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Factors influencing paramedic conveyance decisions when attending children with minor head injury: a qualitative study

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ABSTRACT

Introduction Children with head injury are commonly transported to the ED by ambulance. However, most of those conveyed are deemed non-serious and are discharged at triage. Research is needed to explore the factors that influence paramedics when deciding to convey children with minor head injury to the ED, and to establish whether a clinical decision tool designed to support them would be beneficial.

Methods A generic qualitative approach, comprising semistructured interviews with front-line ambulance paramedics working in the UK. Interviews were audio-recorded and transcribed. Data were analysed using reflexive thematic analysis. Interviews aimed to explore the factors that influence paramedics when deciding to convey children with minor head injury to the ED.

Results A total of 20 paramedics from several ambulance services participated in interviews. Three overarching themes were identified: 'we just take them in'; 'there are too many hurdles'; 'creating the right tool'. These were further categorised into subthemes. Paramedics do not feel confident when assessing and managing children with head injury, and convey children to hospital due to fear of consequences, despite knowing there will be no intervention in the ED. Further education, a prehospital paediatric clinical decision tool and greater support from Ambulance Trusts would be welcomed by paramedics. Criteria such as: parental anxiety; time; wound closure; policy and non-accidental injury need to be considered in a clinical decision tool designed to support paramedics' management of children with head injury.

Conclusion Paramedics generally feel a lack of confidence in assessing and managing children with head injury. A decision tool, coupled with training and useful feedback from EDs following conveyance, would be useful to help improve decision-making.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ In the UK and most high-resource countries, children with minor head injury rarely require intervention, yet many are conveyed to hospital by Emergency Medical (ambulance) Services. Reasons for ambulance conveyance of children with minor head injury have not been explored.

⇒ Several decision tools exist to support clinical decision-making when a child presents to hospital with a head injury, however there is no out-of-hospital clinical decision tool designed to support paramedics in their assessment and management of children with head injury at scene, including decision-making regarding conveyance.

WHAT THIS STUDY ADDS

⇒ Paramedics do not feel confident when assessing and managing children with head injury, and often convey children to hospital due to fear of consequences, despite knowing there will likely be no intervention in the ED.

⇒ Criteria such as: parental anxiety; time since the injury/time of day; wound closure; local policy and non-accidental injury influence paramedics' conveyance decisions.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Local policies that stipulate the conveyance or referral of children based on age alone should be revisited.

⇒ There is a desire for a paediatric-specific out-of-hospital clinical decision tool to support paramedics in their assessment and management of children with head injury, which will inevitably help with decision-making regarding conveyance.

INTRODUCTION

Globally, head injury in children is a common reason for Emergency Medical (ambulance) Services activation. However, in the UK 90% of head injuries in children are minor, requiring no treatment.[1] Despite this, children with head injury are commonly transported to the ED by ambulance, though, 74% of those conveyed in the UK are deemed non-serious and are discharged at triage.[1]

Unnecessarily conveying a child to hospital puts them at risk of infection, and potentially exposes them to witnessing traumatic events.[2] It can also lead to avoidable treatment delays for others who need emergency care. ED observation of children with minor head injury is costly and often unnecessary and crowding in EDs is associated with poorer patient outcomes.[3] It is not clear why paramedics convey children with minor head injury to the ED and this needs further exploration, noting that paediatric patients are deemed 'high risk' by many paramedics.[4]

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A previous web-based survey identified several factors that inhibit the ability of paramedics to manage children with minor head injury at scene, such as parental anxiety, wound management and safeguarding concerns.[5] Further qualitative research is needed to explore these factors in greater depth, and to investigate whether a clinical decision tool designed to support paramedics in their assessment and management of children with head injury would be beneficial. Currently, no such tool exists.[6]

Aims

There are five aims of this study which include: identifying the factors that influence UK paramedics when deciding whether to convey children with minor head injury to the ED; investigating paramedics' current assessment and management of children with minor head injury; identifying barriers and facilitators to managing children with minor head injury at scene; exploring what a clinical decision support tool specifically designed for use by paramedics to assess and manage children with head injury might include, and whether paramedics would be willing to use such a tool; finally, identifying what training would be required for paramedics to use the tool.

