Original Publication:* London : BioMed Central, [2001]-

**MeSH Terms:** Frailty\*/diagnosis

Frailty\*/epidemiology

Frailty\*/therapy

Hospitalization\*

Aged ; Aged, 80 and over ; Cohort Studies ; Emergency Service, Hospital ; Female ; Frail Elderly ; Geriatric Assessment ; Humans ; Prospective Studies

**Abstract:** **Background:** The development of ambulatory emergency care services, now called 'Same Day Emergency Care' (SDEC) has been advocated to provide sustainable high quality healthcare in an ageing population. However, there are few data on SDEC and the factors associated with successful ambulatory care in frail older people. We therefore undertook a prospective observational study to determine i) the clinical characteristics and frailty burden of a cohort in an SDEC designed around the needs of older patients and ii) the factors associated with hospital admission within 30-days after initial assessment.

**Methods:** The study setting was the multidisciplinary Abingdon Emergency Medical Unit (EMU) located in a community hospital and led by a senior interface physician (geriatrician or general practitioner). Consecutive patients from August-December 2015 were assessed using a structured paper proforma including cognitive/delirium screen, comorbidities, functional, social, and nutritional status. Physiologic parameters were recorded. Illness severity was quantified using the Systemic Inflammatory Response Syndrome (SIRS> 1). Factors associated with hospitalization within 30-days were determined using multivariable logistic regression.

**Results:** Among 533 patients (median (IQR) age = 81 (68-87), 315 (59%) female), 453 (86%) were living at home but 283 (54%) required

some form of care and 299 (56%) had Barthel< 20. Falls, urinary incontinence and dementia affected 81/189 (43%), 50 (26%) and 40 (21%) of those aged > 85 years." Severe illness was present in 148 (28%) with broadly similar rates across age groups. Overall, 210 (39%) patients had a hospital admission within 30-days with higher rates in older patients: 96 (87%) of < 65 years remained on an ambulatory pathway versus only 91 (48%) of ≥ 85 years ( $p < 0.0001$ ). Factors independently associated with hospital admission were severe illness (SIRS/point, OR = 1.46, 95% CI = 1.15-1.87,  $p = 0.002$ ) and markers of frailty: delirium (OR = 11.28, 3.07-41.44,  $p < 0.0001$ ), increased care needs (OR = 3.08, 1.55-6.12,  $p = 0.001$ ), transport requirement (OR = 1.92, 1.13-3.27), and poor nutrition (OR = 1.13-3.79,  $p = 0.02$ ).

**Conclusions:** Even in an SDEC with a multidisciplinary approach, rates of hospital admission in those with severe illness and frailty were high. Further studies are required to understand the key components of hospital bed-based care that need to be replicated by models delivering acute frailty care closer to home, and the feasibility, cost-effectiveness and patient/carer acceptability of such models.

- References:** Br J Gen Pract. 2019 Aug;69(685):e555-e560. (PMID: 31308000)  
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 Clin Med (Lond). 2012 Oct;12(5):420-6. (PMID: 23101140)  
 Future Hosp J. 2016 Jun;3(2):106-108. (PMID: 31098198)  
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CMAJ. 2005 Aug 30;173(5):489-95. (PMID: 16129869)  
Scott Med J. 1957 May;2(5):200-15. (PMID: 13432835)  
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BMJ Open. 2015 Nov 16;5(11):e007808. (PMID: 26576806)  
Crit Care. 2007;11(2):R31. (PMID: 17331245)

**Grant Information:** AC14/046 National Institute for Health Research RCF translational fellowship

**Contributed Indexing:** *Keywords:* Ambulatory care; Bed-based care; Delirium; Frailty; Hospital admission; Multi-morbidity; Predictive factors; Same day emergency care

**Entry Date(s):** *Date Created:* 20210107 *Date Completed:* 20210423 *Latest Revision:* 20210423

**Update Code:** 20250114

**PubMed Central ID:** PMC7788859

**DOI:** 10.1186/s12877-020-01942-9

**PMID:** 33407210

**Database:** MEDLINE Complete

## Factors associated with admission to bed-based care: observational prospective cohort study in a multidisciplinary same day emergency care unit (SDEC)

**Background:** The development of ambulatory emergency care services, now called 'Same Day Emergency Care' (SDEC) has been advocated to provide sustainable high quality healthcare in an ageing population. However, there are few data on SDEC and the factors associated with successful ambulatory care in frail older people. We therefore undertook a prospective observational study to determine i) the clinical characteristics and frailty burden of a cohort in an SDEC designed around the needs of older patients and ii) the factors associated with hospital admission within 30-days after initial assessment. **Methods:** The study setting was the multidisciplinary Abingdon Emergency Medical Unit (EMU) located in a community hospital and led by a senior interface physician (geriatrician or general practitioner). Consecutive patients from August–December 2015 were assessed using a structured paper proforma including cognitive/delirium screen, comorbidities, functional, social, and nutritional status. Physiologic parameters were recorded. Illness severity was quantified using the Systemic Inflammatory Response Syndrome (SIRS > 1). Factors associated with hospitalization within 30-days were determined using multivariable logistic regression. **Results:** Among 533 patients (median (IQR) age = 81 (68–87), 315 (59%) female), 453 (86%) were living at home but 283 (54%) required some form of care and 299 (56%) had Barthel < 20. Falls, urinary incontinence and dementia affected 81/189 (43%), 50 (26%) and 40 (21%) of those aged > 85 years. Severe illness was present in 148 (28%) with broadly similar rates across age groups. Overall, 210 (39%) patients had a hospital admission within 30-days with higher rates in older patients: 96 (87%) of < 65 years remained on an ambulatory pathway versus only 91 (48%) of ≥ 85 years ( $p < 0.0001$ ). Factors independently associated with hospital admission were severe illness (SIRS/point, OR = 1.46, 95% CI = 1.15–1.87,  $p = 0.002$ ) and markers of frailty: delirium (OR = 11.28, 3.07–41.44,  $p < 0.0001$ ), increased care needs (OR = 3.08, 1.55–6.12,  $p = 0.001$ ), transport requirement (OR = 1.92, 1.13–3.27), and poor nutrition (OR = 1.13–3.79,  $p = 0.02$ ). **Conclusions:** Even in an SDEC with a multidisciplinary approach, rates of hospital admission in those with severe illness and frailty were high. Further studies are required to understand the key components of hospital bed-based care that need to be replicated by models delivering acute frailty care closer to home, and the feasibility, cost-effectiveness and patient/carer acceptability of such models.

Keywords: Same day emergency care; Ambulatory care; Predictive factors; Hospital admission; Bed-based care; Frailty; Delirium; Multi-morbidity

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1186/s12877-020-01942-9>.

## Background

Major restructuring of existing clinical services is required to provide sustainable high quality healthcare for increasing numbers of older people with complex co-morbidity [[ 1]–[ 3]]. In the United Kingdom, the Royal College of Physicians' has called for an 'ambulatory by default' approach (Future Hospital Commission) [[ 1]] particularly for frail/older patients who are frequent users of acute internal medicine services, have high rates of hospital admission for conditions considered suitable for ambulatory care [[ 3]] and may be harmed by unnecessary in-patient stays [[ 4]]. To achieve high quality care will require a multidisciplinary approach [[ 6]–[ 8]], incorporating comprehensive geriatric assessment [[ 9]] and NHS England has developed a support programme to encourage the development of ambulatory emergency care services, now called 'Same Day Emergency Care' (SDEC) [[10]].

