Digital and online symptom checkers and health assessment/triage services: systematic review protocol

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Summary

- This work has been commissioned to provide NHS England with an independent review of previous research in this area to inform strategic decision-making and service design.
- The objective is to identify, appraise and synthesise published research (including 'grey literature') on digital and online symptom checkers and assessment services, including their safety and clinical effectiveness, impact on demand for services, patient compliance with advice received and cost effectiveness.
- We will include studies of online or digital services for the general population designed to assess symptoms, provide health advice and direct patients to appropriate services. Services that only provide health advice will be excluded.
- We will not restrict inclusion by study design (and will include relevant audits or service evaluations in addition to formal research studies) but included studies must evaluate (quantitatively or qualitatively) some aspect of an online/digital service.
- We will provide a narrative synthesis structured around the pre-specified research questions and outcomes. This will include an 'evidence map' summarising the quantity and strength of evidence for each outcome and identifying gaps that may need to be filled by further research.
- Given that outputs are required before 30th June, we will aim to deliver a draft report by 25 May.

Background

Digital and online symptom checkers and assessment services are used by patients seeking guidance about an urgent health problem. These services generally provide people with a number of possible diagnoses based on their reported symptoms and suggest a course of action (e.g. self-care, GP appointment or go to emergency department (ED)).

In England, the NHS111 service provides assessment and triage by telephone for problems that are urgent but not classified as emergencies. NHS England intends to introduce a digital platform for NHS111. This would include a possibility for patients to be referred to the NHS111 telephone service for further assessment. It is hoped that a digital 111 platform will help to manage demand and increase efficiency in the urgent and emergency care system. However, there is a risk of increasing demand, duplicating healthcare contacts and providing advice that is not safe or clinically appropriate.

This rapid systematic review has been commissioned to provide NHS England with an independent review of previous research in this area to inform strategic decision-making and service design.

Research question and aims

The research questions that the review will address are as follows:

In relation to digital and online symptom checkers and health advice/triage services:

- Are these services safe and clinically effective? Do they accurately identify patients with both low acuity and high acuity problems?
- What is the overall impact of these services on healthcare demand; in particular is there evidence that they drive patients towards higher acuity services (e.g. ambulance and Emergency Department use)?
- Do individuals comply with these services and the advice received? Are these services used instead of, or as well as, other elements of urgent and emergency care?
- What is the cost effectiveness of these services?

Methods

This is a review of published research (including informally published 'grey literature') and not an evaluation of services themselves. We will tabulate the key characteristics of any services covered by studies included in the review but will not attempt to provide a comprehensive listing of current services. We will highlight areas where evidence to address the research questions is lacking and provide implications for further research (primary research and/or evidence synthesis).

Inclusion and exclusion criteria

Population: General population seeking information online or digitally to address an urgent health problem, including adults and children and issues arising from both acute and long-term chronic illness

Intervention: Any online or digital service that is designed to assess symptoms, provide health advice and direct patients to appropriate services. This reflects the role of the NHS111 telephone service. Services that only provide health advice will be excluded.

Comparator: The 'gold standard' comparator is current practice of telephone assessment (e.g. NHS111) or face to face assessment (e.g. general practice, urgent care centre or ED). However, studies with other relevant comparators (e.g. comparative performance in tests or simulations) or with no comparator will be included if they address the research questions.

Outcomes: The main outcomes of interest are

- Safety (e.g. any evidence of adverse events arising from following or ignoring advice from online/digital services)
- Clinical effectiveness (any evidence of clinical outcomes associated with use of online/digital services)
- Cost-effectiveness (including costs and resource use)

- Accuracy: This refers to 1) ability to provide a correct diagnosis and 2) ability to distinguish between high and low acuity/urgency problems (and hence direct patients to appropriate services, avoiding over- or under-triage)
- Impact on service use/diversion (including possible multiple contacts with health services)
- Compliance with advice received
- Patient/carer satisfaction
- Equity and inclusion (e.g. barriers to access, characteristics of patients using the service compared with the general population)

This list is not exhaustive and other relevant outcomes from included studies will be reported.

