

Knowledge mobilisation in bridging patient-practitioner-researcher boundaries: a systematic integrative review

Abstract

Aim. To review when, how and in what context knowledge mobilisation (KMb) has crossed patient-practitioner-researcher boundaries.

Background. KMb is essential in contemporary health care, yet little is known about how patients are engaged.

Design. Integrative review.

Data sources. Ten academic databases and grey literature

Review Methods. We followed integrative review methodology to identify publications from 2006-2019 which contributed to understanding of cross boundary KMb. We extracted data using a bespoke spreadsheet and the Template for Intervention Description and Replication (TIDieR) framework. We used meta-summary to organise key findings.

Results. Thirty-three papers collectively provide new insights into 'when' and 'how' KMb has crossed patient-researcher-practitioner boundaries, and the impact this has achieved. Knowledge is mobilised to improve care, promote health or prevent ill health. Most studies focus on creating or re-shaping knowledge to make it more useful. Knowledge is mobilised in small community groups, in larger networks and intervention studies. Finding the right people to engage in activities is crucial, as activities can be demanding and time-consuming. Devolving power to communities and using local people to move knowledge can be effective. Few studies report definitive outcomes of KMb.

Conclusion. Cross boundary KMb can and does produce new and shared knowledge for health care. Positive outcomes can be achieved using diverse public engagement strategies. KMb process and theory is an emerging discipline, further research is needed on effective cross boundary working and on measuring the impact of KMb.

Impact. This review provides new and nuanced understandings of how KMb theory has been used to bridge patient-researcher-practitioner boundaries. We have assessed 'how', 'when' and in what context patients, practitioners and researchers have attempted to mobilise knowledge and identified impact. We have developed a knowledge base about good practice and what can and potentially should be avoided in cross boundary KMb.

Key words

Integrative review, systematic, knowledge mobilisation, exploring boundaries, patient, researcher, practitioner

Why is this review needed?

- Knowledge mobilisation is essential on contemporary health care
- Those mobilising knowledge need to understand *when, how* and *in what context* boundaries can most effectively be crossed
- Shared decision-making must be underpinned by shared knowledge and understanding.

What are the key findings?

- In health care knowledge is mobilised to improve care or promote health or prevent ill health
- Cross boundary KMb focuses on knowledge creation or re-shaping knowledge. Few studies report definitive outcomes
- All stakeholders, particularly facilitators, need to recognise that the context and purpose of the knowledge mobilisation activity should inform how knowledge is moved, and strategies used.

How should these findings be used to influence policy/practice/research/education?

- Future knowledge mobilisation research should be designed to demonstrate alignment between stated aims and design principles as highlighted in this review.
- Researchers and practitioners should reflect on their role in knowledge mobilisation, and use models and guides of best practice in PPI involvement with sensitivity.
- Community focused KMb projects should strive to empower community representatives. Supportive frameworks for empowerment should provide further insight into the experience of being fully engaged in a KMb experience. Current insight into fully empowered KMb is limited and needs considerable exploration.

1. INTRODUCTION

Knowledge mobilisation (KMb) can be defined as “the reciprocal and complementary flow and uptake of research between researchers, knowledge brokers and knowledge users” (Social Sciences and Humanities Research Council, 2016), or simply as “moving knowledge to where it can be most useful” (Ward, 2016). KMb is the preferred term, encapsulating four of the most commonly used descriptors, namely; knowledge translation, knowledge transfer, knowledge exchange and knowledge mobilisation (Ward 2016). As KMb and associated terms become more prevalent, most attention is given to moving research knowledge to practitioners. Exploration of patient-practitioner-researcher boundaries re-shifts the focus of KMb and, at the same time, offers the possibility of KMb techniques to bridge the patient–practitioner–researcher boundary and promote use of shared knowledge to inform decision-making.

Knowledge holds the potential to change practice and achieve positive clinical, population or other outcomes. However, to achieve this potential, knowledge must be mobilised for the benefit of different stakeholders (patients, practitioners and researchers) across boundaries that otherwise exist between these groups. KMb is designed to move knowledge across these boundaries but are poorly described and even more poorly understood. Our review intends to add to the growing evidence-base that recognises KMb between patients-practitioners-researchers as a complex socially constructed process. We will look beyond networks to any context within which KMb bridges patient-practitioner-researcher boundaries, so adding to a growing evidence-base for what works, for whom and in what context.

Current rhetoric maintains that patients should be active partners in their healthcare (Härter et al 2011; Department of Health [DH] 2010; DH 2012; HM Government 2014), with the need being most critical in disease prevention (Mora et al 2015) and self-management of long-term conditions (Lenzen et al 2016). Given the global increase in those who need to embrace a healthy lifestyle and self-manage, these issues command international relevance. To this end patients need to become empowered decision makers at every level. Patient empowerment and engagement requires an individual to have sufficient knowledge to underpin shared decision-making (SDM).

This integrative review updates and illuminates processes of knowledge mobilisation across the patient-practitioner-researcher boundary. It focuses on when, how and in what contexts patients, practitioners and researchers have been involved in KMb activity and the impacts involvement may have had.