However, there are few data on SDEC and particularly on the factors associated with successful ambulatory care in older and co-morbid patients with frailty where hospitalization rates are high [[12]]. Studies of SDEC in younger cohorts or services dedicated to specific conditions (e.g. heart failure, pulmonary embolism, syncope) [[12]] may not be applicable to older patients in whom multi-morbidity, frailty and non-specific presentations of disease are common. Data from emergency departments/medical units suggest that SDEC is used less frequently in older, frail people [[13]]. Small studies suggest SDEC may reduce admissions in carefully selected older patients, although numbers are too small to draw firm conclusions regarding later readmission rates [[14]], and the care model is liked by patients [[16]].

In the current study, we report data from a specialist-led community hospital-based SDEC unit with multidisciplinary team input and inclusive referral criteria, locally termed the ambulatory emergency multidisciplinary unit (EMU). The EMU was set up with the specific aim to provide ambulatory emergency care focused on the needs of unselected older adults with acute medical illness. Using data from a consecutive cohort of predominantly older patients prospectively assessed in the EMU, we determined i) the case-mix and frailty burden of the cohort and ii) the factors associated with any use of bed-based care (any hospital admission) up to 30 days after initial EMU assessment.

## Methods

### Setting

The EMU was set up in 2010 following a commitment by the Oxford University Hospitals NHS Foundation Trust (OUHFT) to develop ambulatory emergency care pathways for older people. The service subsequently won the Guardian Healthcare Innovation Award in 2013 [[17]]. Although the EMU was designed to be responsive to the needs of frail older patients, it is not exclusively for older patients and younger people may also be referred to the service. The EMU is based in Abingdon Community Hospital and includes six in-patient beds for EMU patients requiring hospital admission from a catchment population of approximately 140,000. The regional district general hospital services including the emergency department are located in the OUHFT approximately 10 miles away. The EMU comprises six assessment cubicles and two rooms and is staffed 7 days a week by a consultant geriatrician or final year trainee geriatrician, or experienced general practitioner (GP) with skills in acute medicine and geriatric medicine (locally termed 'Senior Interface Physician'), a primary care trainee doctor, a nursing team (of advanced practitioners, staff nurses and associate practitioners), an occupational therapist, a physiotherapist and a social worker.

Emergency referrals of adult medical patients are made by primary care physicians, paramedics or local acute in-patient services (patients cannot self-present to the service). Local primary care clinicians and ambulance crews were made aware of the service by written information and regular educational sessions organised by a primary care physician working in both EMU and a local primary care practice. Referrers call directly through to the senior clinician or nurse, and patients are then seen on the same day, given a future appointment, directed to an alternative service, or treated in the community without EMU attendance. There are no absolute exclusions to EMU assessment with patient-centred

decisions being made for each individual. However, patients with high degrees of acuity (severe physiologic instability, acute coronary syndromes, acute stroke, trauma, surgical emergencies) without advance care plans are routinely redirected to the acute hospital. At the time of this study, a dedicated EMU patient transport service was available if required.

Point-of-care blood testing provides results within minutes (electrolytes, creatinine, haemoglobin, C-reactive protein, troponin, lactate, blood gases, prothrombin time). Additional laboratory-based tests are sent for analysis to the OUHFT (results accessible within 24 h). Plain x-ray is available on site. For additional imaging (e.g. computed tomography, ultrasound), slots are arranged at the OUHFT. Intravenous treatments (including blood products) can be administered in EMU and there is a wide stock of oral medications, supplemented by access to a nearby pharmacy by prescription. Equipment to aid functional ability can be provided by therapists and a dedicated social worker is available to facilitate discharge-planning. Resuscitation equipment is available for advanced adult life support.

After assessment in EMU, patients may be discharged (with or without further review in EMU or elsewhere), referred for domiciliary treatment by the 'Hospital at Home' nursing team (who are able to administer intravenous treatments and carry out phlebotomy) or admitted to a hospital bed in the Abingdon Hospital or the OUHFT.

### Patient cohort

All consecutive patients referred for assessment in EMU between August–December 2015 were included in the current study. There were no exclusion criteria. All data were routinely acquired as part of standard patient care and anonymized data were entered into the Oxford Cognitive Co-morbidity and Frailty Ageing Research Database (ORCHARD). ORCHARD was specifically set-up to inform the care of older and frail patients and has a patient and public involvement group including older patients and carers which informs study planning and design [[18]]. The local research ethics committee (REC reference 18/SC/0184) has approved the use of ORCHARD data for research purposes waiving the need for informed consent, and the agreement of the OUHFT Divisional Management was also obtained for this substudy (Datix Number 3812).

Patients were prospectively assessed using a structured paper clerking proforma to ensure systematic and standardized recording of the history and examination findings as described previously [[19]], by clinicians working in EMU (JB, TE, RH). The clerking proforma includes a cognitive screen with the Confusion Assessment Method (CAM) [[20]], cognitive test (the abbreviated mental test score (AMTS) [[21]]) and documentation of diagnosed dementia and delirium, validated for use in the emergency medical setting [[22]]. Demographic data, presenting complaint, past medical and drug history, living arrangements, transport requirements, care needs ('care' was defined as regular (from weekly to 24-hourly) help with instrumental (e.g. shopping or cleaning) or personal (e.g. washing or dressing) activities of daily living), and number of comorbidities were recorded from the patient, relatives or carers, and GP and medical records. The Charlson index for comorbidities was calculated [[23]]. Barthel Index of Activities of Daily Living [[24]] and modified Rankin Scale (mRS) [[25]] were recorded for level of functional dependence. The Braden Scale [[26]], to quantify pressure ulcer risk, and the Malnutrition Universal Screening Tool (MUST) [[27]] were recorded by nursing staff.

Although no specific frailty scale/score was measured, we used data from the comprehensive geriatric assessment undertaken as part of the EMU assessment to provide proxy measures or "markers of frailty". Markers of frailty included reduced function (need for care, history of falls, decline in mobility), visual or hearing impairment, incontinence, poor nutrition (MUST score), pressure sore risk, and impaired cognition (delirium, dementia, AMTS score). Clinicians were also asked to answer the following questions: "Do you judge the patient to be frail?", and "Do you judge the patient to be clinically dehydrated?"

Physiological parameters on admission (pulse, temperature, systolic and diastolic blood pressure, oxygen saturation and respiratory rate) were taken from the patient chart. Illness severity was quantified using the Systemic Inflammatory Response Syndrome (SIRS) score [[28]] and National Early Warning Score (NEWS) [[29]] as these require only routinely collected clinical data. Severe illness was defined as SIRS > 1, and NEWS > 4. Anaemia was diagnosed when both haemoglobin level was less than the local laboratory reference range and this was relevant to the primary presenting complaint. Acute kidney injury (AKI) was defined as Stage 1 or above of the Acute Kidney Injury Network (AKIN) Classification [[30]].

Outcomes

Ambulatory care status was defined as living at home vs any hospital admission, within 30 days from the first assessment in EMU. EMU patients requiring acute hospital admission are admitted either to the dedicated in-patient beds at Abingdon community hospital or to the OUHFT acute hospital in-patient services. Ambulatory status was recorded by the clinical researchers embedded in EMU (JB, TE, RH) supplemented by hand-searching of EMU paper and electronic records and OUHFT electronic records. 30-day ambulatory outcome data were unavailable for 8 patients (5 aged < 65 years, 2 aged 65–84 years and 1 aged ≥ 85 years). Mortality data was obtained from EMU and OUHFT electronic records with follow-up for death to 1 year. Mortality data were unavailable for 12 patients who were normally resident outside the region.