Study design: We will not restrict inclusion by study design (and will include relevant audits or service evaluations in addition to formal research studies) but included studies must evaluate (quantitatively or qualitatively) some aspect of an online/digital service

Other: Studies from any developed country healthcare system will be eligible for inclusion

Excluded: The following types of studies will be excluded from the review:

- Studies that merely describe services without providing any quantitative or qualitative outcome data
- Conceptual papers and projections of possible future developments
- Studies conducted in low or middle income country health systems

Literature search and screening

The initial scoping searches revealed that a highly sensitivity search strategy, as typically conducted for systematic reviews, retrieves a disproportionately high number of references on GP decision-making and triage. These references are outside of the scope of the NHS Digital 111 review and will unnecessarily divert resources from the review focus. Therefore, to optimise retrieval and sifting effort we have devised a three stage retrieval strategy as an acceptable alternative to comprehensive topic-based searching. This involves

i. targeted searches of precise high specificity terms (see Figure 1 for Medline example)

Figure 1: Highly focused specific search strategy on Medline (to be adapted for different databases)

Database: Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) <1946 to Present>
Search Strategy:
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1. (symptom checker or symptoms checker or symptom checkers or symptoms checkers).tw. (21)
2. ("self diagnosis" or "self referral" or "self triage" or "self assessment").tw. (10403)
3. TRIAGE/ (9969)
4. 2 or 3 (20333)

5. (online or on-line or web or electronic or automated or internet or digital or app or mobile or smartphone).tw. (652566)
6. 4 and 5 (1542)
7. ("online diagnosis" or "web based triage" or "electronic triage" or etriage).tw. (41)
8. 1 or 6 or 7 (1581)

We will search the following databases:

- MEDLINE
- EMBASE
- Cochrane Library
- CINAHL (Cumulative Index to Nursing and Allied Health Literature)
- HMIC (Health Management Information Consortium)
- Web of Science (Science Citation Index and Social Science Citation Index)
- ACM Digital Library

ii. identification of exhaustive synonyms for named and generic systems (e.g. askmygp, webgp, webMD, GP at hand, Push Doctor, Engage Consult, online triage and econsult) using phrase searching

iii. follow up of citation searches for key included studies and reviews. This will be complemented by contact with service providers, directly and via websites.

The search will not be restricted by language or date.

Search results will be stored in a reference management system (EndNote) and screened against the inclusion criteria by one reviewer, with a 10% sample screened by a second reviewer. Uncertainties will be resolved by discussion among the review team. We will use EPPI-Reviewer software to facilitate rapid screening and analysis of the included studies.

Data extraction and quality/strength of evidence assessment

We will extract and tabulate key data from the included studies, including study design, population/setting, results and key limitations. Data extraction will be performed by one reviewer, with a 10% sample checked for accuracy and consistency. If possible we will extract data directly into summary tables for the report.

Quality (risk of bias) assessment will be undertaken using appropriate tools for the types of study designs included. Quality assessment will be performed by one reviewer, with a 10% sample checked for accuracy and consistency. Assessment of the overall strength (quality and relevance) of evidence for each research question will form part of the narrative synthesis. If there are sufficient studies, we will perform a formal assessment of the strength of the evidence base using GRADE for quantitative evidence and CERQUAL for qualitative evidence. Alternatively, a system such as that described by Baxter et al (in press) may be used. This involves classifying evidence as ‘stronger’, ‘weaker’, ‘conflicting’ or ‘insufficient’ based on study numbers and design.

Evidence synthesis

We will provide a narrative synthesis structured around the pre-specified research questions and outcomes. This will include an 'evidence map' summarising the quantity and strength of evidence for each outcome and identifying gaps that may need to be filled by further research. We will seek to characterise key features of the interventions using standard components (within the limitations imposed by reporting in the included studies and online/digital resources). Appendix 1 presents a draft checklist adapted from the TIDIER (Template for Intervention Description and Replication) checklist. We will undertake meta-analysis if suitable groups of studies are available.