1.1 Background

Our review occupies the philosophical standpoint that patient empowerment, engagement and SDM are desirable and necessary at every level of contemporary healthcare. For conceptual clarity, KMB in bridging patient-practitioner-researcher boundaries is set within the context of the National Institutes of Health (NIH) Roadmap for Clinical Research. The original NIH roadmap comprised two translational steps from bench to bedside to practice (NIH 2006). This notion of knowledge translation (KT) is both linear and limited. Westfall et al (2007) point to the absence of “Blue Highways” on the NIH map. These smaller roads connect communities and provide two-way connections. They further argue for the need to include another step in KT, translation to ambulatory practice, a step without which individual patient care will not change. Bodison et al (2015) expands the scope of the Roadmap in adding engagement of the community in the dissemination, implementation and improvement of health and health related research. The authors identify challenges, and offer solutions, designed to support achievement of this goal. The focus is predominantly on how to engage patients in research with limited attention given to how patients / community members may best be involved in KMB activity.

Waldman and Terzic (2010) offer an alternative linear continuum of clinical and translational science moving from T0 through to T5 (see table 1 for details of each step).

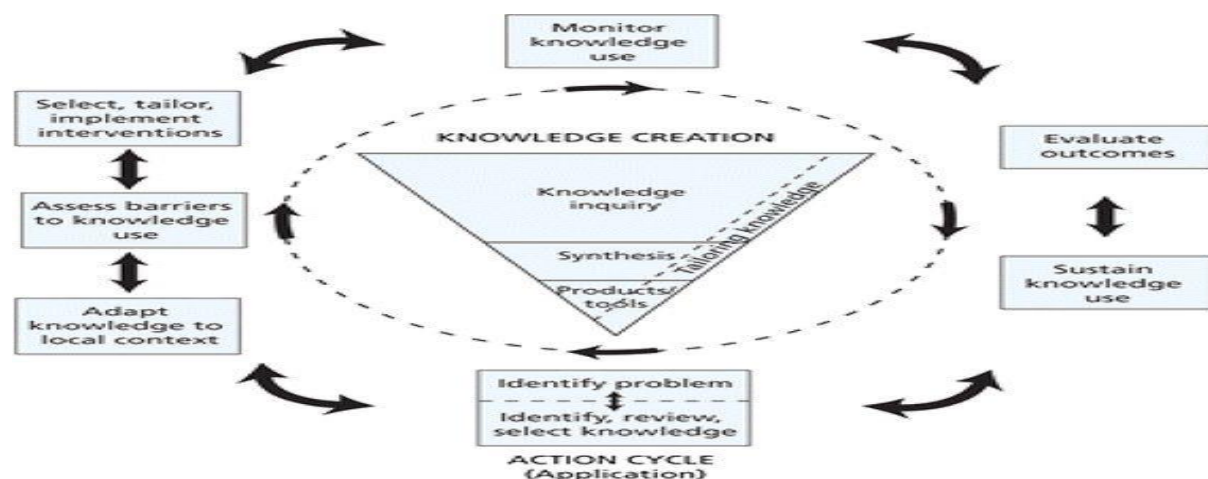
Table 1: Continuum of clinical and translational science

T0	Targets, biomarkers, genes, pathways, mechanisms
T1	First in human, phase I-II trials, proof of concept
T2	Phase III trials, clinical efficacy, clinical guidelines
T3	Dissemination, community engagement, health service research, comparative effectiveness
T4	Public health, prevention, population health impact, behavioural modifications, lifestyle modifications
T5	Social health care, political security, economic opportunity, access to education, access to health care

This Continuum of clinical and translational science tells us where, and potentially how and who, should be involved in knowledge translation from T0 to T5, and the skills and domains of knowledge used in different stages (Waldman and Terzac, 2010). It also recognises that translation at T1 and T2 involve well-established skillsets, and skillsets at T3 and beyond to T5 are less well established, offering challenges to knowledge mobilisers.


Waldman and Terzic (2010) highlight that, regardless of the stage of translation, all stages inherently involve activities from knowledge creation to deployment. Acknowledging this, and helping to orientate 'when' knowledge was mobilised and 'for what purpose' the Knowledge to Action Cycle (Graham et al, 2006) was used to further contextualise KMb across P-P-R boundaries at different levels of translation (Figure 1).

Fig 1. Knowledge to Action Cycle (Graham et al, 2006)



Moreover, the International Association of Public Participation (IAP2) Spectrum of public participation (IAP2 International Federation, 2018) used internationally to define best practice in public participation in public-facing research (Figure 2), will be used to capture levels of public involvement in KMb, as an important reference point for knowledge mobilisation across P-P-R boundaries.

This review seeks to explore KMb activities/processes across the knowledge translation landscape (Waldman and Terzic, 2010), focusing on when, how and in what contexts patients, practitioners and researchers have been involved in KMb and the impact this may have had. An otherwise substantial literature reveals a notable lack of investigation into the extent to which KMb has included patients and, specifically, into strategies which bridge the patient-practitioner-researcher boundary. This is the focus of our review.

