Point of Care Ultrasound Scanning in Paediatric Haemophilia Patients

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SUMMARY

Point of Care Ultrasound Scanning (POCUS) is a procedure commonly used at the patient's bedside, often within acute medicine to aid assessment and management of patients. A Human Factors project was undertaken to consider the implementation of POCUS to improve the diagnosis, treatment and management of Paediatric Haemophilia Patients with suspected joint bleeds. A Human Factors approach was used to support the implementation to ensure a systematic approach was taken to ensure the feasibility, usability, viability, scalability and sustainability was considered. Human Factors data gathering and observations were conducted to fully understand the current patient pathway and to understand how POCUS could be implemented to benefit both staff and patients. By using a Human Factors approach and considering the work system fully, it is anticipated that any potential disadvantages of the new technology are identified and addressed prior to full implementation. The project is currently in the pilot phase with staff trained in the use of POCUS and trialling equipment alongside the original pathway. It is anticipated that benefits to staff, patients, their carers, families and the NHS Trust will be identified.

KEYWORDS

Point of Care Ultrasound, Haemophilia, Paediatric

Introduction

Ultrasound technology has progressed to enable healthcare staff to use a handheld probe connected to a tablet or smart phone. This technology has been transformational in how healthcare staff can use it. Ultrasound has long been used for diagnosis; however, the new handheld technology enables it to be used to inform decision making. POCUS can positively impact patient flow and journey with more timely diagnostics and increased capacity within radiology (Akanuwe et al, 2023 and Rudolph et al, 2014).

Through Health Innovation West Midlands' (HIWM) work, it was identified that several healthcare organisations from around the West Midlands region were interested in exploring the use of POCUS in their clinical areas. One such area was the Birmingham Children's Hospital Haemophilia Team. This paper explores the Human Factors work to understand the feasibility and impact of using POCUS to rule in or out a joint bleed in Paediatric Haemophilia patients presenting with joint bleeds.

Method

One of the areas that the Haemophilia team at Birmingham Children's Hospital (BCH) treats are suspected joint bleeds. Repeated bleeding into a joint breaks down the joint lining and causes joint damage which is why timely treatment should be sought if a bleed is suspected. When a child with

Haemophilia has a joint or muscle bleed, it needs to be treated with replacement for the missing clotting protein as soon as possible.

Paediatric Haemophilia patients from around the West Midland's region attend BCH if they suspect a joint bleed. The patient will initially be seen by the Haemophilia Nurse team who will examine the joint and make an initial assessment. If a joint bleed is suspected, it will need to be confirmed by an ultrasound scan. The Haemophilia Team had no dedicated ultrasound slots on the regular Radiology lists. If they felt a patient required an ultrasound scan, the Nurse had to contact the Radiology Department and request a scan (an addition to the standard list). Once an ultrasound scan had been performed, the results of the scan would be sent to the Haemophilia Team and then discussed with patient/carers and treatment plan agreed. If no ultrasound slot available, then clotting factor treatment may have been given as a precautionary measure.

The Nurse Team faced challenges with the pathway which had a negative impact on patients if they were required to return to the hospital the following day for a scan and/or being prescribed precautionary medication which may not be required. BCH treats children with Haemophilia from across the region, so, making multiple trips to hospital before a diagnosis is given can create additional worry for patients and their families and carers, additional time for multiple trips and increased cost due to multiple journeys. The cost of Haemophilia is high for both healthcare organisations and the families of patients (O'Hara et al, 2017).

The Haemophilia Team at BCH were keen to improve the patient journey and diagnostic pathway in order to benefit staff and patients and wanted to consider the implementation of Point of Care Ultrasound to enable the Haemophilia Nurse or Physiotherapist to undertake their own ultrasound scanning to inform decision making. Human Factors support was provided to the team from the beginning of the project.

Hierarchical Task Analysis (HTA) is a structured approach to understanding the tasks and goals within a system. An HTA was conducted to following discussion and observations with the team to understand the existing process for suspected bleed patients to be referred to Radiology for an ultrasound. Information from discussions with staff, observations and the HTA was used assist with the identification of where and how the pathway could change with the implementation of POCUS. This information was better understood by applying the SEIPS 2.0 framework (Holden et al, 2013).

Baseline data was collected to gain greater understanding of the patient pathway for suspected joint bleed patients. The data collected included:

- Date of presentation to clinic;
- Date of ultrasound (if performed);
- Length of wait for ultrasound results;
- Whether a bleed was confirmed;
- Whether Factor medication was prescribed.

Findings

The HIWM team works with industry partners to match make technology with healthcare system requirements. A supplier of POCUS equipment was identified and HIWM arranged a trial of the equipment with the Haemophilia Team. Taking a Human Factors systems approach prior to the trial and implementation of the POCUS equipment ensured that full consideration was given to how

the patient pathway would change with the introduction of a Nurse led ultrasound scan. Work was also carried out to understand the potential musculoskeletal risks of the implementing POCUS and by ensuring that this was considered at the outset of the project, it is hoped that the risk of staff developing musculoskeletal problems in the future is reduced.

The project is still currently in progress. Baseline data has been collected to understand whether the introduction of POCUS has any impact on:

- The number of patients prescribed Factor medication when joint bleed is not confirmed.
- The amount spent on Factor medication.
- The waiting time for patients when ultrasound conducted in Haemophilia clinic.
- Reassurance given for parents/carers that there is or isn't a bleed.
- The number of ultrasound requests to Radiology.

Data collected showed that the shortest waiting time for an ultrasound scan was 10 minutes, whilst the longest was a week. Out of the baseline patients that had an ultrasound scan, 33% were confirmed to have a joint bleed and all were prescribed Factor clotting medication. Out of the patients who didn't have a bleed confirmed by ultrasound scan, 50% of those were still prescribed Factor clotting medication.

Conclusion

Staff have now been trained in the use of POCUS so the project is currently in the trial stage of equipment to understand fully how its use will impact the patient journey, patient experience and the use and cost of clotting factor medication. Once the project has been completed, it is hoped that the implementation knowledge that has been gained by HIWM can be used to support other Haemophilia units or specialities who are considering implementing similar technologies.

References

Akanuwe, J.N.A., Siriwardena, A.N., Bidaut, L., Mitchell, P., Bird, P., Lasserson, D., Apenteng, P. and Lilford, R. (2023). Practitioners' views on community implementation of point-of-care ultrasound (POCUS) in the UK: a qualitative interview study. *BMC Health Services Research*, 23(1).

Holden, R.J., Carayon, P., Gurses, A.P., Hoonakker, P., Hundt, A.S., Ozok, A.A. and Rivera-Rodriguez, A.J. (2013). SEIPS 2.0: a human factors framework for studying and improving the work of healthcare professionals and patients. *Ergonomics*, [online] 56(11), pp.1669–1686.

O'Hara, J., Hughes, D., Camp, C., Burke, T., Carroll, L. and Diego, D.-A.G. (2017). The cost of severe haemophilia in Europe: the CHESS study. *Orphanet Journal of Rare Diseases*, 12(1).

Rudolph, S.S., Sørensen, M.K., Svane, C., Hesselfeldt, R. and Steinmetz, J. (2014). Effect of prehospital ultrasound on clinical outcomes of non-trauma patients—A systematic review. *Resuscitation*, 85(1), pp.21–30.