Registration and outputs

We will make the protocol available via the HS&DR programme website, the Sheffield HS&DR Evidence Synthesis Centre website and PROSPERO.

Proposed outputs:

- Report for NHS England (subsequent publication as a peer-reviewed web report?)
- Peer-reviewed journal article
- Evidence briefing for decision-makers (2–4 pages)

Project timetable

We note that outputs are required by 30th June 2018 at the latest. The timetable below reflects this. We have allowed time for NHS England to comment on the draft report in late May/early June. We will hold regular team meetings to monitor progress and will keep the HS&DR programme team and NHS England informed of progress.

Process	Start	Finish
Scoping and protocol development	21 March	9 April
Main literature search		16 April
Inclusion screening	16 April	27 April
Data extraction and quality assessment	30 April	14 May
Analysis and report writing	27 April	25 May
Rapid peer review	29 May	8 June
Delivery of 'final' report		15 June–end June

Appendix 1: draft checklist for reporting key features of digital and online symptom checkers and health assessment/triage services

The TIDieST (Template for Intervention Description for Systems for Triage) Checklist*:

Information to include when describing an intervention for online self-triage systems

Item number	Item	Relationship to original TIDIER Template
	BRIEF NAME	
1.	Provide the proprietary name or generic name that describes the intervention.	AMENDED
	WHY	
2.	Describe the objective of the intervention (*not the study*).	AMENDED
	WHAT	
3.	Interface: Describe the physical characteristics of the interface, including layout, design and any adaptations for accessibility etcetera. Provide information on where the interface can be viewed (e.g. online, screenshots, demo, URL, research article figures).	AMENDED
4.	Procedures: Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.	UNCHANGED
	WHO PROVIDED	
5.	For each category of intervention provider (e.g. psychologist, nursing assistant), describe their expertise, background and any specific training given.	DELETED
	HOW	
6.	Describe how the system is accessed e.g. via Web pages, a remote computer, an app etcetera	AMENDED

	WHERE	
7.	Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.	DELETED
	WHEN and HOW MUCH	
8.	Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity or dose.	DELETED
	TAILORING	
9.	Describe provision for particular disease groups or populations and how these differ from general provision	AMENDED
	MODIFICATIONS/VERSIONS	
10.‡	If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).	AMENDED
	HOW WELL	
11.	Simulation/Laboratory Testing: How the intervention was tested and by whom.	AMENDED
12.‡	Real world testing: How the intervention was tested and by whom.	AMENDED

** **Authors** - use N/A if an item is not applicable for the intervention being described. **Reviewers** – use '?' if information about the element is not reported/not sufficiently reported.

† If the information is not provided in the primary paper, give details of where this information is available. This may include locations such as a published protocol or other published papers (provide citation details) or a website (provide the URL).

‡ If completing the TIDieR checklist for a protocol, these items are not relevant to the protocol and cannot be described until the study is complete.

* We strongly recommend using this checklist in conjunction with the TIDieR guide (see *BMJ* 2014;348:g1687) which contains an explanation and elaboration for each item.

* The focus of TIDieST is on reporting details of the intervention elements (and where relevant, comparison elements) of an online triage system. When a **randomised trial** is being reported, the TIDieST checklist should be used in conjunction with the CONSORT statement (see www.consort-statement.org) as an extension of **Item 5 of the CONSORT 2010 Statement.** When a **clinical trial protocol** is being reported, the TIDieST checklist should be used in conjunction with the SPIRIT statement as an extension of **Item 11 of the SPIRIT 2013 Statement** (see www.spirit-statement.org). For alternate study designs, TIDieST can be used in conjunction with the appropriate checklist for that study design (see www.equator-network.org).