Figure 2. Patient Engagement and Integrated Knowledge Translation


	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision. We will seek your feedback on drafts and proposals.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will work together with you to formulate solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

2. THE STUDY

2.1 Aim

Our aim was to review published and unpublished literature to identify ***when, how and in what context, patients, practitioners and researchers*** have been involved in knowledge mobilisation activity and the impact this may have had on targeted KMb outcomes. Our intention was to address the question ‘What are the **optimal characteristics of strategies** to bridge patient-practitioner-researcher boundaries in knowledge mobilisation activity?’ Specific objectives were to:

1. Review the ways in which patients have been engaged in KMb activity (how)
2. Assess the extent to which patients are involved in KMb activity (how much)
3. Examine the extent to which patients/HCP and or Researchers have been explicitly engaged in shared KMb activity (how)
4. Evaluate the impact of patient involvement KMb activity (so what)

For clarity and precision, we use the following definitions:

- *Knowledge mobilisation*: an umbrella term for four key terms most commonly used in seminal papers in this field namely; knowledge translation, knowledge transfer, knowledge exchange and knowledge mobilisation (Ward 2016)
- *Patient*: any recipient of health services
- *Health care practitioner*: a person who provides preventive, curative, promotional or rehabilitation health care
- *Researcher*: a person engaged in research

2.2 Design

Current understanding of KMb suggests that many different types of activities are captured and tested using differing methodologies (Rycroft-Malone et al, 2011). We selected integrative review methodology (Whittemore & Knafl 2005) as it supports inclusion and synthesis of papers with diverse methodologies (i.e. experimental and non-experimental research) and encourages methods of synthesis, such as meta-summary (Finfgeld-Connett, 2018) to capture and frame diversity of relevant literature relevant to study objectives.

We have used a systematic, theory driven approach including:

- Systematic search of published peer-reviewed literature and grey literature
- The five stages of integrative review methodology (IRM) to review and synthesis of literature (Whittemore & Knafl 2005). Stages comprise i) problem identification, ii) literature search, iii) data evaluation, iv) data analysis and v) presentation using meta-summary (Finfgeld-Connett 2018).
- PRISMA guidance to map inclusion / exclusion decisions (Moher et al, 2009)

2.3 Search methods

A qualified information professional (AB) conducted a search to ensure maximum inclusivity. Dates were limited to 2006-2019 to correspond with an exponential rise in KMb literature. Only English language papers were included in the absence of funding for translation.

Systematic search of academic literature

Ten databases were searched: CINAHL, MEDLINE, EMBASE, Web of Science (all databases), ASSIA, PsycINFO, British Nursing Index, HMIC, DH-Data and King's Fund Library Catalogue. Applied search terms are summarised (see MEDLINE example as supplementary file). Forward (i.e. citation

searching) and backward (i.e. checking of reference lists) chaining techniques from identified papers were employed (Booth, 2008).

Structured search of the grey literature

Unpublished (“grey”) literature can be particularly valuable when reviewing emerging fields. The information professional also searched: Electronic Theses Online Service (EthOS), Index to Theses, Zetoc conference proceedings, King’s Fund Library, DH Data, British Library Catalogue, COPAC (Combined UK Universities Catalogue), INVOLVE and the Patients Association. Google and Google Scholar was also searched using key words representing ‘Knowledge Terms’, ‘Patient Terms’ and ‘Consumer Terms’.

Inclusion criteria were: produced from 2006 onwards, English language, empirical studies, qualitative, quantitative and mixed methods, descriptive papers and policy documents with a focus on KMb involving patients / community. Exclusion criteria were protocols, opinion papers and editorials. Title, abstract and full text review was completed by FC and BA. Disagreements were resolved through discussion between all authors.

Bibliographic management

Our searching and screening process was recorded using the bibliographic data management system EndNote. This provided an audit trail of decision making at each stage of screening.

2.4 Search outcome

A summary of the search process, and reasons for exclusion is provided in a PRISMA flowchart (Figure 3). Many papers purporting to report on KMb activity lacked clarity in terms of patient / community engagement in title and abstract leading to deferral to full text. A PEOS (Population, Exposure, Outcome, Studies) framework was used to determine eligibility, and helped to frame the diverse studies and exposures to KMb. The refined criteria helped to determine the number of papers included at full text.

Table 2. *Eligibility Criteria*

Population	Patients: any recipients of health services Health care practitioner: a person who provides preventative, curative, promotional or rehabilitation of health care Researcher: a person engaged in research
Exposure	Knowledge Mobilisation (KMb): 'moving knowledge' involving: Patients-Practitioners-Researchers; Researchers-Patients; Practitioners-Patients
Outcome	Any reported outcomes related to KMb
Study	Primary/Secondary or Descriptive and Policy-based literature

2.5 Quality assessment

Due to the interpretive review question, it was not considered appropriate to exclude empirical studies on the basis of either design or study quality. For this reason, standard quality assessment was not undertaken. Methodologically weak studies were considered equally relevant in addressing our review question.

2.6 Data extraction

A bespoke data extraction spreadsheet was created with standard headings for author, title, date, country of origin, aims, type of publication, design, stated limitations and results. Categories of 'when' and 'how' were guided by the patient and public involvement and engagement literature (Staniszewska et al, 2017; Boaz 2016). These headings framed the purpose and context of each study, and the methods used to mobilise knowledge. For all studies that described KMb the Template for Intervention Description and Replication (TIDieR) framework (Hoffman et al, 2016) was used to help identify the relationship between KMb inputs and the impact of KMb interventions (Additional File 1: Data Extraction Table)

2.7 Synthesis

Meta-summary (Dixon-Woods, 2004; Finfgeld-Connett, 2018) was used to make collective sense of the complex data from different types of included literature. This involved three steps i) data extraction and interpreting the main focus of each paper, ii) exploring the relationship within and between studies, which involved grouping similar studies, and iii) assessing the robustness of the synthesis by reflecting on the value of synthesis methods in addressing the main aims of the study. From the final inclusion of papers (n=33), the process involved examining the papers collectively and

listing 'when and in what context', 'how' and 'Impact' of KMb (Figure 3). Categories were developed from each list, using qualitative, inductive interpretation of data (Christmals and Gross 2017).

