BJU Int 2021 doi:10.1111/bju.15336

Original Article

BJUI
BJU International

What influences adherence to guidance for postoperative instillation of intravesical chemotherapy to patients with bladder cancer?

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Objective

To understand the barriers and facilitators to single instillation of intravesical chemotherapy (SI-IVC) use after resection of non-muscle-invasive bladder cancer (NMIBC) in Scotland and England using a behavioural theory-informed approach.

Subjects and Methods

In a cross-sectional descriptive study of practices at seven hospitals, we investigated care pathways, policies, and interviewed 30 urology staff responsible for SI-IVC. We used the Theoretical Domains Framework (TDF) to organise our investigation and conducted deductive thematic analyses, while inductively coding emergent beliefs.

Results

Barriers to SI-IVC were present at different organisational levels and professional roles. In four hospitals, there was a policy to not instil SI-IVC in theatre. Six hospitals' staff reported delays in mitomycin C (MMC) ordering and/or local storage. Lack of training, skills and perceived workload affected motivation. Facilitators included access to modern instilling devices (four hospitals) and incorporating reminders in operation proforma (four hospitals). Performance targets (with audit and feedback) within a national governance framework were present in Scotland but not England. Differences in coordinated leadership, sharing best practices, and disliking being perceived as underperforming, were evident in Scotland.

Conclusions

High-certainty evidence shows that SI-IVC, such as MMC, after NMIBC resection reduces recurrences. This evidence underpins international guidance. The number of eligible patients receiving SI-IVC is variable indicating suboptimal practice. Improving SI-IVC adherence requires modifications to theatre instilling policies, delivery and storage of MMC, staff training, and documentation. Centralising care, with bladder cancer expert leadership and best practices sharing with performance targets, likely led to improvements in Scotland. National quality improvement, incorporating audit and feedback, with additional implementation strategies targeted to professional role could improve adherence and patient outcomes elsewhere. This process should be controlled to clarify implementation intervention effectiveness.

Keywords

guideline adherence, implementation science, non-muscle-invasive bladder cancer, Theoretical Domains Framework, #BladderCancer, #blcsm, #uroonc

Introduction

Bladder cancer is the ninth most frequent diagnosed cancer globally, with particularly high incidence in Europe and North America [1]. In the UK, there are >10 000 new bladder cancer diagnoses a year [2]. About 75% of diagnoses are non-muscle-invasive bladder cancer (NMIBC) [3]. NMIBCs are treated with curative intent with a transurethral resection of the bladder tumour (TURBT), where the tumour is removed from the innermost lining of the bladder. Using the European Organisation for Research and Treatment in Cancer (EORTC) risk calculations, which accounts for the number of tumours, tumour diameter, prior recurrence rate, tumour stage, tumour grade and whether there is concomitant carcinoma *in situ*, the probability of recurrence at 5 years is 31% in the lowest-risk group to 78% in the highest-risk group, and the probability of progression at 5 years is 1% in the lowest-risk group and 45% in the highest-risk group [4]. NMIBC requires frequent follow-up and repeated TURBTs, making it the most expensive of all cancers to treat from diagnosis to death [5], with additional productivity losses and informal care costs [6].

High-certainty evidence [7] shows that an immediate postoperative single instillation of intravesical chemotherapy (SI-IVC), such as mitomycin C (MMC), into the bladder after TURBT is well tolerated and reduces the risk of cancer recurrence, in selected patients with a low or intermediate risk of recurrence, by proposedly killing circulating cancer cells before they re-seed [8]. This evidence has underpinned strong recommendations to use SI-IVC in guidelines from the National Institute for Health and Care Excellence (NICE) [9] and European Association of Urology (EAU) [10] for two decades. Despite this strong and consistent recommendation, estimated adherence is low across Europe at 22% in France, 39% in Germany, 38% in Italy, 41% in Spain [11], 61% in the UK [12], and estimates range from 0.33% to 50% in the USA [13–15], although whether the denominator includes only eligible low/intermediate-risk patients, and factored contraindications (e.g. perforations, bleeding; obvious muscle-invasive disease) is unclear. The 2014/2015 regional Scottish Quality Performance Indicators (QPIs) report found that adherence varied between 15% and 100% [16–18]; however, when targets were lowered to factor in contraindications, the range was 16–90% (2015/2016) and 21–85% (2016/2017) [19]. Nonetheless, low estimates of adherence in various countries highlight potentially suboptimal practice and an evidence–practice gap.