Statistical analyses

Any patient re-referred with a new illness episode during the study was included as a separate new case, but the first illness episode only was used for mortality analyses. Missing data were < 5% for all variables (see Additional file 1: Table 1). Missing data were not imputed except for white cell count (not always done in relatively well patients) and AMTS which were imputed as normal.

Differences in clinical characteristics across age groups, defined as < 65, 65–84 and ≥ 85 years, were compared using ANOVA for continuous variables and chi square for categorical variables. Associations between potential predictive factors and any bed-based care at 30 day follow up were determined by binary logistic regression to generate odds ratios adjusted for age and sex. In view of the number of potentially important co-variables associated with admission to bed based care after an initial assessment in the ambulatory setting, we highlighted those variables significant at  $p < 0.001$  i.e. those variables that remained significant after adopting a Bonferroni correction. We also compared univariable associates of admission adjusted for age and sex between patients with immediate hospital admission from EMU with those admitted later within the 30-days.

To determine the independent associates of any bed-based care, univariable associates significant at the  $p < 0.1$  level were entered into a multivariable logistic regression model with forward selection. The SIRS and NEWS were each entered into the models separately. Items not routinely measured in most acute care services at the point of first patient assessment (MUST, Braden, mRS, Barthel, and Charlson index scores) were omitted from the primary analyses but included in additional analyses presented in the Additional file 1. Models were run with and without inclusion of patients with delirium to determine the factors associated with admission in non-delirious patients since delirium was strongly associated with admission. Prior to modelling, variables were assessed for collinearity (tolerance statistic < 0.4), and all had tolerances of > 0.5. Statistical analyses were performed using SPSS version 25.

Results

Five hundred and thirty three consecutive new patient referrals (mean/SD age = 75.0/17.5 years, median (IQR) age = 81 (68–87) years, range 18–102, 416 (78%) aged ≥65 years, 189 (35%) aged ≥ 85 years; 315 (59%) female) were assessed in EMU over the four-month study period (Table 1, Fig. 1). Most patients were referred by their primary care practitioner (Table 1). Nearly half of patients used the dedicated EMU transport service at least once to reach the EMU with higher rates in older patients: 115 (51%) and 129 (68%) for 65–84 years and ≥ 85 years respectively (Table 1).

Table 1 Cohort descriptives including patient demographics, co-morbidity and markers of frailty by age group (< 65 years, 65–84 years and ≥ 85 years)

| Age group, years |         |         |         |   |
|------------------|---------|---------|---------|---|
| All              | < 65    | 65–84   | ≥ 85    | p |
| N = 533          | N = 117 | N = 227 | N = 189 |   |

Demographics & Living Arrangements

|                                           | Age group, years |           |          |          |          |
|-------------------------------------------|------------------|-----------|----------|----------|----------|
|                                           | All              | < 65      | 65–84    | ≥ 85     | p        |
|                                           | N = 533          | N = 117   | N = 227  | N = 189  |          |
| Age, mean/SD years                        | 75.0/17.5        | 47.0/13.3 | 77.1/5.4 | 89.7/3.6 | < 0.0001 |
| Female                                    | 315 (59)         | 63 (54)   | 130 (57) | 122 (65) | 0.14     |
| Living in own home                        | 453 (86)         | 113 (97)  | 197 (88) | 143 (78) | < 0.0001 |
| Living alone                              | 212 (40)         | 31 (27)   | 85 (38)  | 96 (51)  | < 0.0001 |
| Any care (formal, informal, or care home) | 283 (54)         | 17 (15)   | 125 (55) | 141 (77) | < 0.0001 |
| Informal care (family, friends)           | 173 (32)         | 11 (9)    | 82 (36)  | 80 (42)  | < 0.0001 |
| Care package in own home                  | 126 (24)         | 8 (7)     | 55 (24)  | 63 (33)  | < 0.0001 |
| Care home or supported living             | 71 (13)          | 3 (3)     | 27 (12)  | 41 (22)  | < 0.0001 |
| Referrer and transport                    |                  |           |          |          |          |
| GP                                        | 443 (83)         | 106 (91)  | 185 (81) | 152 (80) | 0.01     |
| Paramedic                                 | 55 (10)          | 3 (3)     | 24 (11)  | 28 (15)  |          |
| Other                                     | 35 (7)           | 8 (7)     | 16 (7)   | 9 (5)    |          |
| Dedicated EMU transport required          | 261 (49)         | 17 (15)   | 115 (51) | 129 (68) | < 0.0001 |
| Co-morbidities                            |                  |           |          |          |          |
| Charlson Comorbidity Index > 3            | 395 (74)         | 18 (15)   | 190 (84) | 187 (99) | < 0.0001 |
| Medications > 7                           | 243 (46)         | 26 (22)   | 129 (57) | 88 (47)  | < 0.0001 |
| Functional status                         |                  |           |          |          |          |
| Barthel Index < 20                        | 299 (56)         | 16 (14)   | 135 (59) | 148 (78) | < 0.0001 |
| Premorbid modified Rankin Scale > 2       | 193 (36)         | 7 (6)     | 91 (40)  | 95 (50)  | < 0.0001 |
| History of falls                          | 143 (27)         | 2 (2)     | 60 (26)  | 81 (43)  | < 0.0001 |
| Visual impairment                         | 65 (12)          | 2 (2)     | 29 (13)  | 34 (18)  | < 0.0001 |
| Hearing impairment                        | 85 (16)          | 4 (3)     | 27 (12)  | 54 (29)  | < 0.0001 |
| Urinary incontinence <sup>a</sup>         | 91 (17)          | 6 (5)     | 35 (15)  | 50 (26)  | < 0.0001 |
| Faecal incontinence or stoma              | 42 (8)           | 3 (3)     | 24 (11)  | 15 (8)   | 0.03     |
| Cognitive status                          |                  |           |          |          |          |
| Diagnosis of dementia                     | 75 (14)          | 0 (0)     | 35 (15)  | 40 (21)  | < 0.0001 |
| Nutrition                                 |                  |           |          |          |          |
| Poor nutritional status (MUST > 0)        | 105 (20)         | 9 (8)     | 50 (22)  | 46 (24)  | < 0.0001 |
| Patient's perception of any weight loss   | 189 (35)         | 6 (5)     | 49 (22)  | 42 (22)  | < 0.0001 |

| Age group, years |         |         |         |   |
|------------------|---------|---------|---------|---|
| All              | < 65    | 65–84   | ≥ 85    | p |
| N = 533          | N = 117 | N = 227 | N = 189 |   |

Other Frailty markers

|                                        |          |         |          |          |          |
|----------------------------------------|----------|---------|----------|----------|----------|
| Pressure sore risk (Braden Score < 19) | 180 (34) | 3 (3)   | 84 (38)  | 93 (50)  | < 0.0001 |
| Clinical impression of frailty         | 246 (46) | 12 (10) | 104 (46) | 130 (70) | < 0.0001 |

<sup>a</sup>includes urinary catheters

Graph: Fig. 1 Flow diagram showing the patient cohort and the number admitted immediately from EMU, the number initially managed on an ambulatory pathway, the number admitted after initial EMU assessment but within 30-days, and the number remaining on an ambulatory pathway at 30-days

Residence, disability and dependency, co-morbidity and frailty

Although the majority of patients were resident in their own home, rates of disability and dependency were high especially in the oldest age group in whom 141 (77%) required some form of care input, 95 (50%) had mRS > 2 and 148 (78%) had Barthel < 20 (Table 1, Additional file 1: Fig. 1). Although rates were lower in those aged 65–84 years, they were nevertheless substantial: 125 (55%) requiring some form of care, 91 (40%) with mRS > 2 and 135 (59%) with Barthel < 20. As expected, patients aged < 65 years were much less likely to be dependent or disabled (Table 1, Additional file 1: Fig. 1).