3. RESULTS

Data synthesis (Figure 3) produced several categories to illustrate and explain the 'When', 'How' and 'Impact' of KMb. The categories 'Managing and Improving Care' and 'Health Prevention and Promotion' provided insight into 'when' and 'for what' purpose KMb is carried out. 'How' knowledge is moved is explained by the context of KMb and the combinations of Patients-Practitioners-Researchers involved; the scale (specific groups, communities or networks) and how much (type of activities) which describe levels of involvement or lack of involvement in a KMb process. The 'impact' describes the usefulness of each KMb approach for either 'Managing and Improving care' or in 'Health Prevention and Promotion'. Results below are mapped to core categories. However, features of 'how' knowledge is moved are common and interconnected with all types of KMb (Graneheim and Lundman, 2004).

3.1 Characteristics of included papers

The included literature was genuinely international, from Africa (N=5), Asia (N=12), Europe (N=1), North America (N=8), Canada and Australia (N=12), with some studies across continents. All included papers have been categorised according to Waldman and Terzic (2010) definitions; T3 (n=1), T3/4 (n=8), T4 (n=13), T4/5 (n=5) and T5 (n=6). Papers that spanned two categories had a KMb focus and activities relevant to both categories.

All 33 papers presented a defined clinical focus and related to child and maternal health (n=10), children's health both mental and physical (n=5) adult mental health (n=6), long-term conditions (n=5) and Primary Health Care (n=2). Five were disease-specific, namely colon cancer and malaria. All papers reported either primary or secondary research. Most primary studies are best categorised as case studies and action research, some were intervention-based studies using experimental or quasi-experimental methods. Most secondary reviews were descriptive, only one being 'systematic'.

The results address the aims of the study and follow the logical flow of 'when', 'how' and impact' of KMb as illustrated in the Pragmatists Picture KMb model – which represents a 'working model' of KMb activities across patient-practitioner-researcher boundaries.

3.2 When is knowledge moved and for what purpose?

In health care, patients-practitioners-researchers mobilise knowledge across boundaries for two distinct reasons - 'Managing and Improving Care' and 'Health Prevention and Promotion'. In both examples, KMb involves either inquiring or synthesising new knowledge about health or evaluating a community's response to KMb interventions.

Managing and improving care

Several studies used participatory approaches to KMb to generate messages and tools to mobilise care to a target community. With reference to the 'Knowledge-to-Action Cycle' (Graham et al, 2006), most studies focus on the 'knowledge creation' phase, using KMb to generate care-related knowledge with communities.

Health Promotion and Prevention

The focus of KMb for this context shared similarities with moving knowledge to 'improve and manage care', but with an increased focus on enquiring and re-shaping public messages of health and health prevention.

3.3 How is knowledge moved, who is involved and how?

All studies described, in varying levels of detail, *how* knowledge is moved. Most studies were exploratory; others described KMb in intervention-based studies such as quasi-experimental or structured trials. Empirical and descriptive papers report exploratory processes akin to action research where 'discussion', 'working together', 'meetings', 'sharing information', 'interviews and field notes' are used to record and move knowledge across boundaries. In some intervention-based studies, quantitative tools, such as questionnaires report change in knowledge or behaviour. The use of theory to mobilise enquiry and change is inconsistent, with theory of change processes sometimes referred to as a general principle or guide. Fundamentally, the purpose of all studies is to report the processes and outcomes of KMb.

Looking more closely across the KMb P-P-R boundary, the context, purpose and scale of KMb determines how boundaries are crossed and who is involved. Common to all variations of patient-practitioner-researcher boundaries (P-P-R; P-R; R-P), it appears that even when the purpose and goals of KMb are similar, for example, to synthesise new knowledge, the roles and activities of stakeholders can be different. This is particularly evident when comparing roles and activities in small-scale studies within communities to larger scale studies across networks or large intervention-based studies.

Managing and Improving Care

Several studies focus on enquiring and contextualising care, across boundaries at different levels of engagement. KMb activities focused on developing insight and practical tools to enhance care delivery, with the role of stakeholders dependent on the context of care and 'what' is being mobilised.

Vargas et al (2008) and Ollivier et al (2018) report researchers working with patients and families of patients to raise awareness of care, albeit in different environments. Within conference, Vargas et al (2008) used a community-partnered participatory approach to convene a community of stakeholders (researchers, health professionals, patients) to create awareness of Chronic Kidney Disease (CKD). Using workshops a 'consultative' proved effective in improving knowledge and awareness. With similar objectives, Ollivier et al (2018) worked with families of children living with an intellectual disability to create educational material and raise awareness of 'care' in hospitals. Most families were happy being consulted through interview, but one family member became more fully involved, helping to produce a video. It could be argued that levels of patient involvement when trying to 'raise awareness' should always offer opportunities to be fully collaborative, whilst at the same time recognising that individual preference can drive levels of patient/family engagement.

Raising awareness of care and evidence to support care practice involving patients and practitioner can highlight boundary challenges. Schwartz et al (2013) illustrated that when promoting mental health recovery, different perspectives of the evidence-based and care 'roles' can reveal a complex interplay of tensions between provider's and consumer's values; exemplified by the conflict between the provider's 'need to protect' and 'patient autonomy'. When these tensions are overcome, sharing knowledge can help to shape positive changes in professional attitude and consumer empowerment (Schwartz et al, 2013). This said, threats to effective collaboration should be monitored when knowledge is mobilised to ensure such changes are achieved.

