OPEN ACCESS

Leadership perspective on the implementation of guidelines on healthcare-associated infections

Josephine Hegarty,[1] Siobhan Murphy,[1] Sile Creedon,[1] Teresa Wills,[1] Eileen Savage,[2] Fiona Barry,[3] Maura Smiddy,[3] Alice Coffey,[4] Aileen Burton,[2] Deirdre O'Brien,[5] Sinead Horgan,[6] Cliodhna Nibhuachalla,[7] Cathal Brennan,[2] Heloise Agreli,[1] Jonathan Drennan[2]

[1]Catherine McAuley School of Nursing and Midwifery, University College Cork National University of Ireland, Cork, Ireland
[2]Catherine McAuley School of Nursing and Midwifery, University College Cork, Cork, Ireland
[3]School of Public Health, University College Cork, Cork, Ireland
[4]Department of Nursing and Midwifery, University of Limerick, Limerick, Ireland
[5]Microbiology Department, Mercy University Hospital and South Infirmary Victoria University, Cork, Ireland
[6]Cork University Hospital, University College Cork, Cork, Ireland
[7]School of Medicine, University College Cork, Cork, Ireland

Correspondence to
Professor Josephine Hegarty, Catherine McAuley School of Nursing and Midwifery, University College Cork National University of Ireland, Cork T12 K8AF, Ireland; J.Hegarty@ucc.ie

Received 21 August 2018
Revised 27 February 2019
Accepted 1 March 2019
Published Online First 3 April 2019

To cite: Hegarty J, Murphy S, Creedon S, *et al*. *BMJ Leader* 2019;**3**:43–51.

ABSTRACT

Background Leadership is a key component for infection prevention and control and plays an important role in the implementation of guidelines on healthcare-associated infections. A body of literature exists on healthcare workers' perspectives on implementing these types of guidelines; however, there is a paucity of data on the leadership perspectives on implementation. This study aims to contribute to the evidence base of leadership perspectives.

Objective To explore the implementation of National Clinical Guidelines pertaining to methicillin-resistant *Staphylococcus aureus* and *Clostridium difficile* from the leadership angle.

Setting Healthcare organisations.

Participants Clinical and non-clinical leaders.

Design This research used a mixed-methods approach comprising qualitative individual interviews (n=16) and quantitative surveys (n=51) underpinned by the integrated Promoting Action on Research Implementation in Health Services framework.

Results Leaders recognise the value and innovation of guidelines to support clinical practice. However, they describe barriers to implementation that prevent the full uptake of guidelines, for example, guidelines may present an ideological approach to care which differs from the contextual reality of clinical practice where resources and time are not always available.

Conclusion This research highlighted that guidelines are complex interventions in complex organisations, perhaps leadership could help overcome the challenges posed by this complexity. Leadership may allow a systematic approach to all aspects of implementation despite the variety of challenges faced at different stages of implementation and sustainability of uptake of guidelines over time.

BACKGROUND

Acquisition of a healthcare-associated infection (HCAI) is one of the most frequent harmful events threatening patient safety globally, affecting 5%–10% of patients admitted to hospital in developed countries and up to 20% in developing countries.[1–3] Based on 2011–2012 data, more than 2.5 million new HCAI cases are reported each year within the European Union.[4] HCAI are a major burden on individuals, their families and the health services[5] leading to increased mortality rates, higher treatment costs and extended hospital stays.[6–8] Not all HCAIs are preventable, but successful implementation of clinical guidelines can reduce the prevalence of such infections, for example, leading to a decline in the incidence of hospital-acquired *Staphylococcus aureus* bacteraemia[9] and a beneficial impact on methicillin-resistant *Staphylococcus aureus* (MRSA) and methicillin-sensitive *S. aureus* bacteraemia rates.[10]

Efforts to translate research evidence into practice internationally have traditionally occurred through the dissemination of clinical guidelines. Although clinical guidelines can facilitate evidence-based practice and improve patient health outcomes, the presence of written guidelines does not ensure successful infection prevention and control (IPC).[11] The uneven implementation of evidence-based guidelines is widely recognised as a continuing challenge.[12] One way to overcome this challenge is adapting guideline recommendations to the context and culture in which they are implemented.[11] This adaptation should acknowledge the local context and engage stakeholders to increase and sustain compliance more effectively.[13] Senior front-line leaders can facilitate this adaptive approach, implementing guidance and motivating individuals to engage in day-to-day IPC duties.[14]

Empirical literature reiterates that implementation of guideline recommendations requires education and training as part of multimodal interventions,[15] in which leadership has been identified as a core component of success. Senior leaders play an essential role in strengthening IPC culture, by demonstrating tangible support to teams, ensuring the necessary resources and healthcare practitioner time is available to undertake IPC activities.[14]

Leadership is considered to be essential for IPC,[16] with supportive claims that leadership at all levels combined with clear national strategy and local structural capacity to deliver the guidelines are effective for IPC.[17 18] Leadership can also play an essential role in IPC implementation when national or regional strategies/approaches have unintended consequences such as inadequate engagement and lack of local ownership on the front line.[19] In this case, leaders can facilitate implementation of clinical standards through a combination of strategic approaches with the principles of bottom-up collaborative working.[20]

Successful leaders can contribute to infection prevention actions through the implementation of guidelines. They can do this by listening to workforce concerns, motivating and engaging healthcare workers, acknowledging that staff are often hassled

and overstretched, by overcoming process issues that impede prevention of HCAI and promoting collaborative work across disciplines.[21] Understanding healthcare leaders' perspectives helps in the study of implementation of guidelines on HCAI. Little rigorous research has been conducted on leadership for IPC, almost nothing has been written about IPC leadership at senior level and there is a paucity of data on the leadership perspective on implementation of guidelines relating to HCAI.[16]

The aim of this study was to explore the experience of implementing HCAI guidelines from the perspective of clinical and non-clinical senior leaders.

