A systematic review of ehealth and shared care

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Introduction

The World Health Organisation defines ehealth as '*the combined use of information and communications technologies for health.*'[1] eHealth strategies worldwide aim to promote quality, safety and efficiency by underpinning shared healthcare provision with technology. The Scottish eHealth Strategy incorporates an ePharmacy programme to support community pharmacists increasing role in shared care[2]. It acknowledges organisational development and training for core and optional ehealth services as key elements in keeping patients and healthcare professionals '*at the heart of this strategy*'.The aim of this study was to explore and report methodologies, findings and gaps in research related to healthcare professionals' perceptions of the adoption of ehealth technologies for shared care.

Methods

A systematic review was conducted using a six phase meta-narrative approach which applies '*principles of pragmatism, pluralism, historicity, contestation and peer review*'[3] (Figures 1 & 2). The search strategy with iterative search refinement was recorded (Figure 3). Articles published post-2004 in English were included; articles on Internet searches for health information or email were excluded. Data were extracted, synthesised and summarised as a basis for recommendations (Figure 4). The review also explored ehealth definitions.

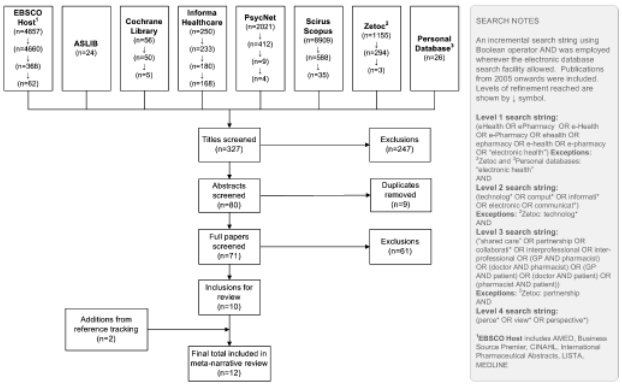

Figure 3. Search Phase Record based on PRISMA Flow Diagram

Discussion

Strategists worldwide believe technology has the potential to promote quality, safety and efficiency in shared care where organisational, social and technical issues are known and addressed. However, evidence of pharmacists' views of these issues, their impact on shared care, organisational development and training needs have still to be identified.

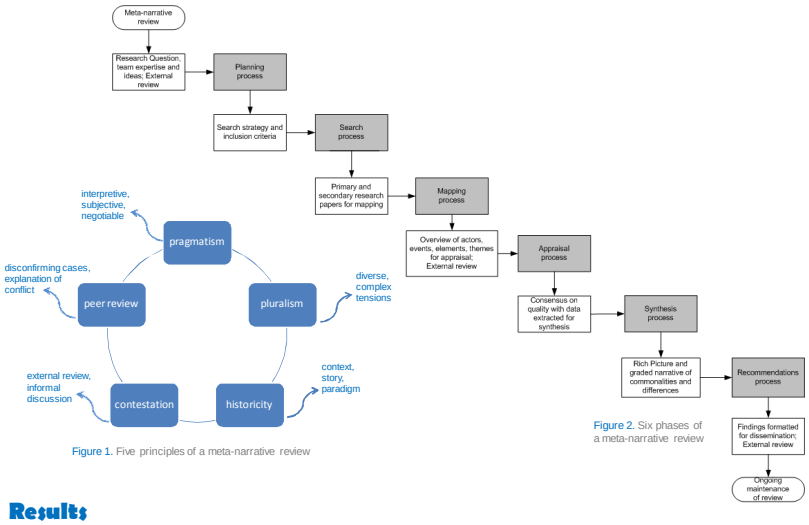

Figure 2. Six phases of a meta-narrative review

Figure 1. Five principles of a meta-narrative review

Results

Screening reduced the initial 327 papers identified to 12 which included 3 reviews; 4 qualitative; 2 mixed-methods and 3 quantitative studies. The studies collected data using combinations of questionnaires (3), case study (1), group (2) and individual (6) interviews, observation (3) and extraction of data from records (1). Practice settings were remote rural or urban featuring primary care, secondary care or both. Geographical settings were diverse. The focus was on electronic records (7), telemedicine (2) or general ehealth implementation (3) from the perspective of doctors, nurses, IT developers, policy makers and managers. One study included the views of a pharmacist. Acceptance of ehealth technologies was reported but with cost effectiveness, resourcing and training questioned. Emerging themes are organisational, social, technical and external (Figure 5): need for realism, clarity and supportive change management; importance of context and compatibility with local work practices; similarity to non-healthcare IT implementations and adoption of innovation theory[4]. Where provided (5), ehealth definitions are similar to WHO's; where omitted (7), the specific ehealth application functionality was defined.

