Technoleg Iechyd Cymru
Health Technology Wales

Topic Exploration Report

Topic explorations are designed to provide a high-level briefing on new topics submitted for consideration by Health Technology Wales. The main objectives of this report are to:

1. Determine the quantity and quality of evidence available for a technology of interest.
2. Identify any gaps in the evidence/ongoing evidence collection.
3. Inform decisions on topics that warrant fuller assessment by Health Technology Wales.

Topic:	Digital triage platform (eTriage) for people presenting at emergency or urgent care settings.
Topic exploration report number:	TER192

Introduction and aims

eTriage is a digital triage platform for the emergency or urgent care setting that allows patients to check-in and be triaged using iPads. Patients input their details and symptoms into the eTriage system, which then automatically triages patients based on clinical need.

Health Technology Wales researchers searched for evidence on eTriage, and other digital triage platforms, for use in emergency or urgent care settings.

Summary of evidence

Digital triage platform (eTriage) for people presenting at emergency or urgent care settings is a digital health technology and was determined to be a Tier 3b technology according to the Evidence Standards Framework for Digital Health Technologies. This classification covers technologies with measurable user benefits, including tools used for treatment and diagnosis, as well as those influencing clinical management through active monitoring or calculation. For technologies of this classification, it is recommended that high-quality randomised controlled study or studies are produced to demonstrate effectiveness of the technology.

Secondary evidence

Guidelines/guidance

NICE Guideline 40 *Major trauma: service delivery* (NG40. 2016) recommends that a national pre-hospital triage tool for major trauma should be developed and validated. It is unclear what proportion of patients with major trauma would be ambulatory and suitable for digital triage at point of presentation.

Systematic reviews

We did not identify any systematic reviews that studied digital triage tools designed to be used by patients at point of presentation to emergency or urgent care centres. Chambers et al

(2019) conducted a systematic review on online or digital services designed to assess symptoms, provide health advice and direct patients to appropriate services. Twenty-nine publications were included in the review, most of which were observational studies and non-peer-reviewed grey literature. There was little evidence to suggest whether symptom checkers are safe or unsafe, and studies evaluating their safety were generally short term and small scale. Symptom checkers were found to be generally less accurate than health professionals, although their performance in studies was variable. Symptom checkers tended to be more cautious in their advice than health professionals. There was some indication that symptom checkers can influence the demand for urgent-care services, but results were inconsistent. There was very limited evidence on patients' reactions to advice from symptom checkers, including information regarding whether or not patients follow the advice. Study participants generally expressed high levels of satisfaction, albeit in uncontrolled studies.

Primary evidence

We identified numerous primary studies that were not included in the systematic review by Chambers et al. The Topic Proposer provided evidence of a case study, in which an independent external assessment of eTriage at Queen Mary's Sidcup Urgent Care Centre found that 99% of the total attendees used it (over 50,000 patients). All of these patients were assessed within 15 minutes of arrival, compared to 75% before eTriage. Fifty-eight percent of staff believed that eTriage saved time, and 64% of staff believed that eTriage made them more efficient. The majority of patients preferred using eTriage to the traditional check-in desk (Harmon et al).

St Richard's Hospital have also been using eTriage and noted that eTriage submissions accounted for approximately 80% of total attendances. Since the implementation of eTriage at St Richard's hospital, there has been an increase in patients that are being triaged within 15 minutes or less. Patients are now being treated as quickly as 30 minutes post arrival in comparison with 90 minutes before eTriage was used (econsult) (Pourasghar et al. 2016).

We identified a number of observational studies investigating digital triage systems other than the eTriage platform described above (some of which have the same name as eTriage but use the Canadian Triage and Acuity Scale scores, as opposed to the Manchester triage system).

Dong et al. (2005) compared eTriage to memory-based triage in 693 patients in a Canadian emergency department (ED). They found that there was a significant down-triaging of patients when patients were triaged without the eTriage. In a later study, Dong et al. (2007) demonstrated significant correlation among eTriage Canadian Triage and Acuity Scale scores and patient severity (deaths, admission rate), resource utilisation (consultation, use of computed tomography scanning, and length of stay), and health care costs ($p < 0.001$). The authors concluded that acuity measured by eTriage demonstrated predictive validity for resource utilisation and ED and hospital costs.

Levin et al. (2018) conducted a multisite (USA), retrospective, cross-sectional study of 172,726 ED visits of patients who were evaluated using e-triage and the Emergency Severity Index (ESI) as a comparator. Compared to ESI, e-triage demonstrated equivalent or improved identification of patients with critical outcomes (mortality, intensive care unit admission, and emergency procedure).