METHODS

This research used a mixed-methods approach to explore the implementation of National Clinical Guidelines (NCGs) pertaining to MRSA and *Clostridium difficile* in Irish healthcare organisations from the perspective of clinical and non-clinical leaders. The research comprised a quantitative survey (n=51) and qualitative individual interviews (n=16) conducted concurrently. Both phases received equal emphasis. Subsequently, both sets of data were merged, compared and interpreted using concurrent triangulation.

Sample

After ethical approval was attained, invitations to participate in the study were sent via email to senior leaders: Directors of Nursing (DONs)/Midwifery and/or Chief Executive Officers (CEOs), as appropriate, of acute hospitals, long-term care facilities and nursing homes in Ireland. These individuals were invited to complete the survey themselves and to cascade the email to the appropriate persons/leaders within their organisation. Within the email, it was specified that we were seeking to attain a senior leadership and management perspective on the implementation of the National Clinical Effectiveness Committee (NCEC) HCAI guidelines. Three emails were sent in total to the DONs and CEOs: two by the research team and one by a representative of the NCEC to the CEOs. The email contained a link to an anonymous, web-based cross-sectional survey and an invitation to the qualitative interviews. Completion of the online survey was taken as inferred consent. Individuals who participated in the interviews completed a written consent form.

Survey instrument

The survey included a mixture of fixed-choice and open-ended questions and was entitled "*The Implementation of National Clinical Guidelines Pertaining to Healthcare Associated Infections—Your Thoughts and Experiences of Using the Guidelines*". The questions related to the sociodemographic details of participants, innovation (evidence), recipients, context and facilitation, and included open-ended questions on the barriers, facilitators and consequences of the implementation of the guidelines within a clinical context. Specific questions included respondents' familiarity with the NCEC HCAI guidelines, experiences with implementation of the guidelines and recommended practices, factors which influence implementation, attitudes on prevention practices and perceived strength of evidence around HCAI guidelines.

The survey was created on the SurveyMonkey online platform. A panel of experts (n=5) reviewed the survey for content validity and the content validity index[22] was calculated for each item (I-CVI). Items with I-CVI above 0.80 were retained in the survey. Changes to item wording were made as per expert reviewer recommendations. The survey was piloted on a number of electronic interfaces (laptop, computer, tablet, mobile phone) to ensure questions and associated instructions were visible on the screen while scrolling through the survey.

Interview schedule

A semistructured interview guide was developed based on a review of the literature and the study objectives. Interviews were digitally recorded and transcribed for analysis.

Data analysis

Survey data were analysed using the Statistical Package for the Social Sciences (SPSS V.22). Descriptive statistics were used to summarise the data. Qualitative data analysis was guided by the principles of qualitative descriptive manifest content analysis.[23] Interview transcripts were read and re-read; condensed meaning units and codes were developed based on participants' verbatim statements and related codes were collated into subcategories and categories based on similarities and predefined Promoting Action on Research Implementation in Health Services (PARIHS)[24] constructs.

Integrated PARIHS

The revised framework iPARIHS[25] was used as a lens through which HCAI guideline implementation from leaders' perspective could be explored. The iPARIHS framework encompasses the key constructs of innovation (the guidelines), recipients (eg, health service leaders, managers, staff and patient, families), context (eg, health services) and facilitation (eg, engagement strategies). The framework reiterates the central importance of context to the implementation process and its success or failure.

The PARIHS framework[24 25] is widely used as a framework to help both explain and predict the success or failure of the implementation of evidence into practice. PARIHS was one of the first frameworks to define the multidimensional and complex nature of the implementation of clinical interventions. The framework proposes that successful implementation of evidence into practice is a function of four broad interactive elements: innovation (evidence), recipients, context and facilitation. Facilitation is seen as the active element assessing, aligning and integrating the other three domains. Several critiques of the framework have also pointed out its limitations and suggested areas for improvement.[26] The most recent version of the framework (integrated or iPARiHS framework) seeks to address such critiques.[26] iPARIHS framework helps to identify the factors, which act as barriers and enablers that influence implementation outcomes.

Innovation is a central construct within the iPARIHS framework and refers to how "the characteristics of knowledge affect its migration and uptake in different settings".[25] Harvey and Kitson[25] propose that people rarely take evidence in the original form (eg, clinical guideline) and apply it within an implementation project. More often people incorporate evidence in adaptive ways, aligning evidence with local priorities and practice. In iPARIHS, innovation is described a set of conditions that make knowledge more or less likely to be recognised and applied. These conditions are underlying knowledge sources, clarity, degree of fit with existing practice and values (compatibility or contestability), usability, relative advantage, trialability and observable results.[25]

The recipients construct refers to the people involved in implementation, and those who are affected by and influence implementation at the individual and collective level.[25]

Table 1 Sociodemographic profile of participants

		Quantitative (n=51)		Qualitative (n=16)	
		%	n	%	n
Gender	Male	12	6	6	1
	Female	88	45	94	15
Primary position	CEO	4	2	0	0
	Group Chief DON	4	2	6	1
	Group ADON role	2	1	0	0
	DON/DOM	27	14	56	9
	Director of Quality and Safety	2	1	0	0
	Hospital General Manager	8	4	0	0
	Assistant DON	12	6	6	1
	CNM/CMM (manager)	17	9	13	2
	CNS/CMS (nurse specialist)	8	4	6	1
	Consultant/SPR	14	7	13	2
	Occupational Therapy Manager	2	1	0	0
Current role	Management/leadership role	82	42	81	13
	HCAI specialist role	18	9	19	3
Work setting	Group-level role	6	3	12	2
	Public model 3 acute hospital	20	10	13	2
	Public model 4 acute hospital	21	11	19	3
	Public acute hospital	2	1	6	1
	Voluntary hospital	8	4	6	1
	Long-term care setting	18	9	19	3
	Nursing home setting	21	11	25	4
	Other	4	2	0	0
Geographical location of workplace	Munster	45	23	69	11
	Leinster	47	24	25	4
	Connaught	8	4	0	0
	Missing data	0	0	6	1

ADON, Assistant Director of Nursing; CEO, Chief Executive Officer; CNS/CMS, Clinical Nurse/Midwife Specialist; DON/DOM, Director of Nursing/Midwifery; HCAI, Healthcare Associated Infection; SPR, Specialist Registrar.