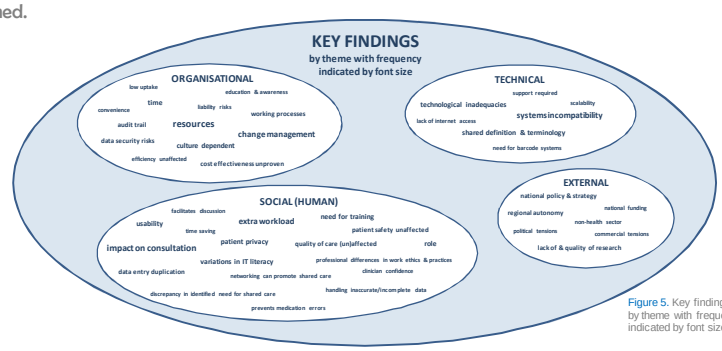

Figure 5. Key findings by theme with frequency indicated by font size

Table of Mapping & Appraisal phase results

Figure 4. Mapping & Appraisal phase results

Aspect / Article	WHO: Actors, Population	WHAT: Elements, Intervention	WHY: Aim, Comparator	WHERE: Geographical setting	WHERE: Practice setting	WHEN: Timeline, Background	HOW: Study design, method (response rate)	Summary of author conclusions plus reviewer notes: Storyline, Outcome
Richards 2005	Nurses, doctors	Telemedicine	Attitudes	Scotland	Remote GP practices	2002; NHS and DoH strategic programmes	Postal questionnaire to GPs (n=154; all) and nurses (n=67; 1 per practice) in inducement practices; (87%); Quantitative analysis	Potential benefits but low uptake by isolated practices. Barriers: cost, workload, lack of training, technical support, patient privacy, impact on consultation. Rated more positively for education. **Notes:** sampling not fully justified; questionnaire not tested for validity, reliability, piloted; unjustified and inconsistent compa rison of GPs/nurses.
Pagliari 2005	Primary and Secondary care 'representatives'	eResults, eReferral, eDischarge, eOutpatient booking	Perceptions of users	Scotland	All	2002-2003; ECCI programme; NHS and DoH strategic programmes	Delphi devised 15 month prospective survey (against 37 measures) + retrospective questionnaire (47%); Quantitative analysis	Benefits: convenience, ease of use, time-saving, audit trail. Barriers: data entry duplication, technological difficulties, time, training and resources. **Notes:** question justification of sampling; 'representatives' not defined; 'significant' increase claimed in results not demonstrated in graph.
Granlien 2007	Physicians, nurses, GPs, IT developers	EPR (Electronic Patient Record)	Why it is so difficult to implement	Denmark	Primary and Secondary care	2005; Diabetes; Danish IT and shared care strategies	Two case studies – one in primary care, one secondary care (21 interviews, 35 hours of observation); Grounded Theory	Three main challenges: poor integration between secondary and GP IT systems; incompatibility with GP work ethic and practice; discrepancy in identified need for shared care. **Notes:** not clear if coding or results validated; limitations and bias not discussed.
Chronaki 2007	Health professionals, patients	EHR (Electronic Health Records)	Attitudes and perceptions	Crete	Remote healthcare facilities	2007; Twister project - fast track deployment, continuous training and evaluation	Questionnaire (Health professionals 29/30; Patients 324; Quantitative analysis	Welcomed by all; health professionals (44%) have significant computing experience; patients have low rate (19%) of internet a ccess; rural-urban divide; need for 'systematic educational and awareness raising'. Barriers: heavy workload, limited secretarial support, shortage of medical personnel, time consuming to use. **Notes:** question validity of questionnaire with patients who are unaware/not users of the Internet; patient sampling power calculation not stated; very limited reference list.
Ludwick 2008	General practitioners	EMR (Electronic Medical Record)	To understand factors and influences	Canada, USA, Denmark, Sweden, Australia, New Zealand, UK	General practice/ primary care	Nov'08 to Jan'09 based on 2000-2007; increasing demand placed on health care systems	Systematic review of 86 articles	Already known: can help mitigate service demand, adoption hampered by clinician concerns (privacy, patient safety, quality of care, decline in efficiency post-implementation), physicians not proactive in adopting (high costs, risks of liability, data security). New findings: does not affect efficiency, quality of care or saf ety; quality of implementation process key, risks mitigated with training, bar coding systems, pilots, shared terminology, strong IT management matching usability, computing skills, system fit to organisational culture. Suggests using socio-technical review methods. **Notes:** search string not provided; no inclusion/ exclusion criteria; no tools; no results tables; single reviewer.
Boddy 2009	Policymakers, senior management, clinicians, suppliers	All ehealth	Influence of context and process	Scotland	Not clear	Year?; part of HAVEN project	Semi-structured interviews (18); Thematic analysis	External (policy/strategy, technology, health system) and internal (working practices, organisational culture, role, finance) contexts. Increasingly IT literate population; professional differences over data security. Ambiguity of cost effectiveness; inter-regional incompatibility; experience in other sectors. Five issues to be managed: workflow; local needs/costs; support/adapt cultural values; involve users; demonstrate usefulness. **Notes:** no demographic of interviewees; five issues akin to Rogers' 5 factors for adoption of innovation.