METHODS

Patients and public involvement

Patients and the public have been involved throughout this research. Both a Young Persons Advisory Group (children aged 9–17 years from Bristol and the surrounding area) and Parent Advisory Group (parents and grandparents from the south-west of England) have supported this study and confirmed its importance to children, parents, and the wider health and care system. Eight members of the Parent Advisory Group (PAG) were involved in the development of the interview questions and schedule (included as online supplemental material). Four members of the Young Persons Advisory Group were involved in designing the recruitment poster and advertisement material. All members have an opportunity to be involved in the dissemination.

Theoretical framework

This research followed the Reflexive Thematic Analysis Reporting Guidelines (RTARG)[7] which are an alternative to the Consolidated criteria for Reporting Qualitative research checklist.[8] RTARG is more specific to reflexive thematic analysis. In their latest work, Braun and Clarke[7] suggest that reflexive thematic analysis is not a singular approach, but rather a family of methods, and recommend RTARG as a new reporting checklist. RTARG offers guidelines rather than a checklist, since not every item is relevant to a particular study. RTARG was therefore used to facilitate methodologically coherent reporting within this study.[7]

A generic qualitative approach was adopted, comprising semistructured interviews. Qualitative research studies often conform to a research design with strict methodological requirements, which tend to be embedded within the constructivist paradigm. However, generic qualitative research can be considered when the parameters of the study do not meet these strict requirements.[9] This study explored paramedics' experiences of attending to children with head injury, with no requirement to examine culture rules (ethnography), or build theory (grounded theory), or engage deeply with the philosophical assumptions of phenomenology. Generic qualitative research has been used effectively since 2003 in healthcare research.[10] It offers a more practical and pragmatic approach, using qualitative methods to answer questions about subjects in a real-world setting.[11] Caelli and colleagues[10] acknowledged the importance of generic qualitative research, specifically in healthcare research, and suggested four areas to ensure rigour and quality in generic qualitative studies. These four areas (theoretical positioning, congruence between methods and methodology, strategies to establish rigour, and the analytical lens through which data are examined) have been followed.

Population

To be eligible for the study, participants needed to be a UK paramedic working on the front-line ambulance (as opposed to another setting such as general practice) and have experience of attending to children with head injury.

Recruitment

Before recruitment commenced, two pilot interviews took place with paramedics to establish whether the topic guide functioned as intended. Participants were recruited by advertising the study on social media platforms such as 'X' and through professional connections. Paramedics from all over the UK were invited to contact the researcher, using their NHS email address, if they were interested in participating.

Braun and Clarke[12] argue that a sample size of 12 is sufficient to reach data saturation, however there is no set requirement for sample size in qualitative research. The concept of data saturation is not new but continues to be used as an assurance of rigour and credibility in qualitative research.[13] However, there is a growing body of evidence debating the notion of data saturation and the term is inconsistently applied. The phrase 'Information power' is now more commonly used to guide adequate sample size in qualitative research.[14] 'Information power' uses five dimensions: aim; specificity; theory; dialogue; analysis.[14] In this study the aim is narrow, the combination of participants is highly specific for the study aim, it is unsupported by established theory in prehospital care (though there is research from in-hospital to draw on), the interview dialogue is deemed average, and the analysis includes in-depth exploration. Therefore, a target sample of 20 was selected, since some factors required a larger sample size and some a smaller sample size (Malterud and colleagues[14] suggest between 6 and 50).

Enrolment and consent

The target sample was 20 paramedics; recruitment was consecutive since every participant who met the eligibility criteria was selected on a 'first-come-first-served basis', until the desired sample size was reached.[15] The first 20 paramedics who volunteered to take part after reading the recruitment material were sent a participation information sheet, privacy notice and consent form via email. As not all went on to be interviewed, recruitment continued until 20 paramedics were interviewed; in total, 24 paramedics were sent study information. Those who wished to take part after reading the participation information sheet were contacted by the researcher to explain the study procedures, answer any questions, and arrange a date and time for interview. Participants did not have to return signed consent forms, as verbal confirmation of consent was audio-recorded at the start of the interview (as approved by the ethics committee). The data were anonymised, and participants were made aware that they had the right to withdraw from the study at any time until their data were analysed.

Data collection

Semistructured interviews were conducted with paramedics using MS Teams. The interviews were conducted by the researcher

(AP) who is a female PhD student with a paramedic background. The researcher has no relationship with the participants. The interviews were audio recorded and transcribed verbatim by an independent transcription company.