Context is a core construct within iPARIHS and has a focus on the micro through the meso and macro levels of context, which can act to enable or constrain implementation.[25]

RESULTS

A total of 51 leaders at senior level were identified (table 1). All identified leaders had filled in the survey. The participants worked in acute hospital, long-term care, nursing home settings or had group/trust level roles with representation from 13 individual clinical sites.

Results from survey

Fifty-one participants completed the survey. Results are presented following the iPARIHS framework key constructs. Table 2 displays the leader's perspective on innovation, recipients, context and facilitation characteristics for the implementation of Irish Clinical Guidelines on HCAI.

Results from interview

Sixteen interviews were conducted with professionals in senior leadership roles. Using content analysis, the research team noted all iPARIHS key constructs and generated four themes (table 3).

Mixed-methods results

Table 4 displays the integration of survey and interviews. The analysis revealed the reality of implementation of National Clinical Guidelines (NCGs) pertaining to MRSA and *C. difficile* in healthcare organisations from the perspective of clinical and non-clinical senior leaders/managers.

DISCUSSION

The findings revealed senior leaders' experiences of implementing HCAI guidelines. This leadership perspective on guideline implementation is seldom reported in the empirical literature. The iPARIHS Framework provided a useful structure for the study, which helped in telling the story of the data in a way that is meaningful to both academic and clinical audiences.

Innovation

Innovation within the iPARIHS framework is operationalised as research, clinical experience and evidence assessment. In this research, approximately 10% of respondents had not seen the HCAI guidelines, while just over 20% had not read the guidelines. In contrast, a previous study[27] found that approximately 36% of spinal cord injury and disorder healthcare providers surveyed had not seen, did not remember seeing or had never heard of the relevant MRSA guidelines.

Within this study, participants in both the quantitative and qualitative phases agreed that research evidence synthesis in the form of clinical guidelines supported the standardisation of clinical practice and informed local guidelines and practices. However, their level of awareness of the background work conducted to support guideline development was variable, with those in specialist or those in leadership positions having more awareness than front-line staff.

In this research, there was a universal perception that front-line staff lacked the time to read a full guideline and required education, reminders, summative documents or infection prevention and control experts to provide a synthesis for them to help inform their front-line practices. Jansson and Forsberg[28] explored nurses' and managers' perceptions on how evidence-based sources are obtained to inform relevant nursing interventions, and they found that nurses do not generally search for scientific research; they tend, instead, to predominantly use clinical experience and learn from each other. Professionals can learn from peers, for example, asking more experienced colleagues to find the best solution or even discussing with students on the ward to attain their perspective on new knowledge. The process of learning by sharing is seen by senior leaders as an appropriate professional practice as it allows professionals to gain more knowledge in the field.[28] However, the 'learning from peers' approach does not reduce the relevance of individually searching for scientific knowledge.

Our findings revealed that leaders perceived that front-line staff do not often have opportunities to access IPC guidelines or to develop awareness of the background work that needs to be conducted to implement these guidelines. The finding suggests insufficient underlying knowledge of the source guideline. To address this gap in knowledge and ultimately support successful implementation of guidelines, leaders could encourage local-level champions of IPC practices. These champions could be given more time to learn about the guideline and ultimately become a reference person to whom colleagues turn when more knowledge is needed in the field. To facilitate implementation, leaders could promote implementation by reminding front-line staff about where and how they can find evidence-based

Table 2 Leaders' perspective on innovation, recipients, context and facilitation for the implementation of Irish Clinical Guidelines on HCAI (survey results)

Innovation—guidelines				
		Yes %	**No %**	**Unsure %**
I have seen the guidelines	MRSA	77.3	22.7	0
	C. diff.	77.3	22.7	0
I have read the guidelines	MRSA	68.2	31.8	0
	C. diff.	68.2	31.8	0
I have used the guidelines	MRSA	68.2	31.8	0
	C. diff.	59	40.9	0
I have implemented the recommendations within the guidelines as they apply to my role	MRSA	86.1	4.5	9.1
	C. diff.	81.8	9.1	9.1
In my leadership role, I have supported the implementation of guideline recommendations	MRSA	95.2	0	4.8
	C. diff.	95.2	0	4.8

C. *diff.*, ***Clostridium difficile***; MRSA, Methicillin-resistant *Staphylococcus aureus*.

Recipients—health service leaders and staff					
The guidelines have greatly improved:		**Disagree %**	**Undecided %**	**Agree %**	**NA %**
My ability to prevent HCAI transmission	MRSA	18.8	12.5	56.3	12.5
	C. diff.	13.3	13.3	60	13.3
The healthcare teams ability to prevent HCAI transmission	MRSA	12.5	25.1	56.3	6.3
	C. diff.	6.7	26.7	60	6.7
My ability to prevent HCAI infection	MRSA	25	12.5	37.5	25
	C. diff.	20	13.3	40	26.7
The healthcare teams ability to prevent HCAI infection	MRSA	18.8	31	43.8	6.3
	C. diff.	13.3	33.3	46.7	6.8

C. *diff.*, *Clostridium difficile* ; HCAI, Healthcare Associated Infection; MRSA, Methicillin-resistant *Staphylococcus aureus*; NA, Not Applicable.