It is well understood that addressing evidence–practice gaps depends on individuals changing their behaviours within complex systems [20,21]. An investigation of individual and organisational barriers and facilitators to SI-IVC practice is needed to understand *who* needs to do *what*, differently [21]. We aimed to identify the barriers and facilitators around SI-IVC in Scotland and England.

Subjects and Methods

Design

This was a cross-sectional investigation of seven urology departments across Scotland and England incorporating an analysis of care pathways at each site and locally used documentation (such as policies, proforma and guidance), and semi-structured interviews with key staff responsible for the prescription and/or instilling of SI-IVC.

To ensure the relevant behaviours and participants were identified, the 'Action, Actor, Context, Target and Time (AACTT)' framework [22] was used to specify behaviours and identify the key professional roles to invite for interviews. Through this process two main behaviours, *prescribing* and *instilling*, were identified (Fig. 1).

Participants

Urology nurses, registrars and consultants in NHS hospitals were eligible. We purposively sampled Scottish sites as 'critical cases' [23] based on comparatively high, medium or low bladder cancer QPI rates, which indicate the percentage of eligible patients receiving SI-IVC, using the 2014 data (which was the data available at the time of study recruitment; exact percentages not shown to preserve anonymity). Critical cases are those where the features represent instances where the phenomena of interest may stand out more clearly and are useful for identifying ideographic features [23–25]. We further used opportunistic sampling through our networks to identify English sites, as there are no published data on rates of SI-IVC for eligible patients in England. At each site, a 'gatekeeper' was identified and invited to participate via e-mail, who in turn invited the nurses, registrars and consultants responsible for SI-IVC behaviours at their site.

Data Collection

Prior to a telephone interview, all participants were e-mailed a care pathway template (Appendix 1) and asked to amend it to convey the typical NMIBC patient pathway through their department. Site-specific guidance, protocols, proforma were inquired about and where deemed acceptable by participants, copies were e-mailed to the research team.

The interviews were structured using the Theoretical Domains Framework (TDF) [26]. The TDF is a comprehensive approach to exploring and explaining influences that prevent or enable desired behaviours, developed for implementation research, and incorporating

Fig. 1 'AACTT' framework for specifying behaviours.

Prescribing	Instilling
• Action: prescribing SI-IVC • Actor: Operating surgeon • Context: within theatre or recovery or ward • Target: patients with low-risk NMIBC • Time: immediately following TURBT surgery	• Action: instilling SI-IVC • Actor: Operating surgeon or cytoxically trained medical or nursing staff. • Context: within theatre or recovery or ward • Target: post-TURBT patients who have been prescribed SI-IVC • Time: up to 24 h following TURBT surgery

>30 theories of behaviour change clustered in 14 domains [27–29]. The interview guide is shown in Appendix 2.

Interviews were conducted by an experienced qualitative research fellow with a MSc. in Health Psychology (J.D., female). All participants completed a consent form before interview. Interviews were audio-recorded (except one where audio recording was declined, so written notes were taken instead) and transcribed verbatim then imported to QSR NVivo [30] for management.

The study was approved by the University of Aberdeen Life Sciences and Medicine Ethics Review Board (CERB) CERB/2018/4/1568.

Analysis

A study-specific coding manual based on the TDF (Appendix 3) was created [27] and analysis proceeded using a theory-based content analysis approach [31]. Data were first deductively coded to the TDF. Then, inductively, belief statements were created and divided into three categories according to whether they were related to *prescribing* or *instilling* behaviours, or *overarching behaviours* related to SI-IVC services generally. The TDF domain and associated belief statements were judged to be relevant if: there was a high frequency of coding (≥80% participants); and/or there were conflicting statements; and/or there were strong beliefs that may impact behaviour.

Results

Care Pathways

A standardised care pathway, highlighting site-specific variations, is shown in Fig. 2. This demonstrates that although there are commonalities across sites, there was also variation in practices, for instance regarding where MMC is stored, the location and timing of SI-IVC delivery (e.g. given immediately in theatre vs on the ward the following day, but within 24 h), and policies agreed with pharmacy to allow MMC to be given in theatre, or not.