In addition to dependency and disability, the cohort overall had a high burden of co-morbidity and pre-existing markers of frailty with substantial variation as expected by age (Table 1, Additional file 1: Figs. 1 and 2). Charlson co-morbidity index > 3 was present in 395 (74%) overall, and 243 (46%) had more than seven prescribed medications. In those aged ≥85 years, 81 (43%) had a history of falls, 50 (26%) had urinary incontinence or a long-term catheter, 72 (38%) had visual or hearing impairment, 40 (21%) had a dementia diagnosis. Other markers of frailty were also prevalent: 130 (70%) were judged to be frail by the assessing clinician, 46 (24%) had poor nutritional status and 93 (50%) were at risk of skin breakdown by Braden score (Table 1, Additional file 1: Fig. 2).

Presenting complaints, illness severity and diagnoses

Older patients often presented with non-specific complaints including decreased mobility (122 (65%) of ≥ 85 years and 120 (53%) of 65–84 years), increased care needs (116 (61%) and 103 (45%)), falls (63 (33%) and 39 (17%)) or change in cognitive status (53 (28%) and 40 (18%)) whereas breathlessness was the most common presentation in younger patients (50 (43%) of < 65 years, Table 2). Other presenting complaints/problems were in keeping with an acute medical admissions unit and patients often reported multiple problems (see Additional file 1: Table 2). Notably, rates of severe illness, defined by SIRS> 1 or NEWS> 4, were broadly similar across age groups with overall rates of 148 (28%) and 102 (19%) respectively. In contrast, delirium affected 46 (24%) of ≥85 years versus only 1 (1%) of < 65 years with low AMTS in 94 (50%) versus 4 (3%, Table 2, Additional file 1: Fig. 2). The majority of patients received blood tests, x-rays and intravenous therapy although older patients were more likely to have existing medications stopped (63 (33%) of ≥ 85 years, 45 (20%) of 65–84 years, Table 2).

Table 2 Presenting complaint, illness severity, acute cognitive status, and diagnoses by age group (< 65 years, 65–84 years and ≥ 85 years)

|                                                                                   | Age group, years |         |          |          |          |
|-----------------------------------------------------------------------------------|------------------|---------|----------|----------|----------|
|                                                                                   | All              | < 65    | 65–84    | ≥ 85     | p        |
|                                                                                   | N = 533          | N = 117 | N = 227  | N = 189  |          |
| Presenting complaint, most frequent <sup>a</sup>                                  |                  |         |          |          |          |
| Decreased mobility                                                                | 256 (48)         | 14 (12) | 120 (53) | 122 (65) | < 0.0001 |
| Increased care needs                                                              | 230 (43)         | 11 (9)  | 103 (45) | 116 (61) | < 0.0001 |
| Breathlessness                                                                    | 198 (37)         | 50 (43) | 79 (35)  | 69 (37)  | 0.34     |
| Falls                                                                             | 106 (20)         | 4 (3)   | 39 (17)  | 63 (33)  | < 0.0001 |
| Fatigue, weight loss, reduced oral intake                                         | 104 (20)         | 17 (15) | 49 (22)  | 38 (20)  | 0.29     |
| Abdominal symptoms (pain, bloating, diarrhoea, nausea, vomiting, constipation)    | 104 (20)         | 28 (24) | 42 (19)  | 34 (18)  | 0.39     |
| Confusion/altered behaviour                                                       | 96 (18)          | 3 (3)   | 40 (18)  | 53 (28)  | < 0.0001 |
| Other respiratory symptoms (cough, wheeze, sore throat)                           | 80 (15)          | 24 (21) | 32 (14)  | 24 (13)  | 0.16     |
| Chest pain/tachycardia/palpitations                                               | 57 (11)          | 20 (17) | 27 (12)  | 10 (5)   | 0.004    |
| Illness severity                                                                  |                  |         |          |          |          |
| NEWS > 4                                                                          | 102 (19)         | 16 (14) | 48 (22)  | 38 (20)  | 0.23     |
| SIRS > 1                                                                          | 148 (28)         | 28 (24) | 69 (30)  | 51 (27)  | 0.67     |
| Diagnosis, most frequent <sup>a</sup>                                             |                  |         |          |          |          |
| Bacterial Infection (LRTI>UTI > cellulitis)                                       | 214 (40)         | 47 (40) | 89 (39)  | 78 (41)  | 0.91     |
| Dehydration (clinical diagnosis)                                                  | 163 (31)         | 18 (15) | 73 (32)  | 72 (38)  | < 0.0001 |
| Anaemia                                                                           | 66 (12)          | 16 (14) | 28 (12)  | 22 (12)  | 0.75     |
| Electrolyte derangement                                                           | 58 (11)          | 5 (4)   | 27 (12)  | 26 (14)  | 0.03     |
| Heart Failure                                                                     | 57 (11)          | 3 (3)   | 21 (9)   | 33 (17)  | < 0.0001 |
| Acute Kidney Injury                                                               | 51 (10)          | 5 (4)   | 24 (11)  | 22 (12)  | 0.15     |
| Acute cognitive assessment                                                        |                  |         |          |          |          |
| Delirium                                                                          | 87 (16)          | 1 (1)   | 40 (18)  | 46 (24)  | < 0.0001 |
| AMTS < 9                                                                          | 160 (30)         | 4 (3)   | 62 (27)  | 94 (50)  | < 0.0001 |
| Diagnostics and Interventions                                                     |                  |         |          |          |          |
| Point-of-care blood test                                                          | 444 (83)         | 89 (76) | 193 (85) | 162 (86) | 0.06     |
| Laboratory blood test                                                             | 396 (74)         | 80 (68) | 170 (75) | 146 (77) | 0.22     |
| Any X-ray                                                                         | 302 (57)         | 48 (41) | 130 (57) | 124 (66) | < 0.0001 |
| Intravenous treatment (e.g. antibiotics, blood, iron, or furosemide)              | 305 (57)         | 57 (49) | 129 (57) | 119 (63) | 0.05     |
| Oral medication (e.g. antibiotics, analgesia, end of life medications, laxatives) | 241 (45)         | 48 (41) | 105 (46) | 88 (47)  | 0.59     |

|                                             | Age group, years |                 |                  |                 | p        |
|---------------------------------------------|------------------|-----------------|------------------|-----------------|----------|
|                                             | All<br>N = 533   | < 65<br>N = 117 | 65–84<br>N = 227 | ≥ 85<br>N = 189 |          |
| Medication stopped                          | 116 (22)         | 8 (7)           | 45 (20)          | 63 (33)         | < 0.0001 |
| Therapy input required                      | 94 (18)          | 4 (3)           | 40 (18)          | 50 (26)         | < 0.0001 |
| Ambulatory outcome                          |                  |                 |                  |                 |          |
| Remained ambulatory at 30 days <sup>b</sup> | 315 (60)         | 96 (87)         | 128 (57)         | 91 (48)         | < 0.0001 |
| Ambulatory pathway after first assessment   | 381 (71)         | 109 (93)        | 153 (67)         | 119 (63)        | < 0.0001 |
| Admitted to hospital after first assessment | 152 (29)         | 8 (7)           | 74 (33)          | 70 (37)         |          |
| Acute Hospital                              | 47 (9)           | 5 (4)           | 25 (11)          | 17 (9)          |          |
| EMU Bed                                     | 90 (17)          | 3 (3)           | 42 (19)          | 45 (24)         |          |
| Other Community Hospital                    | 15 (2)           | 0 (0)           | 7 (3)            | 8 (4)           |          |
| Unplanned admission within 30 days          | 58 (11)          | 8 (5)           | 23 (10)          | 27 (14)         |          |
| Mortality                                   |                  |                 |                  |                 |          |
| Death ≤ 30 days                             | 31 (6)           | 1 (0)           | 14 (6)           | 16 (10)         | 0.03     |
| Death ≤ 1 year <sup>c</sup>                 | 138 (28)         | 7 (6)           | 57 (26)          | 74 (42)         | < 0.0001 |