Context—health service					
In my experience within the organisation I work in, we have the necessary support in terms of resources to underpin the implementation of the guideline:		**Disagree %**	**Undecided %**	**Agree %**	**NA %**
Budget/financial resources	MRSA	75	6.3	18.7	0
	C. diff.	73.3	0	26.8	0
Training/education resources	MRSA	31.3	12.5	56.3	0
	C. diff.	26.7	13.3	60	0
Environmental facilities	MRSA	87.5	6.3	6.3	0
	C. diff.	86.7	6.7	6.7	0
Staffing levels	MRSA	68.8	12.5	18.8	0
	C. diff.	60	13.3	26.7	0
Infection control expertise	MRSA	12.5	6.3	81.3	0
	C. diff.	6.7	6.7	86.7	0

C. diff., Clostridium difficile ; MRSA, Methicillin-resistant *Staphylococcus aureus*.

Facilitation—engagement strategies used for the implementation of Irish Clinical Guidelines				
Perceptions of effectiveness of strategies used	**Not at all effective %**	**Slightly effective %**	**Moderately effective %**	**Very/extremely effective %**
Once off educational sessions for staff	0	14.3	85.7	0
Repeated educational sessions for staff	0	20.0	50.0	30.0
Posters	0	55.6	33.3	11.1
Pocket versions of the guidelines	0	50.0	50	0
Organisational level clinical champions	0	33.3	22.2	44.4
Key nominated person in each department to support the implementation of the guideline	0	20.0	40.0	40.0
Audit	0	14.3	71.4	14.3
Feedback post audit	0	30.8	61.5	7.7
Leader boards (comparing results across departments)	0	40.0	60.0	0

Continued

Table 2 Continued

Facilitation—engagement strategies used for the implementation of Irish Clinical Guidelines				
Perceptions of effectiveness of strategies used	Not at all effective %	Slightly effective %	Moderately effective %	Very/extremely effective %
Electronic reminders	33.3	33.3	33.3	0
Checklists	0	20.0	60.0	20.0
Care bundles	12.5	25.0	37.5	25.0

The categories strongly agree/agree and strongly disagree/disagree were combined to create a percentage agreement and percentage disagreement category.
Agree, % agreement with statement; Disagree, % disagreement with statement; NA, Not Applicable.

guidelines, and by facilitating the adaptation of guidelines in summative versions, in which information is available in small bite size chunks, more easily accessible by front-line staff.

Recipients

Study participants reiterated the need for engagement of both the interprofessional team at the front line and senior leaders. Such engagement allows for the prioritisation of the guideline at an organisational level and the co-production of an implementation strategy. This co-production and shared ownership is required for knowledge flow, for the transformation of services and to ensure the sustainability of the altered practices.[29]

The value of guidelines was endorsed by participants, with some equating guidelines to the '*Holy Grail*'. However, the resource and time implications of implementing the guidelines were repeatedly cited.

To assist implementation, healthcare staff needed to be able to understand why the guidelines were important and relevant. Chan *et al*[12] also noted the importance of implementers understanding how their organisations' practices may vary from that of clinical guideline recommendations and the rationale for the new guideline recommendations.

The implications for guideline implementation for recipients can be synthesised into two main challenges. The first challenge refers to the limited collaboration between front-line staff and senior management and the consequent lack of shared ownership of the implementation of HCAI guidelines. The second challenge refers to leaders' motivation to move implementation forward in a context of resource constraints. Although clinical and non-clinical leaders reported awareness of the relevance of HCAI guidelines, their motivation to implement these guidelines was apparently undermined by barriers such as time pressure and suboptimum resources.

To overcome these challenges, leaders are encouraged to promote collaborative-implementation strategies, co-produced by all recipients: front-line staff, infection prevention practitioners, managers, senior clinicians and service users. This co-produced approach was illustrated by Jeanes *et al*[13] in a strategy aimed to improve hand hygiene compliance. To achieve this aim, front-line staff and leaders worked together in identifying, prioritising and removing barriers to implementing guidance. The combination of information and insights from front-line staff and leaders was effective in identifying priorities and opportunities for realistic improvements in practice, rather than focusing on achieving pre-conceived targets.[13]

Context

Context within the iPARIHS framework is operationalised as leadership, culture, measurement and context assessment.

In iPARIHS, the context construct explores how elements at the micro, meso and macro level could have an impact on implementation processes. At the micro level, local aspects are observed including the formal and informal leadership support, previous experiences of innovation and change, degree to which the innovation fits with existing practice and values, existing evaluation and feedback processes. At the meso level, organisational aspects are observed such as senior leadership and management support, culture and learning networks. At the macro level, elements from the wider health system are observed including policy drivers and priorities, regulatory frameworks, interorganisational networks and relationships.

Within this study, participants in both the quantitative and qualitative arms agreed that, in general, leadership/management were supportive of implementing the HCAI guidelines. Having governance systems that prioritise IPC practices, having effective communication loops with audit and timely feedback, and having regular regulatory oversight were important local and organisational system-level drivers. Good governance involves having clear accountability, transparent reporting to monitor progress, identification of risks, good communication and ongoing engagement with implementation issues.

When asked about the degree to which HCAI guidelines fit with existing practice and values, leaders described facilitating factors including guideline characteristics such as format, resources and end-user involvement; involving stakeholders; leadership support; scope of implementation; organisational culture such as multidisciplinary teams and low-baseline adherence; and electronic guidelines systems. Likewise, Jun *et al*[30] appraised and synthesised the literature on barriers to and facilitators in the use of Clinical Practice Guidelines (CPGs). They characterised internal factors (attitudes, perceptions and knowledge) and external factors (usability of CPGs, resources, leadership and organisational culture) as influencing CPG use.

