

**BRIEF REPORT**

# Nationwide study found higher paediatric readiness in emergency departments and trauma centres with a paediatrician on-site

Injuries are the most common cause of death among children globally.<sup>1,2</sup> Although preventive measures have reduced mortality rates in recent decades, injuries are still a major health problem in childhood.<sup>1,2</sup> Critically ill and injured children are frequently admitted to mixed adult and paediatric emergency departments (EDs) and trauma centres. However, they only account for about 20% of patients and this means that they can receive poor quality paediatric emergency care.<sup>2</sup> The National Pediatric Readiness Project (NPRP) was introduced to encourage American EDs to assess their compliance with American guidelines on paediatric emergency care. These guidelines are outlined in the 2009 Joint Policy Statement: Guidelines for Care of Children in the Emergency Department issued by the American Academy of Pediatrics, American College of Physicians and Emergency Nurses Association.<sup>3</sup> Studies have shown that day-to-day paediatric readiness has been associated with a reduced risk of mortality in critically ill children. However, it has not been investigated in Scandinavian EDs and trauma centres,<sup>4</sup> and our aim was to do that in Denmark. We hypothesised that high paediatric readiness would be associated with designated trauma centres, rather than EDs, and with having a paediatrician on-site 24/7.

All 18 Danish EDs and four designated trauma centres were approached and asked to take part in our survey. The questionnaire was a Danish translation of the national survey used by the NPRP that assessed paediatric readiness in more than 4000 EDs across the USA from September 2013 to January 2015.<sup>5</sup> According to the NPRP, we measured paediatric readiness using a weighted score from 0 to 100, where 100 indicated full compliance with the 2009 joint American guidelines.<sup>3</sup> The NPRP recommendations reflect six areas of paediatric emergency care, which are weighted according to the NPRP scoring matrix. The number of points are administration and coordination of care ( $n = 19$ ), competencies for physicians and nurses ( $n = 10$ ), quality improvement ( $n = 7$ ), policies and procedures ( $n = 17$ ), patient safety ( $n = 14$ ) and medical equipment ( $n = 33$ ).

From November 6, 2020 to January 31, 2021, the chief physicians of each facility were contacted by phone and invited to participate in the survey. If they agreed, the questionnaire was emailed to them so it could be completed by a nominated physician or nurse with an interest in paediatric emergency care patients. After two

weeks, non-responders were contacted by phone and given a second deadline. A senior physician contacted the facilities if a third and final reminder was needed. The statistical analyses were performed using SAS statistical software, version 9.4 (SAS Institute). We applied nonparametric statistical testing for the two analyses of paediatric readiness, using the Mann-Whitney  $U$  test.  $p$  values of less than 0.05 were considered statistically significant. The weighted paediatric readiness scores are presented as medians with interquartile ranges (IQR).

A total of 13 EDs and three trauma centres replied resulting in 16 completed assessments (73%). The overall median (IQR)-weighted paediatric readiness score was 72.0 (58.0–78.3). Table 1 shows that we found no significant difference in the paediatric readiness scores between EDs and trauma centres: 70.0 (56.1–78.2) versus 75.6 (70.9–78.4) ( $p = 0.42$ ). In addition, the 12 facilities that had a paediatrician on-site 24/7 had significantly higher paediatric readiness scores than the four facilities without: 75.5 (67.7–78.8) versus 53.8 (44.9–63.1) ( $p = 0.02$ ).

Our estimates of paediatric readiness were comparable with the 2013–2015 American assessment, which found a median (IQR) paediatric readiness score of 68.9 (56.1–83.6) in 4,149 American EDs.<sup>5</sup>

Applying American guidelines in a Scandinavian context was a potential limitation of this survey. However, the World Health Organization and the International Federation for Emergency Medicine have declared similar standards and we felt the American guidelines were applicable. Our response rate was 73%, and we are confident that our findings reflect current paediatric readiness in Danish EDs and trauma centres. However, we had no way to confirm the accuracy of the responses and our survey was potentially limited by reporting bias. The evaluation of paediatric readiness was not directly patient related, so these findings may not affect critically ill and injured children immediately. However, one study published in 2019 examined the relationship between paediatric readiness and mortality in critically ill children and found a dose-dependent association. Mortality decreased as the paediatric readiness scores increased.<sup>4</sup>