Data analysis

Data were analysed using reflexive thematic methods, building codes into themes (using NVivo software). Reflexive thematic analysis is a flexible interpretive approach to qualitative data analysis that facilitates the analysis of themes in a data set.[16] It is not aligned with a particular epistemological viewpoint or theoretical approach and therefore is well suited to generic qualitative work.[17 18] Each data set was analysed by the primary researcher and a 20% sample checked by a second researcher to aid interpretation of the findings. It is recognised that using a reflexive thematic analysis approach means that no two researchers will interpret the data in exactly the same way, however as Caelli and colleagues[10] previously suggested, having a second researcher to analyse a sample of the data can improve plausibility and validity in generic qualitative research. Additionally, this is also a form of triangulation[9] as multiple researchers have conducted the analysis, which Cooper and Endacott[19] suggest establishes rigour in generic qualitative research studies. Consensus of themes was then sought. The six-phase framework described by Byrne[20] which provides a worked example of Braun and Clarke's reflexive thematic analysis was followed:

Step 1: Familiarise with the data.
Step 2: Coding phase.
Step 3: Generating themes.
Step 4: Review themes.
Step 5: Define themes.
Step 6: Write thematic analysis.

RESULTS

Description of participants

Twenty registered paramedics aged 25–42 years (mean 31.1 years and median 29 years) were interviewed between March and May 2023. Interview length ranged from 23 min to 55 min. All participants were of white British ethnicity, apart from two who described themselves to be white other. The participating paramedics worked across nine different UK ambulance trusts, representing a wide geographical area, though 7 of the 20 participants were from a single ambulance service. There was an equal distribution of men and women. Experience ranged from 1 year to 19 years with a mean of 7 years. Table 1 shows the participant demographics.

Table 1 Participant demographics

Age	
20–25 years	3
26–30 years	8
31–35 years	7
36+ years	2
Sex	
Male	10
Female	10
Ethnicity	
White British	18
White other	2
Location	
West Midlands	2
South-Central	3
South-West	7
East of England	2
Yorkshire	2
Other	4
Experience	
1–5 years	7
6–10 years	8
11–15 years	4
15+ years	1

Reflexive thematic analysis

Three overarching themes were identified, each consisting of four or five subthemes derived from the initial codes. These subthemes are discussed below supported by quotes from participants.

The three overarching themes were:

1. 'We just take them in'.
2. 'There are too many hurdles'
3. 'Creating the right tool'.

Subthemes are shown in table 2.

Theme 1: 'We just take them in'

'It's a risky business'

The majority of paramedics would currently opt to take children with head injury to hospital, despite a recognition that this was often neither needed nor the right thing to do. It was apparent that there was a general fear of consequences among paramedics when managing children as a patient group.

> I think from the profession point of view there's a lot of anxiety around not taking children to hospital, because of fear of not making the right decision PARA 1

This fear of consequences is from litigation by both families and employers. This was worsened by the fact that paramedics reported feeling unsupported by the organisation that they worked for.

> If something went wrong, I feel like the trust would just turn their back straightaway and say well you should have taken them in, we get dragged into investigations easily PARA 27

Because of this fear, paramedics reported that taking children with minor head injury to hospital was the easy thing to do, even when they were aware staff in the ED are unlikely to give any additional treatment.

> It frustrates me that paramedics take children to ED just for a period of observation if it's a simple head injury. There is still a sub-

Table 2 Subthemes

Main theme	Subthemes
'We just take them in'	► 'It's a risky business' ► 'Leave it to the experts' ► 'If only they could talk' ► 'A never-ending story'
'There are too many hurdles'	► 'We aren't equipped' ► 'The time has to be right' ► 'It's out of our hands' ► 'Red flags' ► 'Parents rule'
'Creating the right tool'	► 'There's nothing else out there' ► 'The tool says it's ok' ► 'Additional criteria' ► 'Presentation'

group of clinicians that just say we'll take you to hospital because it's easier PARA 3

Paramedics felt that there could still be a chance the child would deteriorate and if that happened, the consequences could be very severe. This risk is not acceptable to paramedics and therefore they opt to convey.

This is why your study is going to be fantastic, because a lot of the time we don't need to take them in and I, I feel bad saying it, but I know I've taken younger kids with head injuries when they didn't need to go in PARA 27

'Leave it to the experts'

Paramedics reported a lack of education regarding paediatrics generally, and specifically head injury in children.