Organisational culture and safety culture were emphasised as important considerations to support implementation of CPGs within this study. Some participants highlighted the 'world apart' concept coined by Sandström *et al*[31] where guidelines reflect the ideological approach to care which differs from the reality of clinical practice where resources and time are not always available to fully implement guideline recommendations. Hence, guidelines may not always be perceived as relevant. Thus, culture cannot be ignored. It is known that implementation of evidence into practice is supported in cultures where research is valued, but not in cultures that overly emphasise tradition and ritualistic practices.

Many participants mentioned the role of regulation, oversight and application of national guidelines and standards, and positives and negatives of having national standards and regulatory oversight were indicated. The positives were that the fight against HCAI was higher up on the corporate agenda than would otherwise be the case, the use of the regulatory body inspection reports to support the request for further resources, and

Table 3 Leaders' perspective on innovation, recipients, context and facilitation characteristics for the implementation of Irish Clinical Guidelines on HCAI (interviews)

Themes	Categories supplemented by leaders' narratives
Innovation—guidelines	Category: Guidelines supported the standardisation of clinical practice *"National Clinical Effectiveness Committee and that whole structure is about* **providing us nationally with a framework for the implementation of evidence into clinical practice***… and to evaluate the impact of the guidelines in practice through audit."* (P13) Category: Guidelines as large documents and difficult to locate *"I think probably the important thing for any guideline, be it local or national, that people are aware that it exists and having it* (the guideline) *user friendly and accessible… and know where you can access the full guideline… that it is* easily accessible *and it is just clicking on a link as opposed to having to go through a page to be redirected as it (the guideline)* **can be hard to find***."* (P13) *"The bigger version (of the guideline) would be too* **cumbersome***…* **I wouldn't have the time personally to read it***… for day to day things I actually think there should be snappy one page, two page documents, quick referral guides."* (P12) Category: Different levels of awareness of guidelines between staff positions "I would say that outside of say myself or the official controller or CNS (Clinical Nurse Specialist) or… antimicrobial pharmacist I'm not so certain of the awareness of these guidelines by other groups in the hospital…" (P1)
Recipients—health service leaders and staff	*Category:* Guidelines as Holy Grail and time consuming *"I think sometimes guidelines are over-arching and they are the* **Holy Grail** *but I just don't think that they are very feasible in practice… C. difficile brings about its own problems… patient needs… can be* **quite time consuming***… time spent in a room or cordoning off a ward… that adds to extra time… with the same amount of staff"* (P5)
Context—health service	*Category:* Importance of governance systems, effective communication loops with audit and timely feedback *"I actually think as the hospitals marry together or whether they go like trusts or whatever that networking between hospitals is important. A* **group role** *is important and it has been shown to be important in the job I am in because you* **share information** *between hospitals and people. Within the hospital I think that there has to be key people in place whether it be a committee like setting or whatever like-minded people trying to implement guidelines as best they can because it is one thing to bring in a guideline but you need* **local governance** *and the local implementation teams to bring that about… you have to just make sure that even what happens at committee level that it actually filters* **down to the wards***."* (P12) *Category:* Suboptimum infrastructure *"… it is very frustrating knowing that* **we can't do better without that** *(single rooms) and they (Health Service Executive/hospital management) don't understand; there is no sign of any of that money coming in."* (P11) *Category:* Wish for more positive affirmation of things done well *… I often think that if wording is put in. Acknowledging subtly that the infrastructure isn't what it should be and that we just have to do what we can."* (P11)
Facilitation—engagement strategies used for the implementation of Irish Clinical Guidelines	*Category: Role of infection prevention and control nurse as vital* instrumental in ensuring the implementation of the HCAI guidelines *"Their (***infection prevention and control nurse***) role is expanded, now they are required to feed in to the data nationally,… other parts of their role have expanded… they have all these other issues to deal with."* (P12) *"… having so many different profiles in terms of my job spectrum it is fantastic to have those guidelines because I cannot be everything and cannot be the infection control person in the small setting where you may only have a director of nursing and a CNM (Clinical Nurse Manager) so* **having the infection control nurse** *that is up to date and has the relevant knowledge to access* **is absolutely vital** *for us to comply with national standards."* (P8) *"we just feel that bringing it back to ward level that you know have these sessions… for staff attending… pertinent information sessions, updates re the guidelines… for staff… there is no member of staff going to sit down and read… three hundred pages of the document so* **what you want is to get the critical information out there (on the wards**)*."* (P12) *"we just feel that bringing it back to ward level that you know have these sessions… for staff attending… pertinent information sessions, updates re the guidelines… for staff… there is no member of staff going to sit down and read… three hundred pages of the document so* **what you want is to get the critical information out there (on the wards**)*."* (P12)

HCAI, Healthcare Associated Infection; P, Participant.

the prospect of regulatory visits focused the mind of healthcare teams and management. The negatives related to the frustrations that healthcare teams felt when working with substandard infrastructure and resources, which ultimately meant that they were hampered in their ability to provide optimum care and the perception of overly burdensome requirements in terms of audit and administration. Participants in this study would also like to see a more positive affirmation of things done well, within regulatory body reports. In this regard, the Health Information and Quality Authority (HIQA)[32] published a regulatory report relating to antimicrobial stewardship in public acute hospitals, which balanced the positive affirmations with areas for improvement. Good practice was found where there were sufficient specialised staff, good surveillance systems, good clinical