Documentation used for managing patients with NMIBC and the SI-IVC decision-making process were discussed with all interviewees and some e-mailed examples to the researchers. For instance, Appendix 4 shows the patient 'consent to surgery' form outlining that depending on the surgeon's assessment of the tumour, SI-IVC may be given. This can act as a prompt for staff to anticipate SI-IVC. Similarly, Appendix 5 shows a proforma used for TURBTs, with similar versions being used in all Scottish sites [32], where the patient eligibility for SI-IVC and the surgeon's decision to give SI-IVC or not (i.e. through contraindications such as bladder perforation) is clearly documented, again providing a reminder.

Interviews

In total 30 participants were interviewed (nine Nurses, 11 Consultants, 10 Registrars) across seven sites between May 2018 and May 2019. Demographic information is given in Table 1.

Data Saturation

Data saturation was reached after 21 interviews (i.e. no new TDF domains or belief statements were identified). The remaining nine interviews were conducted before saturation was established.

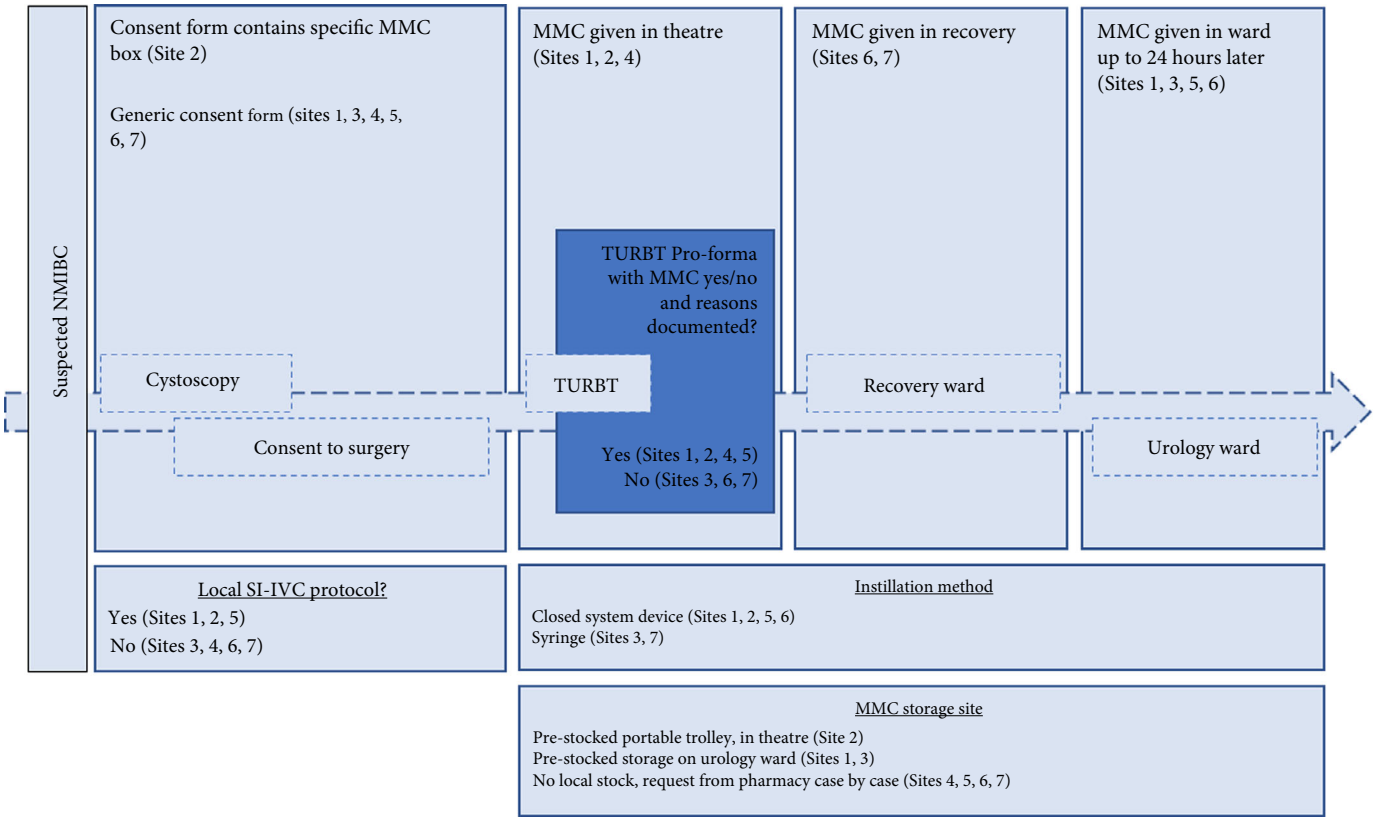
Domains Analysis

Table 2 overviews the relevant TDF domains specific to behaviours. Six domains were relevant to overarching behaviours related to SI-IVC services, six to prescribing behaviours, and eight to instilling behaviours. Appendix 6 provides detailed information regarding the frequency of coding, reasons for relevance, and illustrative quotes. In total, there were 133 belief statements. Of these, 31 related to overarching SI-IVC behaviours, 41 to prescribing, and 51 to instilling.

