

What influences adherence to guidance for post-operative instillation of intravesical chemotherapy to bladder cancer patients?

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Abstract

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

Materials 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 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 operation pro-forma (four hospitals). Performance targets (with audit and feedback) within a national governance framework was 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 Mitomycin C (MMC), following NMIBC resection reduces recurrences. This evidence underpins international guidance. Numbers 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.

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1 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 over 10,000 new bladder cancer diagnoses a year. [2] About 75% of diagnoses are non-muscle invasive bladder cancer (NMIBC). [3] NMIBC 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. ~~NMIBC recurrences are frequent~~ Using the European Organisation for Research and Treatment in Cancer (EORTC) risk calculations, which accounts for 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% percent 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 (30-80% within 5 years) and up to 45% progress to muscle-invasive disease within 5 years. [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 following TURBT is well tolerated and reduces the risk of cancer recurrence, in selected patients with low and 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 NICE [9] and 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 and 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 2014/15 regional Scottish quality performance indicators (QPIs) report, found that adherence varied between 15-100%, [16-18], however, when targets were lowered to factor in contraindications, the range was 16-90% (2015/16) and 21-85% (2016/17). [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. [20-22] An investigation of individual and organisational barriers and facilitators to SI-IVC practice is needed to understand *who* needs to do *what*, differently. [22] We aimed to identify the barriers and facilitators around SI-IVC in Scotland and England.

2 Methods

2.1 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 [23] 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 (Figure 1).

Figure 1. 'AACTT' framework for specifying behaviours

FIGURE 1 HERE

2.2 Participants

Urology nurses, registrars and consultants in National Health Service (NHS) hospitals were eligible. We purposively sampled Scottish sites as 'critical cases' [24] based on comparatively high, medium or low bladder cancer QPI rates, which indicate the percent 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. [24-26] 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 email, who in turn invited the nurses, registrars and consultants responsible for SI-IVC behaviours at their site.

2.3 Data collection

Prior to a telephone interview, all participants were emailed a care pathway template (see 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 emailed to the research team.

The interviews were structured using the Theoretical Domains Framework (TDF). [27] The TDF is a comprehensive approach to exploring and explaining influences that prevent or enable desired behaviours, developed for implementation research, and incorporating over 30 theories of behaviour change clustered in 14 domains [28-30]. The interview guide is shown in appendix 2).

Interviews were conducted by an experienced qualitative research fellow with an MSc. in Health Psychology (JD, 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 [31] for management.

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

2.4 Analysis

A study specific coding manual based on the TDF (appendix 3) was created [28] and analysis proceeded using a theory-based content analysis approach. [32] Data were first deductively coded to the TDF. Then, inductively, belief statements were created and divided in to three categories according to whether they were related to *prescribing* or *instilling* behaviours, or *over-arching 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 ($\geq 80\%$ participants); and/or there were conflicting statements; and/or there were strong beliefs which may impact behaviour.

3 Results

3.1 Care Pathways

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

Figure 2. Care pathway variations

FIGURE 2 HERE

Documentation used for managing NMIBC patients and the SI-IVC decision-making process were discussed with all interviewees and some emailed 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 pro forma used for TURBTs, with similar versions being used in all Scottish sites, [33] 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.

3.2 Interviews

In total 30 participants were interviewed (9 Nurses, 11 Consultants, 10 Registrars) across seven sites between May 2018 and May 2019. Demographic information is displayed in table 1.

Table 1: Participant characteristics

TABLE 1 HERE

3.3 Data saturation

Data saturation was reached after 21 interviews (i.e. no new TDF domains or belief statements were identified). The remaining 9 interviews were conducted before saturation was established.

3.4 Domains analysis

Table 2 overviews 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.

Table 2 Summary of relevant domains

TABLE 2 HERE

3.5 Overarching belief statements

Overarching belief statements were applicable to both instilling and prescribing behaviours or the overall management of NMIBC patients. Relevant TDF domains 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 **regrading 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, though the overwhelming majority stated they do intend to give SI-IVC to all eligible patients (**goals**), although there was 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 which did not diverge from

EAU or NICE guidance but offered site-specific instruction, but four sites did not (**behavioural regulation**).

3.6 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 prompted consideration of post-operative treatments (**memory, attention and decision processes**). As shown in figure 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 is collated from the operation notes (and counter-checked with prescription record). This accounts for the similar format of proformas among Scottish sites, containing a check list of post-operative instructions and stipulating SI-IVC (see appendix 5). Whereas English sites tended to use generic operation notes which requires writing post-operative 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, that 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**).

3.7 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**).

Most felt capable of instilling MMC and more so with experience over time, although some, especially those who normally prescribe and don’t 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 against 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 24hr 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 post-operative hand-over either written or verbal and they referred to the written post-operative 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**).

4 Discussion

SI-IVC reduces recurrences in selected NMIBC patients in clinical trials [8, 10] and “real-world” data. [33] Adherence to this high-certainty evidence and strong guideline recommendation facilitates optimal patient care as an adjunct to high quality TURBT. Our study highlights that attention must be paid to the complex personal, social, organisational and contextual barriers and facilitators which 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 which will benefit from SI-IVC, and having dedicated TURBT theatre lists, as opposed to general urology day lists, [34] 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. 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. 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, [35] and this

has had a positive effect, [33] 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. [36] 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 [35, 37, 38] 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 [39] found that adherence to SI-IVC recommendations was low across studies. “Logistical difficulties” are cited as one reason for non-adherence, corroborating our results. “Concern about side effects” was another non-adherence reason, but our 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 results, but our focus on the UK setting contrasted with their international scope may explain the differences here.

Stroman et al [40] aimed to increase rates of SI-IVC in a UK single site with an intervention including pre-operative MMC delivery, a pro-forma 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.