When the objective is to generate tools or action plans to inform care, 'expert groups' are often formed (Michalek et al, 2012; Russell et al, 2016; Kwan et al, 2017) to represent patients/communities in the KMb process. Kwan et al, (2017) described the use of a Boot Camp methodology to re-structure self-care tools in the management of diabetes, using stepped methods of engagement in face-to-face meetings; group work; online meetings and evaluations, used over long periods often for nine months. Using this process patient representatives preferred being involved more as an 'information source' and less as 'change agents'. This preference highlights that not all patient representatives want to fully collaborate in activities of knowledge synthesis, particularly within large groups.

Similar principles and processes of engagement are used to move knowledge on a wider scale across networks. The key difference in network KMb is that patients within the P-P-R take on representative 'roles' of their community or practice, as 'experts' or as members of 'Advisory Councils', which can shift perceptions and roles within the P-P-R boundary. Various approaches help to move knowledge. Michalek et al (2012) used 'expert groups' or 'advisory groups' in a blend of face-to-face written and virtual interactions on a dedicated website on Bipolar Disorder, recommending participatory leadership to create a collective shared responsibility. To enhance a musculoskeletal network, Briggs et al (2012) advised mapping barriers and enablers of policy, and Boustani et al (2012) reflective problem solving as a focus for change. Armstrong and Kendall (2010) describe using collaborative research hubs in primary care to 'link and exchange' 'interact', 'collaborate' and 'exchange ideas' to produce a web of evidence. Common to all these approaches, is the intention to collaborate with patients, particularly when trying to convert technical to practical information (Armstrong and Kendall, 2010; Kwan et al, 2017), and to develop relevant strategies to promote change at the community level (Michalek et al, 2012). Organisationally, KMb projects were driven mostly by researchers and senior clinicians, with patients/community representatives being 'consulted', 'involved' or 'collaborated with', dependent on the purpose of the project. This highlights the scope of patient involvement within KMb processes.

The patient-practitioner-researcher boundary appears to shift when the goal is to mobilise interventions in communities to improve care. Intervention-based studies direct patients/community representatives, practitioners and researchers to take on different roles, further shaping their KMb experience. Morrison et al (2008) highlight the importance of facilitators 'knowing the community' and involving significant people from that community; for example, men, older women and community leaders (Ensor et al, 2013; Nahar et al, 2012). Other studies emphasise the importance of facilitators being accepted within the group, particularly when health professionals facilitate the transfer of knowledge in community groups, and being familiar with local culture (Nahar et al, 2012). Moreover, Rath et al, (2010) highlight the need for collective problem solving and for group members to develop a 'critical consciousness' to enhance learning and confidence building; using stories and picture boards to share knowledge can help group members to explain and share their experiences (Morrison et al, 2008). However, using interactive activities highlights the challenges of facilitation, such as developing rapport, solving conflict, and dealing with dominant group members, further emphasising the need for strong and effective facilitation roles, which can be demanding (Rath et al, 2010). These intervention-based studies demonstrate a clear hierarchy of support, from health organisations to universities to health communities to facilitators and trained volunteers, guided by

community participatory models of KMb. Key within this structure appears to be involving and recruiting the right people.

Health Prevention and Promotion

Targeted outcomes in health prevention and promotion focus on raising a clearer health awareness amongst communities. Norman et al, (2013) and Westfall et al, (2016) used Boot Camp processes over a nine month period targeted at producing community-specific messages to the symptoms and risks of colon cancer and the need to be screened. Using 'expert groups' and 'Advisory Councils', the importance of selecting the right people for Boot Camp was emphasised', whilst recognising the potential challenges of keeping stakeholders motivated within a KMb process which can draw out across several months.

Ginis (2012) and Boutin-Foster et al (2008), in raising awareness in public health, further emphasise the importance of mutual ownership of the research process by using a community based participatory approach as a model for engagement. Further evidence emphasises knowledge sharing at different phases of research dissemination; a repeating theme when creating new knowledge. In these projects, dissemination is seen as an important part of the process, but mostly it is not clear how much support is provided by researchers/academics and their role in developing material for dissemination and impact. This said, Westfall et al (2016) attributed a 10% increase in colon screening to the effectiveness of the translation process, and Norman et al (2013) identified improvement in the readability and message in each guideline for hypertension and asthma screening. Ginis (2012) also reported large-scale dissemination of a 'Get Fit' toolkit to 10,000 people, although it is not clear how many actually used the toolkit.

Collectively these studies highlight the need to select patients who are creative and willing to give time and effort to a process in which participants create community perspectives. Similarly, creating the right environment for patients/service users to express their views is important, evidenced by the use of media platforms to encourage autonomous thought. A sense of autonomy and sharing shines through, together with the need for communities to be places in which knowledge can be shared, rather than experimental sites for teaching, learning and confirming their views of research (Boutin-Foster et al, 2008). When sharing ideas, these studies highlight similar methods of engagement ranging from being 'consulted to being 'involved', and highlight challenges of maintaining lay commitment to KMb. Moreover, we identified evidence that close supervision and rewards can

improve participation (South and Cattam, 2014), but this does not guarantee either participation or ongoing involvement (Jenkins, 2016).