Overarching Belief Statements

Overarching belief statements were applicable to both instilling and prescribing behaviours and the overall management of patients with NMIBC. Relevant TDF domains

Fig. 2 Care pathway variations.



are in bold after descriptions (further evidenced in Appendix 6).

Beliefs about the effectiveness of SI-IVC from influential people within a site were reported to influence other staff. For instance, although most participants believed the sooner SI-IVC is given, the better (beliefs about consequences), one consultant explicitly did not think SI-IVC was effective, which influenced nurses on the same list (corroborated with nurse interview) (social influence). Consultants, registrars and nurses all stated that consultants influenced, and were ultimately responsible for decision-making at many levels: whether a patient receives SI-IVC or not, in which location (theatre, recovery ward, urology ward), and policy agreements with pharmacy regarding stock and storage (social influence and social and professional role). Some sites noted difficulties in communication within the surgical theatre team and with pharmacy (social influence).

Participants from all four Scottish sites drew attention to the QPIs, and that they could 'fail' the target if they do not give SI-IVC (beliefs about consequences), which affected decisions to give SI-IVC even in instances where the consultant disagrees with the evidence for SI-IVC. Participants noted that there were no formal consequences, but they do not like being seen to be doing worse than colleagues in other health boards or having to write up reports to explain poor performance and outline improvement plans (beliefs about consequences).

Some noted that perforations are common, so instillation delays do occur, although the overwhelming majority stated they do intend to give SI-IVC to all eligible patients (goals), although there were some conflicting beliefs as to whether this was realistic in all instances (optimism) due to bleeding/perforations, and also storage and staffing issues.

All participants were aware of national and international guidance for SI-IVC. Most consultants and registrars further mentioned the evidence base, and all participants knew about indications and contraindications for SI-IVC (knowledge). Three sites had local protocols that did not diverge from EAU or NICE guidance but offered site-specific instruction, but four sites did not (behavioural regulation).

Prescribing Belief Statements

Prescribing consisted of decisions to prescribe and writing prescriptions. Many mentioned anticipating the use of MMC before the TURBT and writing '± MMC' onto consent forms facilitated remembering to consider MMC after the TURBT. Likewise, completing operation notes and prescribing further

Table 1 Participant characteristics.

Site	Country	QPI adherence rate*	Interview number	Role	Years in current role	Main responsibility	Duration, min
1	Scotland	Mid	1	Senior Charge Nurse	16	Instilling	72
			2	Senior Charge Nurse	2.5	Instilling	54
			3	Urology Consultant	1.5	Prescribing	51
			4	Urology Consultant	7	Prescribing	35
			10	Urology Specialty Registrar	<1	Prescribing	61
			13	Urology Specialty Registrar	1.5	Prescribing	29
2	Scotland	High	17	Urology Consultant	12	Prescribing	50
			18	Urology Consultant	24	Prescribing	35
			20	Deputy Charge Nurse	11	Instilling	49
			21	Staff and Theatre Nurse	8	Instilling	37
			23	Senior Charge Nurse	4	Instilling	37
3	England	N/A	7	Urology Consultant	1	Prescribing	56
			8	MacMillan Urology Oncology Clinical Nurse Specialist	10	Instilling	58
			11	Urology Specialty Registrar	5	Prescribing	41
			12	Ward Sister Nurse	10	Instilling	†
			14	Locum Consultant Surgeon	1.5	Prescribing	42
			15	Urology Specialty Registrar	2.5	Prescribing	60
4	Scotland	Low	5	Urology Clinical Nurse Specialist	10	Instilling	67
			6	Urology Consultant	9.5	Prescribing	80
			9	Urology Consultant	28	Prescribing	62
5	Scotland	Mid	24	Urology Consultant	15	Prescribing	53
			26	Urology Specialty Registrar	5	Prescribing	49
			27	Urology Specialty Registrar	6	Prescribing	33
			29	Urology Nurse Practitioner	2	Instilling	53
6	England	N/A	16	Urology Consultant	17	Prescribing	37
			19	Urology Specialty Registrar	1.5	Prescribing	33
			22	Urology Specialty Registrar	NR‡	Prescribing	13‡
7	England	N/A	25	Urology Specialty Registrar	3	Prescribing and Instilling	51
			28	Urology Specialty Registrar	6	Prescribing and Instilling	54
			30	Urology Consultant	3	Prescribing	37