Multiple EDs and trauma centres were involved in this assessment, and we hope this study will raise awareness of how paediatric patients are treated in emergency facilities that also cover adults. As

**Abbreviations:** ED, emergency department.; IQR, interquartile range.; NPRP, National Pediatric Readiness Project.

**TABLE 1** Data from questionnaires of emergency departments and trauma centres in Denmark, presented as medians and interquartile ranges or numbers and frequencies

	Trauma centre (n = 3)	Emergency department (n = 13)	On-site paediatrician (n = 12)	No on-site paediatrician (n = 4)
Paediatric readiness score	75.6 <sup>†</sup> (70.9–78.4)	70.0 <sup>†</sup> (56.1–78.2)	75.5 <sup>**</sup> (67.7–78.8)	53.8 <sup>**</sup> (44.9–63.1)
Paediatric emergency care coordinator				
Only physician	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Only nurse	0 (0.0)	3 (23.1)	1 (8.3)	2 (50.0)
Both	3 (100)	7 (53.8)	10 (83.3)	0 (0.0)
None	0 (0.0)	3 (23.1)	1 (8.3)	2 (50.0)
Paediatric competency evaluations of medical staff				
Physician	1 (33.3)	5 (38.5)	5 (41.7)	1 (25.0)
Nurse	1 (33.3)	4 (30.8)	4 (33.3)	1 (25.0)
Paediatric patient safety initiatives				
24/7 interpreter	3 (100)	12 (92.3)	12 (100)	3 (75.0)
Precalculated drug dosing	2 (66.7)	10 (76.9)	9 (75.0)	3 (75.0)
Key paediatric policies and procedures				
Triage	3 (100)	10 (76.9)	10 (83.3)	3 (75.0)
Child abuse	2 (66.7)	8 (61.5)	7 (58.3)	3 (75.0)
Death	2 (66.7)	5 (38.5)	6 (50.0)	1 (25.0)
Family centred care	3 (100)	9 (69.2)	10 (83.3)	2 (50.0)
Disaster plan	0 (0.0)	5 (38.5)	4 (33.3)	1 (25.0)
Quality improvement	1 (33.3)	7 (53.8)	7 (58.3)	1 (25.0)
Recommended paediatric equipment available				
Monitoring	100 (83.3–100)	100 (83.3–100)	100 (83.3–100)	100 (91.7–100)
Fluid resuscitation	83.3 (83.3–100)	66.7 (66.7–83.3)	75.0 (66.7–91.7)	66.7 (58.3–83.3)
Airway management	85.7 (59.5–95.2)	78.6 (71.4–85.7)	83.3 (65.5–90.5)	71.4 (59.5–85.7)

<sup>†</sup>No statistically significant difference,  $p = 0.42$ .; <sup>\*\*</sup>Statistically significant difference,  $p = 0.02$ .

reflected by our results, having an on-site paediatrician was important to the paediatric readiness in EDs and trauma centres. However, improving the paediatric readiness is not solely dependent on the presence of a paediatrician. The 2009 joint American guidelines recommended that facilities should appoint local experts in paediatric emergency care to provide paediatric leadership. In order to become a local expert, emergency physicians staffing the EDs and trauma centres need the special training in paediatric emergency care patients. Although emergency medicine has only been a medical speciality in Denmark since 2017, there is an emerging need for recognising paediatric emergency medicine for the purpose of improving paediatric emergency care.

We concluded that there was no difference in paediatric readiness between trauma centres and EDs, but we found a significantly higher paediatric readiness in facilities with a paediatrician on-site 24/7. Further studies are required to confirm the level of paediatric readiness in other Scandinavian countries, but we hope that our


results will be of interest to both policymakers and clinicians and guide future quality initiatives.

#### ACKNOWLEDGEMENTS

We would like to thank all the respondents and participating departments for taking part in the survey.

#### CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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**How to cite this article:** Jensen LT, Andersen LH, Steinmetz J. Nationwide study found higher paediatric readiness in emergency departments and trauma centres with a paediatrician on-site. *Acta Paediatr*. 2021;00:1-3. <https://doi.org/10.1111/apa.16079>