<sup>a</sup>Patients could have more than one presenting complaint or diagnosis <sup>b</sup>For 8 patients, 30-day outcome was unavailable <sup>c</sup>Data unavailable on 10 patients *LRTI* lower respiratory tract infection, *UTI* urinary tract infection

Of the most common diagnoses, bacterial infection occurred in 214 (40%, of which 111 (52%) were respiratory) with similar rates across age groups. Dehydration and heart failure (both  $p < 0.0001$ ), and to a lesser extent, electrolyte disturbance ( $p = 0.03$ ), were more common in older patients but anaemia and acute kidney injury (AKI) showed no significant age-related variation (Table 2, Additional file 1: Table 3).

### Patient outcomes

Overall, 210 (39%) of patients were admitted to hospital for bed-based care by 30-days (Fig. 1). The oldest patients were least likely to remain on an ambulatory pathway: 96 (87%) of those aged < 65 years remained ambulatory versus only 91 (48%) of those aged ≥ 85 years ( $p < 0.0001$ , Table 2, Fig. 2). Most of the 210 patients requiring hospital bed-based care were admitted immediately following first EMU assessment rather than subsequently: 152/210 (72%) versus 58 (28%, Table 2, Figs. 1 and 2). Immediate admission was usually to an EMU in-patient bed (90/152 (59%)) with the majority of the remainder going to the regional acute hospital (OUHFT, Table 2). In the oldest patient group, 16 (10%) had died within 30 days and 74 (42%) by 1 year compared to 14 (6%) and 57 (26%) in those aged 65–84 years and 1 and 7 (6%) in those aged < 65 years ( $p < 0.0001$ , Table 2). Most deaths within 30-days (25/31) occurred in admitted patients (Fig. 1).

Graph: Fig. 2 Proportion of patients remaining on an ambulatory pathway at 30 days by age group (< 65 years, 65–84 years and ≥ 85 years) versus hospital admission immediately ie directly from EMU assessment or within 30-days after initial EMU assessment

### Factors associated with admission for bed-based care

Factors associated with non-ambulatory status at 30 days are shown in Table 3 with adjustment for age and sex and with factors significant at the  $p < 0.001$  level shown in bold (ie with the significance level corrected for the number of variables). Non-ambulatory patients were older than ambulatory patients (mean/sd age = 81.4/17.5 vs 71.5/18.6 years,  $p < 0.0001$ ) and had more frailty and severe illness. There were associations with measures of disability/dependency including need for transport (OR = 2.84, 1.91–4.24,  $p < 0.0001$ ), any care at home (OR = 2.17, 1.42–3.31,  $p < 0.0001$ ), mRS > 2 (OR = 1.76, 1.48–2.09,  $p < 0.0001$ ), referral with increased care needs (OR = 7.61, 4.94–11.74,  $p < 0.0001$ ), and requirement for therapy input (4.32, 2.87–6.51,  $p < 0.0001$ ). Strong associations (all  $p < 0.0001$ ) were also seen for cognitive factors including delirium (OR = 17.54, 8.17–37.66), presentation with confusion or altered behaviour (OR = 7.04, 4.05–12.24), low AMTS (OR = 3.32, 2.17–5.08) and dementia (OR = 2.65, 1.56–4.50,  $p < 0.0001$ ).

Table 3 Factors associated with ambulatory versus non-ambulatory status at 30 days (OR and  $p$  values shown adjusted for age and sex), bold values are those significant at the  $p = 0.001$  level

|                                         | <b>AmbulatoryAdmitted</b>  |                | <b>OR</b> | <b>CI (95%)</b> | <b>p</b> |
|-----------------------------------------|----------------------------|----------------|-----------|-----------------|----------|
|                                         | <b>n = 315<sup>a</sup></b> | <b>n = 210</b> |           |                 |          |
| <b>Demographics and Transport</b>       |                            |                |           |                 |          |
| Age (mean +/- SD)                       | 71.5 (18.6)                | 81.4 (17.5)    |           |                 |          |
| Female                                  | 187 (59.4)                 | 124 (59.1)     | 0.87      | 0.60–1.23       | 0.45     |
| Transport required                      | 115 (36.5)                 | 145 (69.7)     | 2.84      | 1.91–4.24       | < 0.0001 |
| <b>Co-morbidities</b>                   |                            |                |           |                 |          |
| Charlson Score > 3                      | 204 (64.8)                 | 188 (89.5)     | 2.46      | 1.24–4.89       | 0.01     |
| Number of medications> 7                | 133 (42.2)                 | 108 (51.4)     | 1.14      | 0.79–1.64       | 0.50     |
| <b>Physical Frailty markers</b>         |                            |                |           |                 |          |
| Any care at home                        | 135 (42.9)                 | 144 (70.9)     | 2.17      | 1.42–3.31       | < 0.0001 |
| Modified Rankin Scale > 2               | 149 (47.3)                 | 177 (84.3)     | 1.76      | 1.48–2.09       | < 0.0001 |
| Barthel< 20                             | 145 (46.0)                 | 151 (71.9)     | 1.99      | 1.30–3.05       | 0.001    |
| History of falls                        | 56 (17.8)                  | 86 (41.3)      | 2.30      | 1.51–3.50       | < 0.0001 |
| Visual impairment                       | 27 (8.6)                   | 36 (17.1)      | 1.74      | 1.01–3.01       | 0.05     |
| Hearing impairment                      | 36 (11.4)                  | 48 (22.9)      | 1.57      | 0.95–2.57       | 0.08     |
| Urinary incontinence <sup>b</sup>       | 45 (14.3)                  | 67 (32.2)      | 2.03      | 1.28–3.21       | 0.002    |
| Faecal incontinence or stoma            | 17 (5.4)                   | 40 (19.2)      | 3.44      | 1.85–6.41       | < 0.0001 |
| MUST> 0                                 | 46 (14.6)                  | 58 (27.6)      | 1.87      | 1.19–2.94       | 0.007    |
| Braden score < 19                       | 62 (19.7)                  | 115 (54.8)     | 3.62      | 2.38–5.50       | < 0.0001 |
| Patient's perception of any weight loss | 41 (13.0)                  | 56 (26.7)      | 1.74      | 1.18–2.55       | 0.005    |
| Therapy input required                  | 58 (18.4)                  | 117 (55.7)     | 4.32      | 2.87–6.51       | < 0.0001 |
| Clinician imp. of frailty               | 104 (33.0)                 | 140 (67.3)     | 3.05      | 2.03–4.58       | < 0.0001 |