*N/A, not applicable; NR, not reported. *Applicable to Scotland only. Exact percentages and thresholds not given to preserve site anonymity. †Participant asked not to be recorded so analysis depended on researcher's notes. ‡Participant was called backed to theatre, so interview was rushed.*

prompted consideration of postoperative treatments (memory, attention and decision processes). As shown in Fig. 2, the consent timing, location and process differs across sites (behavioural regulation).

A main difference between Scottish and English sites is that all Scottish sites are required to submit QPI data, which are collated from the operation notes (and counter-checked with prescription record). This accounts for the similar format of proformas among Scottish sites, containing a checklist of postoperative instructions and stipulating SI-IVC (Appendix 5). Whereas English sites tended to use generic operation notes, which requires writing postoperative instructions (environment, context and resources).

Many prescribers mentioned their decisions were based on the tumour characteristics via TURBT findings. Many mentioned anecdotes of patients with perforations or allergic reactions, which make them mindful of contraindications, but that anecdotes would not make them reluctant to prescribe SI-IVC (reinforcement).

In sites practising SI-IVC within theatre, the scrub nurse, who is usually required to prepare MMC, may remind the surgeon to consider MMC. Even in sites, which do not offer MMC in theatre, the team try to work together and enlist each other's help to ensure that MMC is prescribed if required. A key figure of influence within most sites was the consultant. Many registrars mentioned that they are supervised by consultants when performing a TURBT and the supervising consultant's decisions are considered final. Consultants also have a preference where MMC is administered, one nurse mentioning that even within a site, consultants work differently. Consultants were generally regarded as having ultimate power over decision-making (social influences).

Instilling Belief Statements

Instilling consists of preparing, instilling, and draining MMC.

In some sites, participants described pre-theatre list safety briefings, or 'time-outs' to discuss patients and give handover notes. Instillers referred to operation notes and prescriptions for confirmation that MMC should be given in theatre or postoperative plan-of-care if it is to be given in the recovery ward or urology ward (behavioural regulation).

Table 2 Summary of relevant domains.

TDF domain	Overarching behaviours (example)	Prescribing behaviour (example)	Instilling behaviour (example)
Knowledge	✓ (Three sites had local protocol tailoring international guidelines to local practice, four did not)	✗	✗
Social influences	✓ (Positive and negative experiences of communication between roles were evident, particularly between roles of differing seniority. Consultants were perceived to influence team decision-making most – particularly important if they are sceptical of the SI-IVC evidence base)	✓ (Consultant preferences influence SI-IVC decision-making more than other roles, although in some sites nurses or registrars give verbal 'reminders', which may be easier when SI-IVC is a delegated responsibility)	✓ (Recovery and/or ward nursing staff found verbal handover notes over and above written information useful – of more importance in sites with policies to not instil in theatre)
Social professional role and identity	✓ (Consultants were perceived to be responsible for instigating or negotiating hospital policy, such as in-theatre instilling, power that that other roles were perceived not to have)	✗	✓ (Some felt nurses were the most appropriate role to instil MMC, others felt this should be the preserve of registrars or consultants)
Beliefs about consequences	✓ (Most believed that SI-IVC reduces recurrences and therefore future workload. Scottish sites did not like being viewed as underperforming on QPIs)	✗	✓ (Some instillers felt that SI-IVC increases workload as it requires time to prepare the MMC and associated devices and donning protective equipment)
Goals	✓ (Many felt that SI-IVC is important and a priority for optimum care, others saw it of less importance)	✗	✓ (Although most saw SI-IVC as a priority, many also noted competing workload pressures, particularly when not given in theatre and delegated to recovery/ward nursing staff)
Optimism	✓ (Many believed that it was possible for all eligible patients to receive SI-IVC, others thought this was unrealistic)	✗	✗
Memory, attention and decision processes	✗	✓ (Consent forms and operation notes act as prompts or reminders to prescribe MMC but the process and materials varied across sites)	✗
Behavioural regulation	✗	✓ (Four sites had consent forms or TURBT specific operation proforma notes to designate MMC, three did not. Such forms helped in planning SI-IVC)	✓ (Instillers refer to safety briefings, 'time-outs' and operation or handover notes for instruction regarding SI-IVC. This has added importance in three sites with policies to not instil in theatre)
Environmental context and resources	✗	✓ (There were variations in the paperwork used to prescribe and document MMC with some finding the process easy and others noting difficulties)	✓ (Approvals from pharmacy to allow SI-IVC in theatre; dedicated TURBT theatre lists; access to modern instilling devices; having staffed trained to instil on rota; convenient and accessible local storage of MMC; and efficient re-ordering processes facilitate adherence to guidance)
Reinforcement	✗	✓ (Prescribers drew on experiences of side-effects, logistics, and suspicion of perforation in SI-IVC decision-making)	✗
Beliefs about capabilities	✗	✗	✓ (Experienced instillers found instilling easy and were confident, but less experienced ones found it more difficult)
Skills	✗	✗	✓ (Many instillers felt adequately trained and grew more confident with experience, although there were variations on how training was delivered, whereas others felt 'rusty' if instilling infrequently and required to revisit device manufacturer instructions)
Emotion	✗	✗	✗
Intentions	✗	✗	✗