Typically, I think we're educated to a lesser extent with children. I know, certainly with my university, we did a lot less on paediatrics then we did in adults, which I think is fundamental PARA 3

This resulted in a lack of knowledge and therefore confidence to manage the child at scene. Paramedics discussed that if they convey to the hospital, the child will be assessed by someone with more knowledge and skills who is better equipped to make decisions.

We did a week's paediatric training but actually that was very robotic, very flow chart driven with regard to some of the presentations you might come across in children, very little input into head injuries PARA 1

'If only they could talk'

Paramedics reported that children are viewed as a challenging patient group. This was particularly apparent with younger, non-verbal children.

Paramedics feel like assessing children is really challenging and I think most paramedics don't feel prepared for the differences in assessment of a child with a head injury PARA 26

I think if you've got a baby, it's a lot more difficult because you can't get them to follow commands or anything, but if you have a child who is older you can almost treat them as a mini adult. I think a child under 2, you have to be more wary, just because they are so small really and it's more difficult to assess them PARA 22

Paramedics reported that assessing for a neurological deficit was very challenging in younger children, and this was a significant reason for conveyance in current practice.

With a younger child it is difficult to ask them to do the cranial nerves PARA 13

'A never-ending story'

Paramedics noted a lack of feedback about what happens to a patient when they are conveyed to the ED inhibits the development of their knowledge and confidence. Paramedics reported that if they were able to get frequent feedback, they would learn more about what does and does not need to be conveyed. In current practice, paramedics receive this feedback infrequently.

A lack of understanding of what goes on when they [children] get to hospital and what investigations they might undertake, I think that ignorance around that makes decision making more complex PARA 1

Theme 2: 'There are too many hurdles'

'We aren't equipped'

All paramedics reported that they lacked the paediatric equipment required to fully assess a child with head injury, as well as the resources needed to close scalp wounds.

We've got very limited equipment, such as suitable sats probes, blood pressure cuffs and otoscopes to look in ears which would help with examination of a head-injured child PARA 24

It was apparent that closing a scalp wound was not something most 'typical' paramedics can do, and even specialist paramedics would not undertake this in children, which led to increased conveyance to hospital.

In the two trusts that I operate in, they don't do wound closure, it's a specialist paramedic skill so core paramedics don't even glue or steri-strip PARA 1

Although most paramedics coming into the service from university have received training on wound management, it's a skill that needs additional training, so we find ourselves conveying a lot of minor head injuries to hospital because of that PARA 11

'The time has to be right'

Another influencing factor was timing. This included whether the head injury occurred in the 'out-of-hours' period, the time since injury and the time the paramedic has on scene to observe. Paramedics consistently reported that out-of-hours was a more challenging time to attend children, since children may normally be asleep at this time. This made drowsiness more difficult to assess.

I think if you go to a child late at night with a head injury, I find that a challenge because the parents ask can I let them sleep and I don't always know the best answer PARA 18

In the middle of the night, parents say 'but they are so sleepy' and it's like yea its 4am PARA 25

Paramedics were asked whether time since the head injury would affect their decision-making to convey. Only two paramedics reported that this would *not* affect their practice.

When the head injury has happened, it has happened and if symptoms are going to occur the time of assessment is the time of assessment, and as long as you safety net then go to ED or call us back PARA 13

Most other paramedics reported that they would feel greatly reassured the longer the time since injury.

With demand at the moment, we can be going to these jobs after 8 hours so if there are no red flags after such a long time, then I am probably more likely to just leave worsening advice with the patient. It is very dependent on time PARA 21

The ability to observe is not always possible for paramedics, and there was concern that worsening symptoms could develop. Most paramedics stated they would generally prefer to stay on scene and have a longer time to observe the child.

If we get to the patient quite soon after the injury, it's just kind of wanting that further time period of observation PARA 18

'It's out of our hands'

Another reported barrier to managing children with head injury at scene is local ambulance policy. All 20 paramedics reported that their trust had some sort of policy to ensure younger children were either conveyed to the ED or at least referred to a senior clinician (such as a GP). The age requirement was

variable, ranging from under 1-year olds, under 2-year olds and under 5-year olds.