Lindsay et al. (2020) reviewed electronic triage outcomes of 809 referrals to osteoporosis specialist services over a 12-month period and found 92% agreement for the triage category between the referring clinician and specialist services.

A prospective study by McLeod et al. (2020) of seven EDs (1,491 patients) using the electronic Canadian Triage and Acuity Scale (eCTAS) found that a standardised, electronic approach to performing triage assessments improved interrater agreement and significantly reduced the number of patients over-triaged (12.0% versus 5.1%) and under-triaged (12.6% versus 2.2%) without substantially increasing triage time (median triage time was 312 seconds [pre-eCTAS] and 347 seconds with eCTAS).

Bolduc et al. (2018) conducted a crossover study investigating the use of electronic Simple Triage and Rapid Treatment (START) triage as compared to the manual method at a Canadian trauma centre. Health care providers triaged 15 patients using the paper-based method and 15 patients by START triage. There was no difference in accuracy of triage between the electronic and manual methods overall: 83% and 80% ($p = 1.0$), respectively. On average, triage time using the manual method was estimated to be 8.4 seconds faster ($p < .001$) for paramedics; and while small differences in triage times were observed for doctors and nurses, they were not significant. Data from the participant feedback survey showed that the electronic method was preferred by most health care providers. Patients had no preference for either method. However, patients perceived the computer-based method as "less personal" than the manual triage method, but they also perceived the former as "better organized."

A cross-sectional study of 25,198 adult emergency department visits compared the electronic triage system (ETS) with ESI and found that ETS better identified those patients with risk of a poor outcome, better distributed patients to each triage level, and reduced overtriage (Dugas et al. 2016).

Cost

The systematic review by Chambers et al (2019) included three UK-based studies which reported on cost or cost effectiveness, but these all focussed on use of digital triage tools in settings other than at point of presentation to urgent or emergency care.

The eTriage platform is listed on the UK Government's Digital Marketplace: according to the pricing specification, eTriage is offered on a per-patient pricing basis, which varies from £0.25 to £3.00 per patient depending on the setting of use and length of contract. Initial use of the software is free but setup/capital costs would be incurred such as supplying suitable tablets and reconfiguring reception design if necessary. A search of the Digital Marketplace did not identify any other similar digital platforms listed that could be used for initial triage in emergency or urgent care.

Ongoing studies

Two systematic reviews were identified investigating online triage. One systematic review studied the effectiveness of triage interventions delivered in all modes of delivery (i.e. via telephone, online, or a healthcare professional) in primary and secondary care (PROSPERO 2020 CRD42020166340). Another systematic review investigated online triage and consultation systems in primary care (patients submit health-related requests, including as free-text, via structured forms, questionnaires, or 'chatbots'). Prioritisation and deciding whether a health professional response is necessary will be performed by the system itself (e.g. by using artificial intelligence), or by a health professional. This will be compared to patients triaged by a member of staff, with consultation taking place through a telephone or face-to-face appointment (PROSPERO 2020 CRD42020191802).

An interventional study of 2,500 patients at a walk-in-clinic and emergency department in Switzerland compared SMASS-Triage, a web-based symptom checker, with urgency assessments conducted by three interdisciplinary panels of physicians. The primary endpoint

will be the proportion of self-triage and the according confidence interval assessed by the physicians to be a hazardous under-triage (NCT04055298).

Areas of uncertainty

The Evidence Standards Framework for Digital Health Technologies recommends that high-quality randomised controlled trials or studies done in a setting relevant to the UK health and social care system, comparing the digital health technology with a relevant comparator, are produced to demonstrate the effectiveness of technologies of this type. No randomised controlled studies were identified that investigated digital triage platforms for people presenting at emergency or urgent care settings. The majority of the studies were observational.

Conclusions

eTriage is currently used in two UK NHS accident and emergency departments and one UK NHS urgent treatment centre. Results over the case study period showed that use of eTriage reduced waiting times and improved the percentage of patients triaged within 15 minutes of arrival.

Observational studies of different digital triage platforms in most cases found similar triage decisions when compared to traditional triage, and found that triage took similar time or shorter. However, some studies suggested these systems can under- or over-triage patients. We found some studies analysing the cost impact of digital triage platforms, but none of these were in the emergency or urgent care settings. Further high-quality evidence investigating digital triage platforms for use in urgent or emergency care would be beneficial, in particular investigating their cost impact in emergency care settings, and their effect on downstream patient outcomes and triage decisions, between digital and traditional triage.