Table 4 Mixed-methods integration

Theoretical perspective	Quantitative result	Qualitative finding	Data integration
Innovation	Guidelines were perceived as useful (100%), easy to understand (≥90%), easy to navigate (≥68%), logical to use (≥62%), easy to use (≥56%) Over half of respondents reported either strong or very strong evidence in answer to their personal perception of the strength of the evidence underpinning the guidelines (≥62.%), and how infection prevention and control experts in their organisation would rate the strength of the evidence underpinning the guidelines (≥60%)	Guidelines supported the standardisation of clinical practice Guidelines as large documents and difficult to locate Different levels of awareness of guidelines between staff positions	Clinical guidelines support the standardisation of clinical practice A universal perception that staff lacked the time to read a full guideline The participants' level of awareness of the background work that is conducted to support guideline development was variable with those in specialist positions or those in leadership positions perceived to have more awareness than front-line staff
Recipients	Respondents were asked their level of agreement with statements which stated that the NCEC HCAI guidelines greatly improved their individual ability and the healthcare teams' ability to prevent HCAI transmission and HCAI infection. The percentage in agreement for each statement in relation to both guidelines was around 50% (range 37.5%–60%) with slightly higher scores for the perception of teams' ability compared with individual level ability	Guidelines as Holy Grail and time-consuming implementation	The value of the guidelines to support clinical practice endorsed by participants The perception that some staff may not see the value of implementing the guidelines or may lack the time was highlighted
Context	In terms of the availability of organisational resources to support guideline implementation: the lowest percentage agreement scores were for environmental facilities (≤6.7%), budget/financial resources (≤26.8%) and staffing levels (≤26.7%). The highest scored items were having access to infection control expertise (≥81.3%) and training/education resources (≥56.3%)	Importance of governance systems, effective communication loops with audit and timely feedback Suboptimum infrastructure Wish for more positive affirmation of things done well	'World apart concept'—The ideological approach to care which differs from the reality of clinical practice where the resources and time are not always available to fully implement the guideline recommendations Guidelines may not always be perceived as relevant by practitioners The negatives related to the frustrations that healthcare teams felt when working with substandard infrastructure and resources which ultimately meant that they were hampered in their ability to provide optimum care and the perception of overly burdensome requirements in terms of audit and administration
Facilitation	The strategies perceived as most effective were audit (85.7%), once off educational sessions (85.7%), checklists (80%), having a key nominated person in each department (80%), repeated education sessions (80%), feedback post audit (69.2%), organisational level champions (66.6%) and care bundles (62.5%)	Role of infection prevention and control nurse as vital instrumental in ensuring the implementation of the HCAI guidelines Need for targeted bite size (small information chunks) updates for staff at the front line	Audit, feedback and multipronged educational activates particularly at the front line were generally effective Information is small bite size chunks is important to ensure translation of evidence into practice The infection prevention and control specialist nurse, infection prevention and control committee and other specialist infection control roles were instrumental in ensuring implementation of the HCAI guidelines

HCAI, Healthcare Associated Infection; NCEC, National Clinical Effectiveness Committee .

pharmacy and good senior management support. However, HIQA highlighted that more needs to be done, including greater investment in the sharing of resources across hospitals within their respective hospital groups, harnessing the potential of information communication technology to further support antimicrobial stewardship, and to effectively implement antimicrobial stewardship programmes within residential care and community settings.

Negative impacts of the HCAI guidelines were articulated in terms of increased resource and workload implications. One area in particular that some participants had queries about was related to whether there existed any cost–benefit analysis supporting or refuting guideline recommendation, citing that the costs associated with implementation of guidelines can be excessive in some cases. Cohen *et al*,[33] in their systematic review, noted there is a need to consider costs as well as health outcomes when generating new policies regarding procedures or products related to infection prevention in long-term care facilities. The authors cited that HCAI prevention practices can include hidden costs associated with additional staff time, use of disposable items, use of cleaning and decontamination procedures.

The contextual implications for guideline implementation can be synthesised into the micro, meso and macro levels. At the micro level of health facilities, participants acknowledged the relevance of leadership support, effective communication and feedback processes as potential mechanisms for embedding change. At the meso level, the existence of a safety culture within the organisation was reiterated as an important consideration to support implementation. At the macro level, participants referred to the frustrations that healthcare teams encounter when working with substandard infrastructure and resources, and the wish for more positive affirmation from regulatory reports of things done well by staff, which could be an incentive for continuing improvement.

Facilitation

The construct of facilitation represents characteristics, role of and style of facilitator(s), engagement strategies and facilitation assessment. Facilitation is the glue that holds the system together and also includes ongoing activities to assure implementation of the guidelines and assessment of the extent of implementation.

Study findings revealed that regular, targeted updates for staff at the front line, the infection prevention and control specialist team, and the infection prevention and control committee were instrumental in ensuring the continued implementation of the HCAI guidelines. The ongoing study (audit) and feedback cycle was thought to be critical to the successful implementation of guidelines with most benefit being attained from instant, timely and relevant feedback. The audit–feedback cycle is a behaviour change intervention used to reduce evidence–practice gaps.[34] While the quantitative evidence presented indicates that audit and feedback were perceived to be effective, the qualitative data indicate that staff feel the additional workload of audit takes from the 'bed side' support provided by the infection prevention and control specialist nurse. A report,[12] which reviewed the evidence from the published implementation science literature on the implementation of clinical practice guidelines, found that audit and feedback and educational outreach visits 'were generally effective' in improving both processes of care and clinical outcomes. Likewise, Wagner *et al*[35] in a systematic review of inpatient antimicrobial stewardship programmes found that most interventions were associated with improved prescribing patterns while few intervention types (eg, audit and feedback, guideline implementation and decision support) impacted patient outcomes; however, some studies were not powered adequately to demonstrate impacts on patient outcomes. In another systematic review, Häggman-Laitila *et al*[36] aimed to review the effectiveness of educational interventions pertinent to nurses with regard to guideline implementation and found that guidelines were implemented in a heterogeneous way and that interventions were delivered once and mainly on a local basis. Gagliardi and Brouwers[37] in a systematic review concluded that despite increasing recognition of the need for implementation tools, guidelines continue to lack such resources, thus, the need for research, which focuses on the sustainable implementation of guidelines in the clinical setting. However, the methodological difficulties of empirically testing 'whole guideline implementation' and the lack of high-quality evidence in this area has been highlighted by Gould *et al*[38] in their systematic review.