Several studies highlight that understanding the community context is a pre-requisite to successfully disseminating information and effecting change when researchers and practitioners work with communities in health prevention and promotion (Mukabana et al, 2006; Timmons et al, 2007; Bluthenhall et al, 2006). Mukubana et al (2006) describe the need to promote full empowerment through shared meetings, wherein local leaders are encouraged to drive change and lead communities to take control and become more self-reliant. When community members are seen as being at risk of adverse health outcomes, developing 'ownership' and 'taking control' of the KMb process is more evident (Mukubana et al, 2016), which could suggest that attitudes towards new knowledge can be influenced by perceptions of risk. Similarly, Bluthenhall et al (2006) highlight the use of community focused action plans to help bring ideas together and help community members 'frame' their own health issues; Timmons et al (2007) also highlight similar collaborative processes when research papers and patients' views are shared. These studies extend the notion of using 'experts' in KMb; 'experts' can not only generate ideas but also facilitate change, wherein participants are empowered as community health workers and volunteers to take on change agent roles, and face similar challenges of facilitation.

It is therefore important for facilitators to acquire adequate attributes and skills (Eriksson et al, 2016, Worton et al, 2018). Community facilitation by local leaders often depended on training provided by health professionals, and the effectiveness of that training (Dongre et al, 2009); although the optimum period of time required to train facilitators remains uncertain. When scaling up facilitated KMb activities across communities it can be effective to use a cycle of knowledge translation, or recognised systems approaches, using joined-up reflective processes to improve KMb outcomes (Nahar et al, 2012; Worton et al, 2018).

Collectively, these studies highlight that 'experts' who represent the community can facilitate change and help to move knowledge, but they need sufficient training, education and support to produce culturally meaningful outcomes. Being aware of what works can produce successful educational and health outcomes (Morrison et al, 2008; Nahar et al, 2012).

IMPACT

Impact in KMb studies can be measured by many different types of outcomes, such as changing beliefs and behaviours, influencing policy/practice, the uptake of evidence into practice, implementation of

KMb research and capacity building (Barwick 2013, Kislov et al, 2014). Such outcomes are reported in both ‘managing and improving care’ and ‘health prevention and promotion’, with most studies falling into the category of changing beliefs and behaviours and a lesser number implementing KMb and capacity building. Empirically, most studies are exploratory and report descriptive outcomes, with intervention-based studies reporting measures of effectiveness and statistical outcomes.

The ‘effect’ of activities of ‘knowledge enquiry and synthesis’ is seen in several studies. Norman et al (2013) and Westfall et al (2016) report improved rates of cancer screening from KMb involving community-focused re-shaping of messages concerning colon cancer. Schwartz et al (2013) raised awareness of recovery-orientated care to improve mental health; Boutin-Foster et al (2007) developed tools to promote public health; Ollivier et al (2018) developed online material to improve awareness of specialist learning disabilities care and Worton et al (2018) improved community perceptions of childhood development. Capacity building is variously demonstrated in improved access to website-based information (Russel et al, 2016); informing new services (Kwan et al, 2017); strengthening links across organisations (Michalek et al, 2012) and developing research agendas (Armstrong and Kendall, 2010; Briggs et al, 2012).

The twin benefits of raising awareness and direct patient outcomes are reported in intervention-based studies. These are demonstrated in raising awareness and education in communities (Dongre et al 2009; Younes et al, 2014), and in direct effects of KMb, such as reduced neonatal mortality (Eriksson et al, 2016), improved maternal care (Ensor et al, 2013) and reduction in cases of malaria (Mukubana et al 2006; Muang et al, 2017). Overall, from a KMb perspective, the context and meaning of ‘impact’ is shaped by the purpose of each study, wherein producing quantifiable outcomes is not a priority.

3. DISCUSSION

This review addresses the question ‘What are the optimal characteristics of strategies to bridge patient-practitioner-researcher boundaries in knowledge mobilisation activity?’ Our work synthesises existing literature pertaining to KMb across patient-practitioner-researcher boundaries and adheres to Enhancing Transparency in reporting the synthesis of qualitative research (ENTREQ) guidance (Tong et al 2012).

Waldman and Terzic’s (2010) Clinical and Translational Science continuum helps to locate types of KMb, alongside the IAP2 framework for PPI which helped to identify the intricacies of KMb across P-P-R boundaries and levels of KMb (T3-T5). Using theory also helped to define a pragmatism to the realities of KMb in different contexts. Our model (Figure 3) depicts a ‘Pragmatic Picture’ of ‘Knowledge

Mobilisation' across P-P-R boundaries and provides a map to explain the realities of public involvement in KMb.

The principal findings indicate:

-Most KMb focuses on knowledge creation activities such as creating tools/re-shaping perceptions in communities of practice and across networks

-Many studies describe patient engagement as 'consultative' or being 'involved', with fewer studies moving towards 'collaboration', and very few examples of patients being 'empowered' and leading KMb

-Context drives P-P-R boundaries, determining also levels of engagement

-In T5 studies, the process of KMb is often hierarchical, but endpoint processes of KMb can be empowering

Key findings are discussed under the following key headings, which highlight the gap between model expectations of PPI in KMb, and the reality.

KMb activity and Patient Engagement

Many studies, in either 'managing and improving care' or 'health prevention and promotion', report KMb as activities of knowledge creation (Graham et al, 2006). In several cases, synthesis targeted the development of new tools to guide care or to promote health (Vargas et al, 2008; Russell et al, 2016; Kwan et al, 2017; Ollivier et al, 2018).