✓ *denotes domain relevance.*

Most felt capable of instilling MMC and more so with experience over time, although some, especially those who normally prescribe and do not frequently instil, mentioned they did not feel confident (beliefs about capabilities).

There was a tension evident in interviewees' beliefs about consequences with some, particularly nurses, perceiving SI-IVC an immediate added workload (a barrier), and others taking a long-term view and that if MMC reduces recurrences, then future workload would be reduced because they would see fewer patients with recurrences, which also contributed to a feeling of job satisfaction (beliefs about consequences).

There are two ways to instil MMC, via syringe or via a closed system. Closed systems were preferred because there is less risk of harmful spillages (to staff and patients). Some noted their pharmacy do not supply closed systems based on cost. One department addressed this issue by writing a protocol to convince pharmacy to change to the closed system and noted their practice had improved. One department has local SI-IVC guidelines that do not allow instilling MMC in theatre. Two departments were not allowed to store MMC in ward or theatre, leading to a long wait for MMC to arrive from the pharmacy each time. Having access to MMC was a major facilitator, particularly in sites where they control their own stock and store it locally. This requires an agreement with pharmacy and a process for replenishing stock. Some sites reported difficulties in storage and communication with pharmacy, leading to delays in MMC delivery. This was particularly a barrier in sites where no MMC stock was available for patients in early morning lists, but mitigated in sites where the policy was to have TURBT lists in the afternoon and ensure these patients received MMC the next day (still within the 24-h window). All departments mentioned having trained staff to instil MMC. However, in some sites, participants noted that sometimes there are no trained staff on rota (environmental context and resources).

For nurses delivering MMC on the ward, they reported there are no other tasks that would conflict with delivering MMC. However, where MMC delivery is a responsibility of a staff member that is not always on the ward, namely, registrars and clinic nurses, their priorities differ from ward nurses. Clinic nurses are not able to leave until they have finished clinic duties, and registrars must find time between operations to go to recovery to instil MMC (goals).

Many instillers noted that MMC is often mentioned as required in postoperative handover either written or verbal and they referred to the written postoperative instructions as a reminder (social influences).

In departments where nurses deliver MMC in wards, most instillation training happened in-house, by more senior nurses, or clinic nurses that train, observe and 'sign off' new instillers. Some departments require new instillers to complete other training alongside this, such as a University short course or Learn Pro modules. However, registrars and consultants had a laxer way of training to instil, via the 'see one, do one' method, and some registrars did not feel well trained (skills).

In most departments, the role of instilling is a ward nurse responsibility *or* the surgeon in theatre at time of the TURBT. Only one site reported having the options of both. There were several mentions of preference of whose role it should be to instil MMC, some mentioned that they would not entrust this responsibility to a nurse, whereas some nurses mentioned they feel more trained than surgeon to instil MMC (social/professional role and identity).

Discussion

A SI-IVC reduces recurrences in selected patients with NMIBC in clinical trials [8,10] and 'real-world' data [32]. Adherence to this high-certainty evidence and strong guideline recommendation facilitates optimal patient care as an adjunct to high-quality TURBT. Our present study highlights that attention must be paid to the complex personal, social, organisational, and contextual barriers and facilitators that influence whether and *how* SI-IVC is delivered in practice. Importantly, different implementation interventions should be targeted to different professional roles.