Greenhalgh 2009	EPR stakeholders	EPR (Electronic Patient Record)	Making sense of and contextualising	All	Health organisations	2007; technological utopia; unfolding of tensions and paradoxes	Systematic review of 118 articles using meta-narrative	Questions definition, scalability, transferability; emphasises ongoing need for human contextualising of data; may offer effi ciencies in audit, research, billing but clinical work may be adversely affected. Tensions noted: in the EPR; the EPR user; organisational context; clinical work; process of change; implementation success; complexity and scale. **Notes:** emphasis on research philosophy and research traditions (Human-Computer Interaction, evidence-based medicine, ethnomethodology, workplace redesign, safety-critical systems research).
Melby 2010	Health care providers (nurses, physicians), project managers	EPR (Electronic Patient Record)	Implications	Norway	Municipal care and associated hospital	2006-2007; Norwegian national health IT strategy; rise in chronic diseases	26 group and individual semi-structured interviews (49 of whom 34 municipality, 13 hospital care providers plus 2 project managers); Thematic analysis	Changes in work processes; increased legibility; better prepared for receiving patients despite unaltered/inaccurate content; no significant increase in integration of care; increased professional networks promoting integrated care. **Notes:** no demographic breakdown; ICT the catalyst/facilitator for shared care and increased organisational awareness.
Ahmad 2010	Physicians	Computer-assisted health risk assessment	Understanding perspectives	Canada	Urban, multi-doctor, hospital affiliated family practice clinic	2005	Semi-structured interviews (10); Analytic induction and constant comparative analysis	Three emergent themes (subthemes): perceived benefits (opening discussion, general facilitation); perceived challenges (generating new risk information, patient readiness, visit length); feasibility (general acceptance, visit fit, resources). **Notes:** useful tool in relation to psychosocial health risks discussion at periodic health exams and follow up rather than all visits .
Greenhalgh 2010	Policy makers, managers, clinicians (including doctors, nurses, hospital pharmacist), software suppliers	Electronic Summary Care Record (SCR)	Evaluate adoption and non-adoption	England	3 primary care out-of-hours and walk-in centres	2007-2010	Mixed method, multilevel case study; Quantitative data (416325 primary care records); Qualitative data (140 interviews); observation; Quantitative analysis plus Thematic and Interpretive analysis	Implementation complex /technically challenging. Subtle, contingent benefits where in use; individual clinician main factor in use, coping with inaccurate/incomplete data; supports quality care, clinician confidence, prevention of medication errors; no evidence of improved safety. Risk to patient privacy. Complex interdependencies/tensions (clinical, technical, political, commercial) high implementation workload; impact of change agents/causal influences. **Notes:** challenging answers which seek to explain in context; draws socio-technical network out to identify actors in five sub-networks (design, implementation, governance, frontline user, evaluation).
Robertson 2010	Managers, implementation team, IT staff, doctors, nurses, AHPs, admin staff, patients, carers	EHR (Electronic Health Record)	Identify insights and experiences	England	5 NHS secondary care trusts - early implementation sites	Feb 2009 – Feb 2010; part of HAVEN project	Mixed method (interviews, observation, quantitative data) longitudinal, multisite, socio-technical case study; Thematic analysis – socio-technical coding matrix	Three main themes: organisational, social, technical. Four policy recommendations: delays /frustrations caused by top -down, centrally driven approach; need greater local choice/flexibility ; need realistic timescale; need to clarify type /scale. **Notes:** timeline of NPfIT and key publications; interim findings; notes socio-technical character of issues raised.
Ekeland 2010	Patients, health professionals, care givers	All ehealth with focus on telemedicine	Impacts and costs	Europe	All	Feb'09 - Jul'09 based on 2005-2009; part of MethoTelemed project	Systematic review of 80 articles using realist review principles	Already known: effectiveness of telemedicine patchy, quality of research poor. New findings: knowledge growing but new knowl edge needed, further research required in economic analysis, patient perspectives of effectiveness. **Notes:** search strategy not available; practical review of reviews.

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