KMb activities vary, but in many studies good practice in knowledge sharing is observed. Abma et al (2017) in Community Based Participatory Research (CBPR) describes the importance of understanding local historical and socio-cultural or political contexts, building partnership practices based on identifying community strengths; and cultivating listening practices that honoured community voices. Across studies in this review these principles were observed, particularly in theory-driven, network-based studies involving larger and diverse groups and, particularly, in intervention-based studies. Thus, the ethos of working in Community Based Research as good practice are observed.

However, the actual mechanisms of 'engagement' expected in KMb (Abma et al, 2017) and PPI (IAP2 International Federation, 2018) often do not match Community Based Research expectations. However, in the current climate of KMb, particularly when creating tools or influencing policy, consultative approaches may be sufficient to achieve KMb outcomes (Boutin-Foster et al, 2007; South and Cattán, 2014; Boulton et al, 2019). KMb activities, particularly those that involve building knowledge, do not always need to be fully empowering. The important ingredient appears to be finding the right people, as KMb can be detailed, complex and carried out over long periods.

Therefore, we caution that it is not always necessary or desirable to overload participants with KMb responsibilities, as many do not want that level of involvement (Kwan et al, 2017).

This said, in some contexts consulting with patients/communities is insufficient to move knowledge across boundaries. This is most evident when communities are threatened by extreme health outcomes, such as controlling for malaria (Mukubana et al, 2006) and in communities where valuing the uniqueness of the community group is pivotal to effective KMb. Thus, when health outcomes directly impact on patients and their community, empowered knowledge sharing across the patient-practitioner-researcher boundary becomes fundamental to success. Here, the aim is to restructure knowledge boundaries from practitioner-patient to patient-population, for example, to meet local expectations of how maternity care should be modelled (Ensor et al, 2012). Full collaboration is also observed when 'care' directly impacts on users; for example, in Mental Health recovery (Schwartz et al, 2013) and Diabetes (Kwan et al, 2017) when seeking to achieve patient 'ownership' of care.

In these examples of enhanced collaboration, reduced participation could hinder the movement of knowledge when empowered patients, parents or users do want to lead. This supports the notion that the Blue Highway of KMb should extend into communities to empower and move knowledge. The evidence is overwhelming to support this view, albeit applied to a limited number of health problems. Moreover, these examples demonstrate that choice of PPI engagement depends on the purpose of the KMb activity, and that correct selection is driven by what is to be mobilised, involving who and for what purpose.

Context, P-P-R roles and boundaries

Roles and expectations do vary, dependent on the theory, context and scale of KMb activity. Many community-based projects involve researchers facilitating projects for patients and practitioners, activities ranging from being mostly consultative (McGrath et al, 2009) to collaboration (Michalek et al, 2012; Schwartz et al, 2013). When theory/models are used roles are more defined (Norman et al, 2013; Westfall et al, 2016) but involve similar levels of collaboration between users, dependent on the number of people involved and group processes. In networks, expert/coordinating groups play a significant role in bringing together knowledge and sustaining effective processes to achieve the targeted KMb (Boustani et al, 2012). This said, the level and type of participation for patients in the network can vary (Armstrong and Kendall, 2010; Briggs et al, 2012), and activities across the P-P-R boundary are often blurred by the number of people involved and complexity of processes.

Looking more closely at those involved in networks, teams appear to be dominated by academics and professionals, with patients being engaged in modes of 'consultation' at specific stages of the KMb process, without being fully involved in all processes of 'moving knowledge'. Researcher involvement is seen in wider network-driven activities or in forging specific relationships between research and

practice. These studies highlight that moving knowledge within networks is a complex process. On this note, Margolis et al (2013) suggests breaking tasks into smaller components so as not to overload activities.

Another clear distinction of how context affects the P-P-R boundary lies in several intervention-based studies, in which community members were involved in different roles as ‘facilitators’ or ‘volunteers’. Involvement of community members in boundary work, at different levels of KMb, is important to move perceptions of safe care and practice. For example, both women (Morrison et al, 2008; Rath et al, 2010) and men (Ensor et al, 2013) are identified as influential and can be trained as facilitators or formally involved in the KMb process. Here, the aim is to restructure knowledge boundaries from practitioner-patient to patient-population to ensure, for example, that local expectations of how maternity care should be modelled are met (Ensor et al, 2012). At levels of T5 translation, using empowering approaches as described do work.

Common to all approaches is the need to train, use and support facilitators to avoid tension across P-P boundaries. Several studies highlight that effective facilitation by professionals (Timmons *et al*, 2007; Dongre *et al*, 2009) or empowered community members (Morrison et al, 2008; Eriksson, 2016) played a crucial role in advancing the KMb process, often requiring high levels of commitment over long periods of time. Long-term engagement represents a key goal for future KMb studies, particularly in re-shaping community perspectives.

4.1 Limitations

To the authors’ knowledge this is the first review to investigate KMb across P-P-R boundaries. The strength of this work is in the rigour and transparent methods used in gathering, analysing and synthesising evidence. Results contribute to the body of knowledge about how, when and in what context KMb engaging with patients, researchers and practitioners is best actualised.