Participant knowledge of the evidence base, guidelines and contraindications is generally comprehensive, but having a local protocol may further improve guideline knowledge transfer. Bladder cancer specialists, with experience and training in discerning 'high' from 'low/intermediate' grade tumours that will benefit from SI-IVC, and having dedicated TURBT theatre lists, as opposed to general urology day lists [33], may also help in SI-IVC planning practices and better guideline compliance.

Social influences affected all health professional roles. Although consultants often delegate SI-IVC, they have power and ultimate responsibility over decision-making and influence much of the SI-IVC policy and process, which can be both a barrier and facilitator depending on context. For instance, one consultant overhauled policy and practice in their site. This involved setting agreements with pharmacy to have MMC available in theatre, ready for use, and efficient reordering processes. The staff at this site speak positively about their SI-IVC processes and their QPI performance is strong. Conversely, at a site with low QPI performance, one consultant stated that they were sceptical of the evidence for SI-IVC. This is an important barrier because it impacts SI-IVC decision-making for this consultant's theatre team. When coupled with local MMC storage problems and an inefficient reordering process, this means that even if the list surgeon

intends to prescribe and instil MMC, patients treated at the start of the list are unlikely to receive MMC. The staff at this site were generally cynical about capabilities to improve practice. Social Influences are likely a useful target for intervention.

Policies and agreements with pharmacy were identified as a main barrier. Most sites mentioned delays between prescriptions sent to pharmacy (a laborious process in itself) and receiving MMC. This creates problems for sites that intend to instil in theatre, but have no readily available stock. Other sites are faced with a policy to not instil in theatre, further reducing an opportunity to ensure eligible patients receive SI-IVC. Formalising agreements with pharmacy for efficient delivery and convenient storage of MMC, and having formalising policies to allow in-theatre instillation is a sensible, although upfront time-consuming barrier to address in sites where current processes are inefficient.

There was a tension evident in beliefs about consequences of delivering SI-IVC, where although it was acknowledged that it likely reduces future work load because these patients are less likely to require treatment for recurrences, it was also noted that SI-IVC increased short-term work and was time-consuming to do in theatre. Targeting beliefs about consequences for instillers may improve adherence to guidance.

Having registrars and nurses who are trained in and confident to instil MMC on rota was talked about positively. Conversely, other sites noted frustrations if there were not enough trained staff available or having to bleep nurses who may be busy at outpatient clinics. Addressing instilling training gaps may improve adherence.

Documenting MMC decision-making through an embedded operation proforma was highlighted as useful. Instillers also preferred this explicit statement embedded in operation notes for confirmation. Introducing this in sites that do not currently have it is a sensible behavioural regulation strategy.

In Scotland, participants cited QPIs. No formal negative sanctions were levied against underperforming sites, but participants did not like being seen to be underperforming, nor preparing plans to address poor performance, particularly in one site where the bladder cancer lead was sceptical if targets could ever be met with their department's current set up. The Scottish QPIs can be regarded as an audit and feedback intervention, which can increase performance [34], and this has had a positive effect [32], through citing a robust evidence base, utilising a wide set of metrics (not only SI-IVC), engaging stakeholders, communicating clear targets, embedding the process within national governance whilst encouraging local responsibility, which are all highlighted as good performance target practices by the Health Foundation [35]. However, without having controlled this process in a randomised implementation trial or controlled before and after or interrupted time series studies (notwithstanding likely Hawthorne effects), it is difficult to comment on effectiveness. Randomisation in healthcare audit and feedback research is possible [34,36,37] and should be borne in mind for the design of any future initiatives to increase SI-IVC rates using audit and feedback.

A recent systematic review of international NMIBC guideline compliance [38] found that adherence to SI-IVC recommendations was low across studies. 'Logistical difficulties' are cited as one reason for non-adherence, corroborating our present results. 'Concern about side-effects' was another non-adherence reason, but our present data suggests that when contraindications are present, staff are comfortable withholding SI-IVC legitimately, so although this does not seem to be an issue in the UK, it may be elsewhere. Last, the authors suggest that better guideline education and knowledge of the treatment may enhance adherence. This is not supported by our present results, but our focus on the UK setting contrasted with their international scope may explain the differences here.