> I'm aware there's an under 2 policy where anybody under 2 has to receive some kind of secondary healthcare professional to assess the patient PARA 1

Opinions on this rule were divided among paramedics, with some agreeing that the policy should be in place to protect staff and patients, while others reported that it can be embarrassing to bring a child to hospital who clearly does not need to be there, just because of their age.

> I can see why it is in place, due to historic events and non-accidental injury and just a lack of pre-hospital knowledge about paediatrics PARA 11

> It's demoralising of the role of a paramedic and degrading, because they ask you why you are ringing, and you have to say because it's policy PARA 16

In some services a paramedic must call a senior clinician if the child is under 5 years. Most paramedics felt this is unnecessary and wastes valuable ambulance and GP time.

> I think it is ludicrous. I could go to a child with a very minor head injury, we arrive 2-3 hours later because it is a low priority call and is now completely resolved. Then I still have to a ring a doctor PARA 16

'Red flags'

Despite the head injury presenting as mild, 'red flags', including suspicion of non-accidental injury and mechanism of injury, were reported as a reason for conveying children with head injury. The responses indicated that non-accidental injury is always at the forefront of paramedics' minds; even if a child presented very well with no other clinically concerning symptoms, any suggestion of non-accidental injury would lead to the child being conveyed, which was also the correct process to follow in line with policy.

> If there were any safeguarding issues, if I was questioning the story about how the child got the head injury, I'd be taking that child to a place of safety, being the hospital PARA 24

Severe mechanism of injury was a common reason most paramedics gave for conveying children with head injury, even if they had no clinically concerning symptoms.

> What if they had a subdural that isn't presenting immediately- I would as a precaution take a child to ED based on the mechanism if they'd been in for example a 70mph head on collision to be checked over PARA 2

However, other participants disagreed and felt that conveyance due to mechanism of injury represents outdated practice.

> We are moving away from the reliance on mechanism alone to convey a patient, especially within sort of trauma and major trauma PARA 11

'Parents rule'

An extremely common response from paramedics was the consideration of parental anxiety and concern. They reported that parental anxiety often resulted in unnecessary conveyance, and that they would take a child to hospital to keep the parent happy.

> If there's a physical injury to see, so they've got a big egg on their head and the parents panic and think they need to be in hospital PARA 16

> Paramedics may take children to hospital to meet the expectations of the parent where I don't think that's warranted PARA 3

However, some paramedics felt that parental concern was an important red flag to consider.

> We are always taught that parents know best, so yea parental concern is considered in a lot of other tools and is one of the concerning features of assessment PARA 13

Other paramedics reported that most parents just want reassurance and are happy to take their advice.

> I think parents on the whole, or certainly for the children that I have been called out to, the parents have been quite sensible and have usually just wanted a bit of reassurance PARA 24

Often paramedics reported that if paramedics felt that the child with head injury was well, but the parent still wanted to go to hospital, they would ask the parent to self-convey. This depended on factors such as the transport available and distance to hospital.

> I think a lot of time we end up with these kinds of jobs when parents don't have any transport PARA 21

Another reported barrier to managing a child with head injury at scene was the paramedic's trust in parents' capability to observe their child safely.

> We end up going to ED sometimes because you don't quite trust the parents, probably sounds horrible to say, but it's honest PARA 21

Theme 3: 'Creating the right tool'

'There's nothing else out there'

All 20 paramedics interviewed stated that a clinical decision tool to support paramedics when managing children with head injury would benefit their practice. Paramedics pointed out that there is nothing available currently, particularly for children.

> Pre-hospital criteria like the NICE CT criteria is very vague, it doesn't fit with our remit. There's a lot of time specific criteria that can't be met, there's nothing that's suitable specifically for children PARA 11

Clinical decision support tools are not a new concept for paramedics, and paramedics understood the benefits of having such a tool for children with head injury.

> I would be all up for it, I think it would be a really good idea, we've got them for lots of things and I think this subject would benefit from it, helping to support paramedics in alternative care pathways for children with minor head injuries PARA 13

'The tool says it's OK'

Paramedics commonly detailed that a reliable decision support tool would increase their confidence to non-convey, and this was thought to be particularly useful for less experienced or newly qualified paramedics.

> I think it will just give some confidence to clinicians to not take every patient to hospital with a head injury, so I think there is a gap in the market for a clinical decision tool for head injuries in children, definitely, especially for less experienced paramedics PARA 22

Paramedics felt that it would reduce the fear of consequences and provide justification for decisions, as well as act as an aide memoire.