Brief literature search results

Resource	Results
HTA organisations	
Healthcare Improvement Scotland	We did not identify any relevant evidence from this source.
Health Technology Assessment Group	We did not identify any relevant evidence from this source.
Health Information and Quality Authority	We did not identify any relevant evidence from this source.
UK guidelines and guidance	
SIGN	We did not identify any relevant evidence from this source.
NICE	**Major trauma: service delivery** NICE guideline [NG40], February 2016 https://www.nice.org.uk/guidance/ng40 **Emergency and acute medical care in over 16s: service delivery and organisation** NICE guideline [NG94], March 2018 https://www.nice.org.uk/guidance/ng94/ This guidelines does not include any recommendations on how initial triage should be carried out.
Secondary literature and economic evaluations	
ECRI	We did not identify any relevant evidence from this source.
EUnetHTA	We did not identify any relevant evidence from this source.
Cochrane library	We did not identify any relevant evidence from this source.
Medline (Ovid)	Chambers D, Cantrell A, Johnson, M, Preston L, Baxter SK, Booth A, Turner J. 2019. Digital and online symptom checkers and assessment services for urgent care to inform a new digital platform: a systematic review. NIHR Journals Library. Health Services and Delivery Research. 7(29): https://dx.doi.org/10.3310/hsdr07290
Primary studies	
Cochrane library	We did not identify any additional relevant evidence from this source.
Medline	Bolduc C, Maghraby N, Fok P, et al. (2018). Comparison of Electronic Versus Manual Mass-Casualty Incident Triage. Prehospital & Disaster Medicine. 33(3): 273-8. doi: https://dx.doi.org/10.1017/S1049023X1800033X Dong SL, Bullard MJ, Meurer DP, et al. (2007). Predictive validity of a computerized emergency triage tool. Academic emergency medicine. 14(1): 16-21. Dong SL, Bullard MJ, Meurer DP, et al. (2005). Emergency triage: comparing a novel computer triage program with standard triage. Academic emergency medicine. 12(6): 502-7. doi: 10.1197/j.aem.2005.01.005

	Dugas AF, Kirsch TD, Toerper M, et al. (2016). An Electronic Emergency Triage System to Improve Patient Distribution by Critical Outcomes. Journal of Emergency Medicine. 50(6): 910-8. doi: https://dx.doi.org/10.1016/j.jemermed.2016.02.026 Levin S, Toerper M, Hamrock E, et al. (2018). Machine-Learning-Based Electronic Triage More Accurately Differentiates Patients With Respect to Clinical Outcomes Compared With the Emergency Severity Index. Annals of Emergency Medicine. 71(5): 565-74.e2. doi: https://dx.doi.org/10.1016/j.annemergmed.2017.08.005 Lindsay JR, Lawrenson G, English S. (2020). A service evaluation of e-triage in the osteoporosis outpatient clinic-an effective tool to improve patient access? Archives of Osteoporosis. 15(1): 53. doi: https://dx.doi.org/10.1007/s11657-020-0703-1 McLeod SL, McCarron J, Ahmed T, et al. (2020). Interrater Reliability, Accuracy, and Triage Time Pre- and Post-implementation of a Real-Time Electronic Triage Decision-Support Tool. Annals of Emergency Medicine. 75(4): 524-31. doi: https://dx.doi.org/10.1016/j.annemergmed.2019.07.048 Pourasghar F, Tabrizi JS, Ala A, et al. (2016). Validity of the Electronic Triage System in Predicting Patient Outcomes in Tabriz, Iran: A Cross-Sectional Study. Bulletin of Emergency & Trauma. 4(4): 211-5.
Ongoing primary or secondary research	
PROSPERO database	Mei Yee Tang, Jan Lecouturier, Louis Goffe, Falko Sniehotta, Dawn Craig. Do triage interventions lead to suitable service use? A systematic review of systematic reviews. PROSPERO 2020 CRD42020166340 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020166340 Sarah Darley, Tessa Coulson, Niels Peek, Sabine Vanderveer, David Wong, Benjamin Brown. Online patient triage and consultation in primary care: a systematic review. PROSPERO 2020 CRD42020191802 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020191802
Clinicaltrials.gov	Is Self-triage by Patients Using a Symptom-checker Safe? ClinicalTrials.gov Identifier: NCT04055298 https://clinicaltrials.gov/ct2/show/NCT04055298?cond=triage&draw=2&rank=2 Estimated completion date: December 2020
Other	
From topic proposer additional info	Harmon M, Burslam K, Reguilon I, Tempest M. Seen in 15: improving clinical indicators through automated check-in and triage: https://econsult.net/urgent-care/evidence/case-studies econsult. Case studies: Western Sussex Emergency Department performance evaluation: https://econsult.net/urgent-care/evidence/case-studies/western-sussex-emergency-department-performance-evaluation

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Concepts used:	eTriage, digital or electronic triage, triage.