Stroman *et al.* [39] aimed to increase rates of SI-IVC in a UK single site with an intervention including preoperative MMC delivery, a proforma documenting SI-IVC decision-making, and designating nurses or registrars with instilling responsibility, which increased SI-IVC rates compared to earlier practice. However, this was not behaviour theory-informed, nor based on a rigorous investigation into barriers and facilitators, and was explored in a single site, which limits transferability. Nonetheless, we agree that delivery of MMC and documentation are important elements for improving practice.

Implications for Practice

Practice can be improved. A local protocol, contextualising guidance – with an agreed pharmacy policy for efficient ordering, restocking, and local storage – and enabling SI-IVC in theatre, with trained staff to give in recovery and on wards (thereby maximising the SI-IVC opportunities), appear to be modifiable markers of good practice. Further enabling influential individuals to support evidence-based practice despite personal scepticism, sharing best practice from well-performing sites, keeping abreast of practice updates, and a focus on the reduced future workload rather than short-term increases, too appear sensible. The Scottish QPI experiences, particularly SI-IVC practices documented in embedded consent and operation notes, and audit and feedback, may have positive impact in the rest of the UK and elsewhere.

Implications for Future Research

An audit of adherence in other areas of UK, learning from Scotland's lead, is required. Given that SI-IVC guidance is an

international standard; such an audit could be extended internationally. This would provide both a baseline from which to measure change in adherence to SI-IVC guidance and, if designed appropriately, the required control group to demonstrate the effectiveness of any implementation interventions. Other interventions not addressed by audit and feedback, such as instilling policy, SI-IVC documentation, MMC logistics, perceptions of workload, and training needs, should not be forgotten. Our present results should be used to inform implementation interventions through mapping the relevant TDF domains to the empirically and theoretically informed behaviour change wheel approach to intervention design [21,40].

Strengths and Limitations

The strength of our case study approach is that the various sources of evidence including care pathways, interview data, and local proforma, illuminated contextual features of well-performing and suboptimal sites. A limitation is that we did not observe teams in practice, which may have further corroborated our other evidence sources. However, our approach was pragmatic given available resources and the care pathways were an attempt to address this.

It could be argued that our present findings have limited transferability to similar sites in Scotland and England. For instance, although MMC is used in the UK, we acknowledge that other agents are used elsewhere, and recent shortages and increased costs may mean other agents are utilised in future. For example, a recent study noted that gemcitabine has low toxicity [41], which could influence 'beliefs about consequences' of side-effects, but presently this is speculative and cannot be inferred from our present data. Although it is unclear whether our present results would apply elsewhere, they can be used as the basis of investigation in a wider UK sample or other countries using, e.g. surveys informed by our results.

Conclusions

Our present study is the first to use a theory-informed behavioural perspective to address non-adherence to SI-IVC guidance in patients with NMIBC in a multicentre setting. A complex picture emerged showing that barriers and facilitators to best practice exist at interpersonal and departmental levels, but crucially, improvement is possible. A better baseline picture of SI-IVC rates is required across the whole of the UK (and elsewhere) through a well-designed audit before further implementation research is embarked on, otherwise it will not be possible to show improvement in a robust evidence-based way and resources may be wasted. Beyond this, further implementation studies should use our present results to design interventions and compare them ideally in randomised studies to demonstrate knowledge translation and/or behaviour change intervention effectiveness. This would be a positive contribution to urology practice by optimising bladder cancer patient care, whilst adding also to the implementation methodology literature.

Funding

This research was supported by the Wellcome Trust Institutional Strategic Support Fund.

Conflicts of Interest

Veeru Kasivivanathan reports grants from Photocure and Karl Storz outside the submitted work. No conflicts exist for all other authors.

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Abbreviations: AACTT, Action, Actor, Context, Target and Time; EAU, European Association of Urology; MMC, mitomycin C; NICE, National Institute for Health and Care Excellence; NMIBC, non-muscle-invasive bladder cancer; QPI, Quality Performance Indicator; SI-IVC, single instillation of intravesical chemotherapy; TDF, Theoretical Domains Framework; TURBT, transurethral resection of the bladder tumour.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Care Pathway Template.
Appendix S2. Interview Guide.
Appendix S3. SI-IVC Project coding manual – Version 1.
Appendix S4. Consent to Surgery Form.
Appendix S5. TURBT Pro Forma (EXAMPLE).
Appendix S6. Summary table of relevant domains, specific beliefs, reason for relevance and illustrative quotations.