> It kind of backs up in the paperwork why, justifies our decision of what we've done really, and it kind of acts like an aide memoire as well PARA 21

Several paramedics also mentioned that it would be beneficial when handing over a patient in the ED, to justify decision-making.

> It's also really useful for handing over a patient, I think it puts confidence in other clinicians PARA 3

Paramedics also stated that such a tool would reduce unnecessary hospital conveyance and have a positive impact on the wider NHS, as well as the patients.

> Families will appreciate the tool because they are not having unnecessary trips to hospital, it all comes back to the wider picture of the NHS and not taking patients to hospital when they don't need to PARA 1

Paramedics want to keep children out of hospital where safe and possible and reported that the tool would help them to reduce unnecessary transportation.

> I think it would be fantastic, I'm really passionate about trying to keep children out of hospital if they don't need to be PARA 24

'Additional criteria'

Paramedics were asked about any additional criteria they would recommend being included in the tool and repeatedly suggested the addition of milestones and normal parameters for children at certain ages. Most paramedics stated they did not feel confident in their knowledge of when a child is able to crawl, walk and talk, which is essential to decide if there is a behavioural or neurological deficit.

> Having some kind of reminder of the developmental milestones would be really useful, and even perhaps having like development milestones in terms of neurology would be useful for head injury PARA 23

This was especially the case for paramedics who did not have children themselves.

> I suppose if you don't have children yourself, it's hard to know, you know, when is it normal for a child to crawl, or to walk? PARA 18

Paramedics reported that it would be useful to be able to send a worsening advice leaflet to parents electronically while on scene, and to include this as part of the clinical decision tool. Paramedics felt that this would then provide traceable proof of their assessment and the advice given.

> On the ambulance it's not as easy to actually give out a physical or digital copy of head injury advice and the signs to be alert for and if you say verbally to a parent, you just know it's going straight over their head and they're not retaining any of it PARA 23

'Presentation'

When considering the format of the tool, some paramedics preferred a flow chart while others preferred an interactive 'yes/no' option which then generates the next question. Paramedics reported that the tool needs to be clear, simple and concise and not a page of words. Generally, paramedics felt that maximum utility would be achieved by embedding the tool in the Electronic Patient Report Form.

> I think it would be good to have a flow chart kind, more like visual than just writing, like NICE which is difficult to follow PARA 25

> It can't be too wordy; it needs to be as short and concise as can be to read in the pre-hospital environment PARA 1

> Within the EPCR, because it's always accessible to paramedics, and there's no excuse not to use it PARA 22

DISCUSSION

This study explored the factors that influence paramedics when deciding whether to convey a child with a minor head injury to the ED. We also identified paramedics' views on a clinical decision tool designed to support them in their assessment and management of children with minor head injury.

Theme 1, 'we just take them in', conceptualised why paramedics often convey children knowing that there is unlikely to be any further intervention in the ED. There was a general fear of consequences among paramedics, a lack of knowledge, exposure and confidence in managing children with head injury, and finally a lack of feedback regarding outcomes. Limited confidence in managing children is apparent from other studies; Fowler and colleagues[21] found that paramedics' confidence when managing paediatrics was very low, which ultimately resulted in poorer care and reluctance to initiate treatment. Houston and Pearson[22] highlighted that paramedic training in the assessment and management of paediatrics was lacking. Hetherington and Jones[23] concluded that paramedics' confidence in managing minor acuity complaints in children remains low, with a need to develop innovative interventions to help mitigate these issues. Paramedic training on paediatrics is variable across the UK, however most paramedics reported that it is not enough.

The suggestion regarding outcome feedback is reflected in other studies; Morrison and colleagues[24] concluded that performance feedback on outcomes in prehospital care is infrequent and inconsistently delivered. Future systems need to be developed to provide meaningful feedback, which may help to reduce unnecessary conveyance of children to the ED in the future.

Theme 2, 'there are too many hurdles', described how paramedics need further training to undertake wound closure, particularly for children. In research by Nicholson and colleagues,[25] wound care/closure accounted for over half of the conveyances of older adults with minor head injury. Aldridge and colleagues[26] developed the Head Injury Discharge at Triage Tool. The authors concluded that 20% of all children presenting with head injury could be discharged at triage using this tool, and this would increase to 50% if patients with minor wounds were given advice and discharged at triage, suggesting that a substantial number of children attend the ED with minor scalp wounds.