Our findings suggest that leaders can facilitate implementation of HCAI guidelines by promoting regular and targeted updates, and multipronged educational activates for staff at the front line. However, these multiple interventions can be challenged by limited resources and alternative implementation strategies might be considered, for example, the use of electronic reminders of IPC.[39]

CONCLUSION

This study provided an exploratory approach underpinned by a theoretical framework to describe a leadership perspective on the implementation of HCAI guidelines.[40]

Our work has described the potential negative impact of resource constraint on the implementation of guidelines. A suboptimum infrastructure seems to influence three (recipients, context and facilitation) of the four iPARIHS dimensions. Given the reported relevance of adequate resources for implementing guidance, further studies are needed to understand the extent to which limited resources are problematic for implementation. Studies estimating the cost of guidelines implementation could lead to better understanding of the magnitude of the cost of embedding innovation. Leaders could use this information to create a realistic implementation plan in which staff would feel encouraged to engage.

In parallel, given the fact that a core task of leadership and management is to make best of limited resources, we describe some recommendations for leaders that could be applied even in a resource constraint context. Leaders can facilitate the implementation of IPC guidelines by reminding front-line staff about where and how they can find evidence-based guidelines, by facilitating the adaptation of guidelines in summative versions, by promoting regular and targeted updates, and by multipronged educational activates for staff at the front line.

Particular problems pertaining to the implementation of guidelines can only be addressed through leadership, such as the limited collaboration between front-line staff and senior management and the consequent lack of shared ownership of the implementation of HCAI guidelines. To overcome such problems, leaders are encouraged to promote collaborative-implementation strategies, co-produced by all recipients: front-line staff, infection prevention practitioners, managers, senior clinicians and service users.

Co-produced implementation plans in IPC can benefit from a collaborative leadership style in which either managers, senior leaders and local-level champions must be able to share their opinions and participate in decision-making, rather than a more hierarchical leadership style. The combination of information and insights from front-line champions and senior leaders can be effective to identify priorities and opportunities for realistic improvements in practice.

This research has highlighted that guidelines are complex interventions being implemented in complex organisations. This requires that a systematic approach is taken to all aspects of guideline implementation with the realisation that the strategies required for initial guideline implementation are different from the strategies required to ensure the continued sustainability of guideline implementation over time as staff change and systems alter.

Acknowledgements The authors thank the Irish Department of Health and the Health Research Board, Ireland for funding this research. The full report of the study findings is available from the Department of Health. The authors also thank the Department of Health-NCEC study steering committee for their guidance as well as the participants who took part in the research.

Contributors JH, SM, SC, TW, ES, FB, MS, AC, AB, DOB, CB and JD made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data. JH, SM, SC, TW, ES, FB, MS, AC, AB, DOB, SH, CN, CB, HA and JD were involved in drafting the manuscript or revising it critically for important intellectual content. JH, SM, SC, TW, ES, FB, MS, AC, AB, DOB, SH, CN, CB, HA and JD have given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. JH, SM, SC, TW, ES, FB, MS, AC, AB, DOB, SH, CN, CB, HA and JD have agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Funding Department of Health and the Health Research Board, Ireland (Applied Partnership Awards, APA-2017-002).

Disclaimer The NCEC Steering Committee had an important role in advising on access to data collection sites, provided some comments on the data collection instruments and signed off on the final report submitted on completion of the research. The funders or their employees did not have a role in the data collection or analysis processes.

Competing interests None declared.

Patient consent for publication Obtained.

Ethics approval Research Ethics Committee of the Cork Teaching Hospitals (CREC), Ireland.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement Requests for further information can be made to the corresponding author on reasonable request.