|                                | <b>AmbulatoryAdmitted OR</b> |                | <b>CI (95%)</b> |            | <b>p</b> |
|--------------------------------|------------------------------|----------------|-----------------|------------|----------|
|                                | <b>n = 315<sup>a</sup></b>   | <b>n = 210</b> |                 |            |          |
| Cognitive frailty markers      |                              |                |                 |            |          |
| Dementia                       | 25 (7.9)                     | 50 (24.0)      | 2.65            | 1.56–4.50  | < 0.0001 |
| Delirium                       | 8 (2.5)                      | 78 (37.1)      | 17.54           | 8.17–37.66 | < 0.0001 |
| AMTS < 9                       | 56 (17.8)                    | 104 (49.5)     | 3.32            | 2.17–5.08  | < 0.0001 |
| Presenting complaint           |                              |                |                 |            |          |
| Shortness of breath            | 130 (41.3)                   | 64 (30.8)      | 0.65            | 0.44–0.95  | 0.025    |
| Confusion/altered behaviour    | 19 (6.0)                     | 77 (37.0)      | 7.04            | 4.05–12.24 | < 0.0001 |
| Decreased mobility             | 101 (32.1)                   | 152 (73.1)     | 4.40            | 2.93–6.61  | < 0.0001 |
| Increased care needs           | 74 (23.5)                    | 153 (73.6)     | 7.61            | 4.94–11.74 | < 0.0001 |
| Falls                          | 44 (14.0)                    | 62 (29.8)      | 1.87            | 1.15–2.94  | 0.007    |
| Illness severity and diagnosis |                              |                |                 |            |          |
| SIRS > 1                       | 75 (23.8)                    | 82 (39.0)      | 2.31            | 1.54–3.46  | < 0.0001 |
| NEWS > 4                       | 42 (13.3)                    | 59 (28.1)      | 2.47            | 1.56–3.93  | < 0.0001 |
| Any bacterial infection        | 106 (33.7)                   | 104 (50.0)     | 2.09            | 1.43–3.04  | < 0.0001 |
| Clinical dehydration           | 66 (21.0)                    | 95 (45.7)      | 2.66            | 1.79–3.95  | < 0.0001 |
| Anaemia                        | 56 (17.8)                    | 14 (6.7)       | 0.30            | 0.16–0.56  | < 0.0001 |
| Electrolyte derangement        | 27 (8.6)                     | 30 (14.3)      | 1.45            | 0.83–2.56  | 0.19     |
| Heart failure                  | 33 (10.5)                    | 24 (11.4)      | 0.78            | 0.44–1.39  | 0.41     |
| AKI                            | 22 (7.0)                     | 29 (13.9)      | 1.65            | 1.09–2.51  | 0.02     |
| Diagnostics                    |                              |                |                 |            |          |
| Point-of-care blood test       | 245 (77.8)                   | 193 (91.9)     | 3.05            | 1.71–5.44  | < 0.0001 |
| Laboratory blood test          | 225 (71.4)                   | 167 (79.5)     | 1.49            | 1.00–2.29  | 0.07     |
| Any X-ray                      | 155 (49.2)                   | 144 (69.2)     | 2.06            | 1.41–3.02  | < 0.0001 |
| Intravenous treatment          | 161 (51.1)                   | 139 (66.8)     | 1.74            | 1.19–2.53  | 0.004    |
| Oral medication                | 133 (42.2)                   | 106 (50.5)     | 1.39            | 0.96–2.00  | 0.08     |
| Medication stopped             | 54 (17.1)                    | 62 (29.5)      | 1.55            | 1.00–2.40  | 0.05     |
| Mortality                      |                              |                |                 |            |          |
| Death < 30 days                | 6 (1.9)                      | 25 (11.9)      | 5.60            | 2.23–14.09 | < 0.0001 |
| Death < 1 year                 | 44 (14.0)                    | 83 (39.5)      | 3.52            | 2.27–5.45  | < 0.0001 |

<sup>a</sup>30-day outcomes were unavailable for 8 patients. <sup>b</sup>includes urinary catheters

Physical frailty markers were associated (all  $p < 0.0001$ ) with admission for bed-based care including referral with decreased mobility (OR = 4.40, 2.93–6.61,  $p < 0.0001$ ), faecal incontinence (OR = 3.44, 1.85–6.41,  $p < 0.0001$ ), pressure sore risk (OR = 3.62, 2.38–5.50,  $p < 0.0001$ ), clinical impression of frailty (OR = 3.05, 2.03–4.58,  $p < 0.0001$ ) and history of falls (OR = 2.30, 1.51–3.50,  $p < 0.0001$ ). Severe illness, whether measured by SIRS or NEWS, was also associated with non-ambulatory status at 30 days (OR = 2.31, 1.54–3.46 and OR = 2.47, 1.56–3.93, both  $p < 0.0001$ ) as was bacterial infection (OR = 2.09, 1.43–3.04,  $p < 0.0001$ ) and clinical dehydration (OR = 2.66, 1.79–3.95,  $p < 0.0001$ ) but patients with anaemia were less likely to be admitted (OR = 0.30, 0.16–0.56,  $p < 0.0001$ ).

155/192 (81%) of patients judged to be non-frail by the assessing clinician without severe illness (SIRS negative) remained ambulatory versus 19/69 (28%,  $p < 0.0001$ ) of those judged to be frail who were severely ill (SIRS positive, Additional file 1: Fig. 3). Patients requiring hospital admission for bed-based care were much more likely to die within 30 days of initial EMU assessment (OR = 5.60, 2.23–14.09,  $p < 0.0001$ ) and by 1 year (OR = 3.53, 2.27–5.45,  $p < 0.0001$ ).

Comparing patients with immediate admission to hospital from the EMU ( $N = 152$ ) with the 58 patients who were admitted later within the 30-days, showed that immediate admission was associated with referral with increased care needs, history of falls, need for therapy input, severe illness by NEWS, and delirium (Table 4).

Table 4 Factors associated with immediate versus later hospital admission (OR and p values shown adjusted for age and sex)

|                                    | Immediate admission<br>N = 152 | Later admission<br>N = 58 | OR   | 95% CI    | p     |
|------------------------------------|--------------------------------|---------------------------|------|-----------|-------|
| Age, mean/sd                       | 81.9/11.0                      | 78.8/16.1                 | 1.02 | 0.99–1.04 | 0.12  |
| Sex, female                        | 90 (59)                        | 34 (59)                   | 0.96 | 0.51–1.79 | 0.89  |
| Referred with increased care needs | 119 (78)                       | 35 (60)                   | 2.27 | 1.14–4.51 | 0.02  |
| History of falls                   | 73 (48)                        | 13 (22)                   | 3.02 | 1.48–6.16 | 0.002 |
| Need for therapy input             | 93 (61)                        | 24 (41)                   | 2.12 | 1.13–3.96 | 0.02  |
| NEWS > 4                           | 51 (34)                        | 8 (14)                    | 3.18 | 1.40–7.23 | 0.006 |
| Delirium                           | 67 (44)                        | 11 (19)                   | 3.18 | 1.50–6.71 | 0.002 |

Numbers are n (%) unless otherwise specified

Multivariable logistic regression to determine the independent associates of any bed based care within 30-days gave similar results whether SIRS or NEWS was used to define illness severity (Table 5, Additional file 1: Table 4). Delirium was the factor most strongly associated (OR = 11.93 (3.70–38.50,  $p < 0.0001$  using SIRS to define illness severity in the model). Other independent factors included the need for the dedicated EMU-transport service, referral with decreased functional ability and increased care needs, and severe illness (Table 5, Additional file 1: Table 4). There were also trends towards associations with vision impairment, history of falls and AKI.