Participants reported that local policy could be a barrier to non-conveyance since most ambulance services stipulate that all children under the age of 2 years should be conveyed to the ED regardless of the presenting complaint. This policy was introduced in the UK following a recommendation from the Royal College of Paediatrics and Child Health.[27] However, the Associate of Ambulance Chief Executives in the UK reviewed the policy and concluded that all children under the age of 1 year should be conveyed to the ED, while all children between the ages of 1 year and 5 years should be referred to a senior healthcare professional (such as a GP). Children from 6 years to 17 years could be discharged at scene by the paramedic if safe to do so.[27] The participants' views on this policy were mixed; some of them felt protected by the policy while others felt that it reduced their autonomy.

Certain 'red flags', such as a suspicion of non-accidental injury, were correctly and understandably given as a reason not to manage a children with head injury at scene. Non-accidental injury is one of the biggest predictors of brain injury, particularly in children under the age of 2 years[28] and abusive head trauma occurs more frequently in under 1-year olds.[29] Paramedics reported that they felt assured in their ability to recognise non-accidental injury, however they were underconfident

in assessing and discharging young children who had sustained a head injury, particularly those who were non-verbal. This is reflected in other work demonstrating that half of children taken to hospital by ambulance were younger than 5 years of age.[1] Another 'red flag' that paramedics reported was mechanism of injury. Nearly all paramedic respondents said they would convey a child based solely on the mechanism of injury, despite not showing any clinically worrying symptoms. The main reason for this was anxiety that the child may have an occult brain injury. Severe mechanism of injury is a common indication for a head CT scan, or at least observation for a prolonged bout of time, however one study found no statistically significant relationship between injury mechanisms and abnormal brain CT.[30] Mechanism of injury alone is less predictive of an abnormal brain CT than other predictors such as a loss of consciousness.[31]

Participants reported that parental anxiety often resulted in conveyance. One study aimed to provide current data on the 'inappropriate' use of ambulances for children and explore the reasons why. The authors found that several 'inappropriate' calls to the ambulance service were due to what the authors described as 'overanxiety' of parents and a perceived emergency.[32] This is reflected in the work of Eastwood and colleagues,[33] which demonstrated that parents often call an ambulance for reassurance and fear of consequences.

The number of patients that wait in ambulances outside hospitals in England for more than an hour has risen recently to around 11 000 a week in 2022,[34] and therefore lower acuity calls have significant wait times. Paramedic respondents consistently reported that the longer the time since the head injury occurred, the more comfortable they would feel to discharge children. Currently, paramedics do not have the ability to observe patients on scene for lengthy periods of time, however it could be argued that observing a child on scene for an hour would take less time than transporting to hospital and waiting in the ED for several hours.

Theme 3, 'creating the right tool', represents a strong interest in a clinical decision tool designed to support paramedics in the assessment and management of children with head injury. Paramedics reported that there is nothing currently available, other than the NICE CKS, which is not wholly applicable to the prehospital setting and is also difficult to apply in children. Paramedics reported that they are familiar with using clinical decision tools in practice, however they discussed that these tools are often not validated for prehospital use. Previous research describes the successful implementation of clinical decision support tools specifically for paramedics, such as identifying alternative patient pathways for older adults following a fall.[35] A randomised controlled trial investigating the effectiveness of clinical decision support tools in prehospital care suggested that paramedics use these tools to justify their decision-making, rather than as a decision-making aid.[36]

Limitations

The experience and opinions of those taking part is subject to recall and other biases and may not reflect the full range of experience and views of other paramedics. In addition, all the participants were volunteers and so are unlikely to be representative of all paramedics in the UK. Using a consecutive sampling method resulted in a predominantly white British ethnicity sample, and those from a black, Asian or minority ethnic group were not represented. Black and minority ethnic paramedics are under-represented in this study as they are in the workforce overall.[37] A maximum variation sampling method could have been adopted to ensure a more diverse paramedic workforce was included.

CONCLUSION

Generally, paramedics do not feel confident when assessing and managing children with head injury, and often convey them to hospital despite knowing there will likely be no intervention in the ED. Overall, this study suggests a change in policy on the conveyance of children and is a driver for the development of a clinical decision tool designed to support paramedics in the management of children with head injury.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

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