REFERENCES

1 Allegranzi B, Bagheri Nejad S, Chraiti M, *et al*. *Report on the burden of endemic health care-associated infection worldwide*. Geneva, Switzerland: World Health Organization, 2011.
2 Rosenthal VD, Al-Abdely HM, El-Kholy AA, *et al*. International nosocomial infection control Consortium report, data summary of 50 countries for 2010–2015: device-associated module. *Am J Infect Control* 2016;44:1495–504.
3 Talaat M, El-Shokry M, El-Kholy J, *et al*. National surveillance of health care-associated infections in Egypt: developing a sustainable program in a resource-limited country. *Am J Infect Control* 2016;44:1296–301.
4 Cassini A, Plachouras D, Eckmanns T, *et al*. Burden of six healthcare-associated infections on European population health: estimating incidence-based disability-adjusted life years through a population prevalence-based modelling study. *PLoS Med* 2016;13:1002150.
5 Kilgore ML, Ghosh K, Beavers CM, *et al*. The costs of nosocomial infections. *Med Care* 2008;46:101–4.
6 de Lissovoy G, Fraeman K, Hutchins V, *et al*. Surgical site infection: incidence and impact on hospital utilization and treatment costs. *Am J Infect Control* 2009;37:387–97.
7 Oberdörfer H, Hübner C, Linder R, *et al*. [Additional costs for care of patients with multi-resistant pathogens—an analysis from the perspective of a statutory health insurance]. *Gesundheitswesen* 2015;77:854–60.
8 Peters C, Dulon M, Kleinmüller O, *et al*. MRSA prevalence and risk factors among health personnel and residents in nursing homes in Hamburg, Germany—a cross-sectional study. *PLoS One* 2017;12.
9 Grayson ML, Russo PL, Cruickshank M, *et al*. Outcomes from the first 2 years of the Australian National Hand Hygiene Initiative. *Med J Aust* 2011;195:615–9.
10 Newitt S, Myles PR, Birkin JA, *et al*. Impact of infection control interventions on rates of Staphylococcus aureus bacteraemia in National Health Service acute hospitals, East Midlands, UK, using interrupted time-series analysis. *J Hosp Infect* 2015;90:28–37.
11 Birgand G, Johansson A, Szilagyi E, *et al*. Overcoming the obstacles of implementing infection prevention and control guidelines. *Clin Microbiol Infect* 2015;21:1067–71.
12 Chan WV, Pearson TA, Bennett GC, *et al*. ACC/AHA special report: clinical practice guideline implementation strategies: a summary of systematic reviews by the NHLBI implementation science work group. *Circulation* 2017;135:122–37.
13 Jeanes A, Coen PG, Drey NS, *et al*. The development of hand hygiene compliance imperatives in an emergency department. *Am J Infect Control* 2018;46:441–7.
14 World Health Organization. Improving infection prevention and control at the health facility: interim practical manual supporting implementation of the WHO Guidelines on Core Components of Infection Prevention and Control Programmes, 2018.
15 Zingg W, Holmes A, Dettenkofer M, *et al*. Hospital organisation, management, and structure for prevention of health-care-associated infection: a systematic review and expert consensus. *Lancet Infect Dis* 2015;15:212–24.
16 Gould DJ, Gallagher R, Allen D. Leadership and management for infection prevention and control: what do we have and what do we need? *J Hosp Infect* 2016;94:165–8.
17 Health Foundation. *Infection prevention and control: lessons from acute care in England. Towards a whole health economy approach. Health Foundation learning report*. London: Health Foundation, 2015.
18 HM Government. UK 5 year antimicrobial Resistance (AMR) strategy 2013–2018. Annual progress report and implementation plan. Department of Health website. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/385733/UK_AMR_annual_report.pdf [Accessed Published 2013. Accessed 10 May 2018].
19 de Silva D. *What's getting in the way? Barriers to improvement in the NHS*. London: The Health Foundation, 2015.
20 Ogunlayi F, Britton P. Achieving a 'top-down' change agenda by driving and supporting a collaborative 'bottom-up' process: case study of a large-scale enhanced recovery programme. *BMJ Open Qual* 2017;6:e000008.
21 Saint S, Kowalski CP, Banaszak-Holl J, *et al*. The importance of leadership in preventing healthcare-associated infection: results of a multisite qualitative study. *Infect Control Hosp Epidemiol* 2010;31:901–7.
22 Lynn MR. Determination and quantification of content validity. *Nurs Res* 1986;35:382???386–5.
23 Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today* 2004;24:105–12.
24 Harvey G, Kitson A. *Implementing evidence-based practice in healthcare: a facilitation guide*. 1ed. New York, NY: Routledge, 2015.
25 Harvey G, Kitson A. PARIHS revisited: from heuristic to integrated framework for the successful implementation of knowledge into practice. *Implement Sci* 2015;11.
26 Rycroft-Malone J, Seers K, Chandler J, *et al*. The role of evidence, context, and facilitation in an implementation trial: implications for the development of the PARIHS framework. *Implement Sci* 2013;8:28.
27 Balbale SN, Hill JN, Guihan M, *et al*. Evaluating implementation of methicillin-resistant Staphylococcus aureus (MRSA) prevention guidelines in spinal cord injury centers using the PARIHS framework: a mixed methods study. *Implement Sci* 2015;10:130.
28 Jansson I, Forsberg A. How do nurses and ward managers perceive that evidence-based sources are obtained to inform relevant nursing interventions?—an exploratory study. *J Clin Nurs* 2016;25:769–76.
29 Gladman JRF, Conroy SP, Ranhoff AH, *et al*. New horizons in the implementation and research of comprehensive geriatric assessment: knowing, doing and the 'know-do' gap. *Age Ageing* 2016;45:194–200.
30 Jun J, Kovner CT, Stimpfel AW. Barriers and facilitators of nurses' use of clinical practice guidelines: an integrative review. *Int J Nurs Stud* 2016;60:54–68.
31 Sandström B, Willman A, Svensson B, *et al*. Perceptions of national guidelines and their (non) implementation in mental healthcare: a deductive and inductive content analysis. *Implement Sci* 2015;10.
32 Health Information and Quality Authority. National standards for the prevention and control of healthcare-associated infections in acute healthcare services. Available: https://www.hiqa.ie/sites/default/files/2017-05/2017-HIQA-National-Standards-Healthcare-Association-Infections.pdf [Accessed 16 Mar 2018].
33 Cohen CC, Choi YJ, Stone PW. Costs of infection prevention practices in long-term care settings: a systematic review. *Nurs Econ* 2016;34.
34 Vratsistas-Curto A, McCluskey A, Schurr K. Use of audit, feedback and education increased guideline implementation in a multidisciplinary stroke unit. *BMJ Open Qual* 2017;6:e000212.
35 Wagner B, Filice GA, Drekonja D, *et al*. Antimicrobial stewardship programs in inpatient hospital settings: a systematic review. *Infect Control Hosp Epidemiol* 2014;35:1209–28.
36 Häggman-Laitila A, Mattila L-R, Melender H-L. A systematic review of the outcomes of educational interventions relevant to nurses with simultaneous strategies for guideline implementation. *J Clin Nurs* 2017;26:320–40.
37 Gagliardi AR, Brouwers MC. Do guidelines offer implementation advice to target users? A systematic review of guideline applicability. *BMJ Open* 2015;5:e007047.
38 Gould D, Gaze S, Drey N, *et al*. Implementing clinical guidelines to prevent catheter-associated urinary tract infections and improve catheter care in nursing homes: systematic review. *Am J Infect Control* 2017;45:471–6.
39 Knighton SC, Dolansky M, Donskey C, *et al*. Use of a verbal electronic audio reminder with a patient hand hygiene bundle to increase independent patient hand hygiene practices of older adults in an acute care setting. *Am J Infect Control* 2018;46:610–6.
40 Hegarty J, Murphy S, Creedon S, *et al*. *The provision of baseline research to inform updates of National Clinical Effectiveness Committee national clinical guidelines on healthcare associated infections*. Unpublished report for the National Clinical Effectiveness Committee, Department of Health, 2017.