Table 5 Factors independently associated with any admission to bed-based care within 30-days, for the cohort overall and after exclusion of patients with delirium

| Factor                             | Using SIRS all patients |          | Using NEWS all patients |          | Using SIRS patients without delirium |       | Using NEWS patients without delirium |       |
|------------------------------------|-------------------------|----------|-------------------------|----------|--------------------------------------|-------|--------------------------------------|-------|
|                                    | OR (95% CI)             | p        | OR (95% CI)             | p        | OR (95% CI)                          | p     | OR (95% CI)                          | p     |
| EMU transport required             | 1.74 (1.04–2.92)        | 0.04     | 1.76 (1.05–2.96)        | 0.03     | 2.01 (1.17–3.45)                     | 0.01  | 1.99 (1.15–3.44)                     | 0.01  |
| History of falls                   | 1.85 (0.94–3.66)        | 0.08     | 1.79 (0.90–3.54)        | 0.10     | 1.27 (0.67–2.38)                     | 0.46  | 1.26 (0.67–2.41)                     | 0.45  |
| Referred with decreased mobility   | 1.91 (1.03–3.53)        | 0.04     | 1.97 (1.06–3.65)        | 0.03     | 2.18 (1.14–4.18)                     | 0.02  | 2.27 (1.18–4.35)                     | 0.01  |
| Referred with increased care needs | 3.26 (1.71–6.23)        | < 0.0001 | 3.17 (1.65–6.06)        | 0.001    | 2.90 (1.48–5.68)                     | 0.002 | 2.88 (1.47–5.64)                     | 0.002 |
| Vision impaired                    | 1.83 (0.94–3.58)        | 0.08     | 1.89 (0.96–3.71)        | 0.06     | 1.91 (0.94–3.89)                     | 0.07  | 1.81 (0.89–3.70)                     | 0.10  |
| Delirium                           | 11.93 (3.70–38.50)      | < 0.0001 | 10.97 (3.36–35.76)      | < 0.0001 | –                                    | –     | –                                    | –     |
| Bacterial infection                | 1.41 (0.87–2.31)        | 0.17     | 1.57 (0.96–2.57)        | 0.07     | 1.34 (0.80–2.24)                     | 0.26  | 1.49 (0.89–2.49)                     | 0.13  |
| AKI                                | 1.64 (0.93–2.87)        | 0.09     | 1.66 (0.93–2.96)        | 0.09     | 1.65 (0.92–2.97)                     | 0.10  | 1.69 (0.93–3.09)                     | 0.09  |
| SIRS, per point                    | 1.48 (1.17–1.87)        | 0.001    | –                       | –        | 1.52 (1.19–1.94)                     | 0.001 | –                                    | –     |
| NEWS, per point                    |                         |          | 1.17 (1.05–1.30)        | 0.003    |                                      |       | 1.20 (1.08–1.34)                     | 0.001 |

Models included age, sex, transport required, care required at home, referred with decreased mobility, referred with increased confusion/altered behaviour, referred with reduced mobility, history of falls, vision impairment, hearing impairment, dementia diagnosis, urinary incontinence, faecal incontinence, dehydration, anaemia, bacterial infection, delirium, SIRS/NEWS. The model did not include factors not routinely acquired at first assessment in urgent care settings (Barthel, mRS, MUST, Braden, Charlson index). Table shows factors significant at  $p < 0.05$  in at least one of the models, or factors showing a trend to an association ( $p \leq 0.10$ )

## Discussion

In this unselected cohort from a multidisciplinary SDEC unit with a predominance of older people, any bed based care at 30 days occurred in one half of those over 65 years, and was associated with markers of frailty and illness severity/acuity. The highest rates of admission were seen in patients with severe illness occurring in the context of frailty, particularly cognitive frailty (delirium).

To our knowledge, this is the first study of an SDEC service with inclusive referral criteria designed around the needs of older patients. Our cohort showed a wide range of presenting complaints and diagnoses in line with what might be expected in an acute medical admissions unit. Non-specific presentations were common including changes in functional status, increased care needs and confusion or altered behavior. Severe illness affected around one quarter of patients and intravenous therapy was required in the majority. In contrast, in previous studies of ambulatory emergency care for older patients chosen by a geriatrician for comprehensive geriatric assessment/multidisciplinary ambulatory care, falls or syncope were often the most common reasons for referral [[14]], consistent with a high level of patient selection, and no data were given on illness severity/acuity [[14]].

We did not have data on specific frailty scores such as the clinical frailty scale [[31]] since such scores were not a routine part of patient assessment on the EMU. However, detailed multidisciplinary assessment was undertaken covering domains generally considered to be integral to a comprehensive geriatric assessment [[9]]. Data from these assessments

showed a high prevalence of frailty markers in the cohort: nearly half were considered frail by the treating clinician, frailty syndromes including falls, incontinence, visual or hearing deficits and cognitive impairment were common, and many patients were at risk of malnutrition or pressure sores. Multimorbidity (Charlson index > 3) affected three quarters of the patients overall and the majority of older patients required some form of care at home and had some degree of disability or dependency.

Frailty markers were associated with admission for bed-based care and two thirds of those considered frail by the assessing clinician were hospitalized. Admission was more likely if the frail person was also severely ill or delirious (< 3% of those with delirium avoided hospital admission) but rates of admission were nevertheless higher in frail patients without severe illness than in non-frail patients who were severely ill. Although delirium was strongly associated with admission, other factors associated with admission were qualitatively similar in those with and without delirium.

Our findings are in keeping with data from the Emergency Department/medical admissions setting in which patients with frailty were less likely to be discharged immediately or to have short (< 72 h) admissions, and only 23–40% of non-admitted patients were frail [[13]]. Although multi-morbidity as defined by the Charlson index was more common as expected in the older patients in our study, associations with admission for bed-based care were relatively weak and did not reach significance after Bonferroni correction, or in multivariable analyses. This illustrates the fact that multi-morbidity is not synonymous with frailty [[2]]. Similarly, although polypharmacy was common, there was no association between number of prescribed medications and hospital admission.

Although illness severity was associated with bed-based care, the proportion varied according to the method of illness severity assessment: a quarter of those classed as severely ill by SIRS [[28]] and around an eighth by NEWS [[29]] avoided hospital admission. The discrepancy between the two scores may be accounted for by the accepted cut-offs used to define illness severity and the inclusion of more vital sign variables in NEWS including "reduced level of consciousness", the latter resulting in higher NEWS in those with hypoactive delirium. Since patients with delirium were more likely to be admitted, this partly explains why the number of patients remaining ambulatory with high NEWS was relatively lower. Looking at specific medical diagnoses, anaemia was associated with remaining on an ambulatory path whereas bacterial infection was more likely to result in admission. Bacterial infection was likely associated with more severe illness but the trend towards an independent association in multivariable analyses suggests that there may be other factors underlying admission in those with infection.

Our findings suggest that most of the risk of admission for bed-based care from an SDEC setting is conferred by a few factors capturing physical and cognitive frailty, change in functional and or cognitive status, and the presence of illness acuity. These factors were more associated with immediate versus later hospital admission after SDEC assessment. In particular, acute change in cognition as defined by delirium, rather than established dementia or cognitive impairment in the absence of delirium, appears important.

Our findings may help in triaging of patients to the appropriate care facility even prior to SDEC referral as well as in the SDEC itself. Currently, there are no risk prediction models to aid decision making in the SDEC environment but models have been developed in the acute medicine/emergency setting. The AMB [[32]] and Glasgow Admission Prediction Score (GAPS) [[33]] were developed to predict same day discharge and include measures of illness severity. The AMB score also includes "access to personal/public transport" and absence of "acute confusion" [[32]]. Both require information on previous hospital admissions, which may not be easily available, but not other measures of frailty. The recently developed Sydney Triage to Admission Risk Tool (START+) does include a physical frailty measure but this requires collection using a specific questionnaire [[34]]. No available scores to our knowledge include delirium, despite its importance in predicting hospital admission, probably because the development cohorts did not contain detailed data on cognitive frailty syndromes.