This review carries several limitations. Despite systematic searching we may have missed relevant papers, due to diverse KMb terminology and the “slippery” nature of the concepts under review (McGuire 2012). Similarly, despite frequent consultation during study selection, it is possible that selection could have been applied inconsistently, again related to the diffuse concepts and terminology. Included studies are predominantly observational and few studies test the effectiveness of KMb interventions. As a consequence, we were not able to assess included studies for quality, focusing instead on their contribution to understanding and interpreting the KMb process. Examples of KMb were heterogeneous making it challenging to isolate common elements, although analysis was facilitated by use of the TiDieR framework as a standardised template for exploration and comparison. Notwithstanding these limitations, much has been learnt about processes of KMb for future testing in interventions intended to cross P-P-R boundaries

4.2 Conclusions

The art and science of KMb is relatively early in its development. Moving knowledge across the P-P-R boundary involves processes with which patients, practitioners, and researchers are not be entirely familiar. Given this state of play, the following recommendations can be made.

Professionals as researchers or practitioners, who typically lead KMb projects, need to be aware that the context and purpose of the KMb project should guide the levels of patient involvement. Perceptions of best practice in PPI should be used as a guide. More collaborative approaches enhance the KMb process when creative solutions to problems are required, whereas consultative approaches between practitioners and patients are effective for learning new skills and knowledge and developing perceptions of best practice. Therefore, policy makers need to be aware, when commissioning KMb projects, of suitable levels of collaboration required to move knowledge across boundaries in different contexts.

When communities introduce and facilitate actual change in care or health promotion, full engagement, leadership and empowerment can effect lasting positive changes. Hierarchical organisational structures help guide the process by which community members embrace change.

Finally, P-P-R KMb is a rapidly developing field, related literature offers valuable learning to drive new developments in the field. Specifically, KMb in health care, although predominantly from research to policy or practice, corresponds to core approaches as summarised by Nutley and Davis (2013). Equally Patient and Public Involvement and Engagement (PPIE) is increasing exponentially with guidance such as the INVOLVE suite of resources. To aid the effectiveness of future P-R-P work a checklist, comparable to the existing GRIPP2 guide for reporting patient and public involvement in health and social care (Staniszewska et al 2017), should be developed. Only through such developments will we achieve the goals of sharing knowledge to create an informed community who are able to participate in shared decision making.

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Fig 1. Knowledge to Action Cycle (Graham et al, 2006)

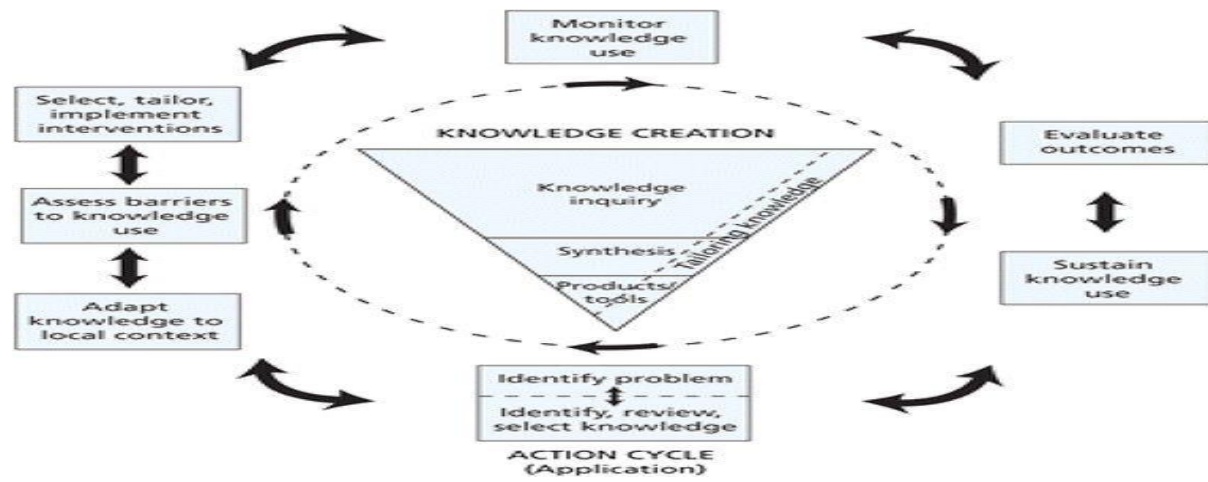



Figure 2. Patient Engagement and Integrated Knowledge Translation


INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision. We will seek your feedback on drafts and proposals.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will work together with you to formulate solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Table 1: Continuum of clinical and translational science

T0	Targets, biomarkers, genes, pathways, mechanisms
T1	First in human, phase I-II trials, proof of concept
T2	Phase III trials, clinical efficacy, clinical guidelines
T3	Dissemination, community engagement, health service research, comparative effectiveness
T4	Public health, prevention, population health impact, behavioural modifications, lifestyle modifications
T5	Social health care, political security, economic opportunity, access to education, access to health care

Table 2. *Eligibility Criteria*

Population	<p>Patients: any recipients of health services</p> <p>Health care practitioner: a person who provides preventative, curative, promotional or rehabilitation of health care</p> <p>Researcher: a person engaged in research</p>
Exposure	Knowledge Mobilisation (KMb): 'moving knowledge' involving: Patients-Practitioners-Researchers; Researchers-Patients; Practitioners-Patients
Outcome	Any reported outcomes related to KMb
Study	Primary/Secondary or Descriptive and Policy-based literature