Strengths of our study include the use of data from a prospective consecutive cohort with no exclusion criteria, careful and detailed patient phenotyping for cognitive and physical frailty using established methodology [[19]], and importantly, measurement of illness severity/acuity. We also ascertained ambulatory status up to 30-days after first EMU assessment rather than only on the day of first assessment. Limitations of our study include first, that our study was from a single centre and other SDEC units will have different

settings and operational criteria. However, the EMU case-mix was broadly representative of current real world emergency acute internal/geriatric medicine practice and was free of selection bias in contrast to other studies of pre-selected patients likely to be suitable for ambulatory care [[14]]. Second, we did not have data on specific frailty scores but patients were assessed in detail for markers of both cognitive and physical frailty. In addition, existing frailty scales may not be valid in acute hospital settings [[35]] and do not contain detailed cognitive assessments including for delirium. Third, determining the specific reasons why patients were admitted after SDEC assessment was beyond the scope of our study. However, the strong independent associations between hospital admission, and increased care needs, delirium and severe illness suggests that need for care is a key factor together with access to physiologic monitoring and treatment escalation. Our findings will inform future studies around interventions to enhance ambulatory pathways to reduce hospital admission as well as service development.

## Conclusions

Our study shows that, even in an SDEC with a multidisciplinary approach incorporating comprehensive geriatric assessment, around three-quarters of older frail patients with severe acute illness as judged by SIRS, were admitted for bed-based care. Expansion of alternatives to acute bed-based care should recognize the dependency and acuity of patients and should not replace continued provision of high quality inpatient frailty services. Further studies are required to understand the key components of hospital bed-based care that need to be replicated by models delivering acute frailty care closer to home, and the feasibility, cost-effectiveness and patient/carer acceptability of such models.

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## Authors' contributions

TE, JB, RH managed the patients, collected, cleaned and assembled data. STP and DL obtained funding and provided the initial concepts for the study. TE and STP performed statistical analyses. TE and STP wrote the paper with critical input from DL and JB. DL was a member of the Oxford University Hospitals NHS Foundation Trust team responsible for the design and implementation of the EMU. STP designed the structured paper clerking proforma and developed, validated and implemented the Oxford University Hospitals NHS Foundation Trust cognitive screen. All authors have read and approved the manuscript.

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## Availability of data and materials

Applications for access to data should be made to Professor Sarah Pendlebury (sarah.pendlebury@ndcn.ox.ac.uk) although access to researchers outside the University of Oxford and Oxford University Hospitals NHS Trust is restricted under the terms of the ethics approval.

## Ethics approval and consent to participate

The study was undertaken with the agreement of the OUHFT Divisional Management (Datix Number 3812) and relevant anonymized patient data were entered into the Oxford Cognitive Co-morbidity and Frailty Ageing Research Database (ORCHARD). ORCHARD is approved by the local research ethics committee (REC reference 18/SC/0184).

### Consent for publication

Not applicable: No individual is identifiable in this study.

### Competing interests

The authors have no competing interests to declare.

### Supplementary Information

Graph: Additional file 1: Table 1. Missing Data. Table 2. Presenting complaints. Table 3. Diagnoses. Table 4. Factors independently associated with any admission to bed-based care within 30-days for the cohort overall and after exclusion of patients with delirium: multivariable analysis with all factors significant in univariable analyses including scores not routinely collected at first patient assessment in most acute care settings. Figure 1. Bar graph showing living arrangements, requirement for Same Day Emergency Care (SDEC) dedicated transport, comorbidities and dependency (mRS>2) for the cohort by age group (black bars= > 85 years, grey bars=65-84 years, white bars=<65 years). Figure 2. Markers of physical (left hand graph) and cognitive (right hand graph) frailty by age group (black bars= > 85 years, grey bars=65-84 years, white bars=<65 years). Figure 3. Percentage of patients admitted to hospital within 30-days of Same Day Emergency Care (SDEC) assessment in not frail (left hand graph) and frail (clinician's impression of frailty – right hand graph) by presence or absence of severe illness as defined by the systemic inflammatory response syndrome (SIRS > 2).

### Abbreviations

- AKI
  - Acute kidney injury
- AMTS
  - Abbreviated Mental Test Score
- CAM
  - Confusion Assessment Method
- EMU
  - Emergency Medicine Unit
- GAPS
  - Glasgow Admission Prediction Score

- GP
  - General Practitioner
- ORCHARD
  - Oxford Cognitive Co-morbidity and Frailty Ageing Research Database
- OUHFT
  - Oxford University Hospitals NHS Foundation Trust
- mRS
  - Modified Rankin Score
- MUST
  - Malnutrition Universal Screening Tool
- NEWS
  - National Early Warning Score
- REC
  - Research ethics committee
- SDEC
  - Same Day Emergency Care
- SIRS
  - Systemic inflammatory response syndrome

- START

- Sydney Triage to Admission Risk Tool

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Emergency Medicine

Subject Terms: Acute medicine
Ambulatory care
Consensus
Delphi process
Same day emergency Care

Description: Same Day Emergency Care (SDEC) services are at the heart of recovery plans for Emergency Care in the National Health Service. There are no validated metrics for the quality of care in SDEC. The Society for Acute Medicine's Quality Improvement Committee invited to a three-stage modified Delphi process to gather metrics used by clinicians. Proposed metrics were ranked and further explored by 33 participating experts from a broad range of backgrounds including clinicians, data scientists and operational managers. Experts ranked five system-based metrics highest. These focus on optimisation of the proportion of patients receiving same day care in and out of SDEC units. Patient and staff experience metrics were ranked low, possibly due to present lack of viable examples. The paper adds a glossary with the rationale for ranking of metrics and their use for the improvement of quality and safety of clinical care.

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Language: English

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Title: Strategies to identify medical patients suitable for management through same-day emergency care services: A systematic review

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Record: 74

Title: How do we identify acute medical admissions that are suitable for same day emergency care?

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Source: In Clinical Medicine March 2022 22(2):131-139

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Keywords: acute medicine
same day emergency care
risk scoring

service design
admission pathways

Abstract: Medical emergencies causing unplanned hospital admission place considerable demands on acute healthcare services. Some patients can be assessed and treated through ambulatory pathways without inpatient admission, via same day emergency care (SDEC), potentially benefiting patients and reducing demands on inpatient services. There is currently considerable variation within acute medicine in aspects of SDEC delivery ranging from overall service design to patient selection methods. Scoring systems identifying patients likely to be successfully managed through SDEC services have been suggested, but evidence of utility in diverse populations is lacking. Specific scoring systems exist for some common medical problems, including cardiac chest pain and pulmonary embolism, but further research is needed to demonstrate how these are most effectively incorporated into SDEC services. This review defines SDEC and describes the variation in services nationally. It reviews the evidence for their clinical impact, tools to screen patients for SDEC and current gaps in our knowledge regarding service deployment.

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Title: Provision of medical Same Day Emergency Care services within the UK: analysis from the Society for Acute Medicine Benchmarking Audit.

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Document Type: Article

Author-Supplied Keywords: Health Systems and Quality Improvement
Hospitals

Abstract: The article discusses the evaluation of medical Same Day Emergency Care (SDEC) services in the UK using data from the Society for Acute Medicine Benchmarking Audit. It highlights that 29.8% of unplanned medical attendances received initial assessment in SDEC services, with most patients being discharged without overnight admission. The study suggests the need for further innovation and improvements to ensure appropriate patients access SDEC services. [Extracted from the article]

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