4.1 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 & feedback, may have positive impact in the rest of the UK and elsewhere.

4.2 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 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. [22, 41]

4.3 Strengths and limitations

The strength of our case study approach is that the various sources of evidence including care pathways, interview data, and local pro-forma, 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 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, [42] which could influence 'beliefs about consequences' of side effects, but presently this is speculative and cannot be inferred from our data. Although it is unclear whether our results would apply elsewhere, they can be used as the basis of investigation in a wider UK sample or other countries using, for example, surveys informed by our results.

5 Conclusions

Our study is the first to use a theory-informed behavioural perspective to address non-adherence to SI-IVC guidance in NMIBC patients in a multi-centre 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 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.

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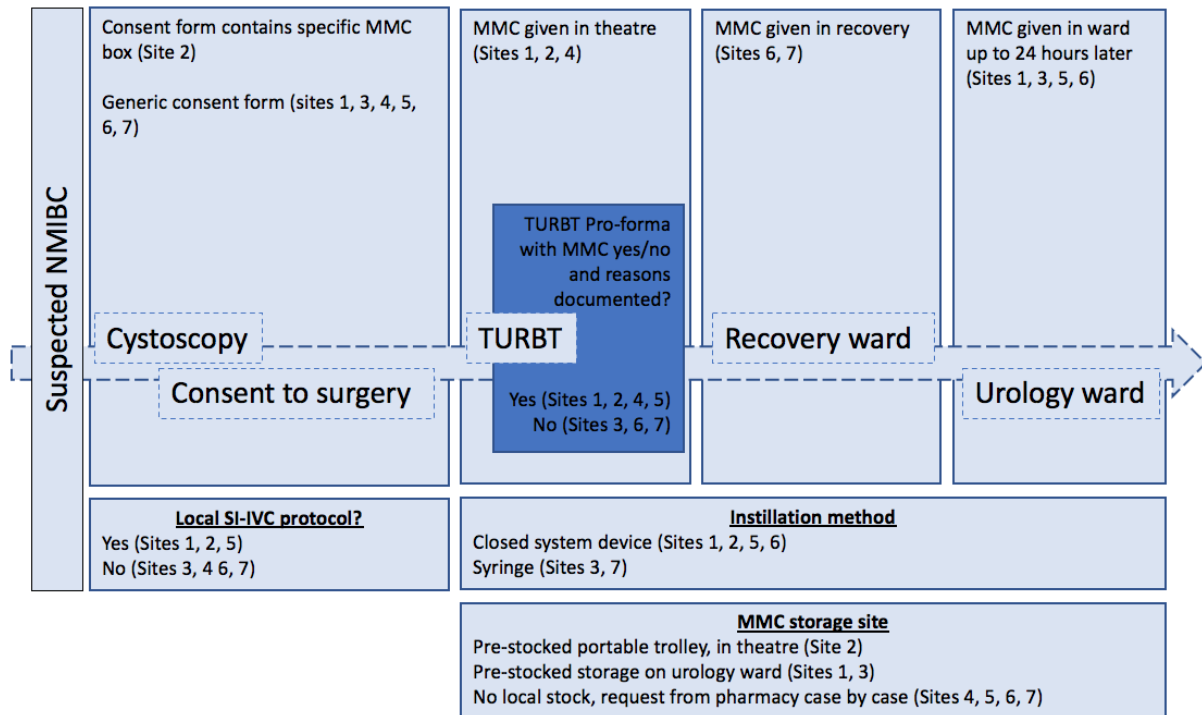
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Figure 1. 'AACTT' framework for specifying behaviours

Prescribing	Instilling
<ul style="list-style-type: none"> • Action: prescribing SI-IVC • Actor: Operating surgeon • Context: within theatre or recovery or ward • Target: low risk NMIBC patients • Time: immediately following TURBT surgery 	<ul style="list-style-type: none"> • Action: instilling SI-IVC • Actor: Operating surgeon or cytotoxically 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 hours following TURBT surgery

Figure 1. Care pathway variations



Appendix 1. Care pathway template

	What happens?	who is responsible?	Where does this happen?
Stock of MMC	Assesses stock levels		
	Orders of MMC		
	Receives Delivery of MMC		
	Storage of MMC		
Diagnosis	Flexible cystoscopy		
	Provides diagnosis information and counselling		
Surgery: TURB	Consent patient		
	TURB		
	Completing Op notes (Indicating contraindications)		
	Deciding to Prescribe MMC		
	Writing prescription: Completing Drug Kardex		
	First opportunity for MMC instillation		
Post-Surgery	Patient goes to recovery		
	Reads prescription		
	Assess for contraindications		
	Collection of MMC kit and PPE		
	MMC preparation		
	Instillation of MMC		
	Record of time of instillation		
	Draining MMC		
Records in/complete instillation			

Appendix 2. Interview Schedule

Appendix 2: Interview guide

Domain	Item																																																					
Preamble	<p>Before we begin the interview, I want to let you know I'm not <u>medically trained</u>, so it would be great if you could talk to me in lay terms.</p> <p>The <u>focus of the interview is the use of immediate instillation of Mitomycin C</u> following a TURBT in eligible NMIBC patients. <u>I'm not here to evaluate</u> clinical practice, I would just like to learn more about this departments' MMC use. I've asked to talk to you today because of your role within the department.</p> <p>I have an <u>interview schedule</u> to help me to remember to cover the <u>relevant points</u> and at times it <u>may feel repetitive but please try to answer as best</u> you can. What you tell me will <u>remain confidential</u>, it will be made <u>anonymous if used in any report</u>. This research has been <u>ethically approved</u> by the University of Aberdeen College Ethics review board.</p> <p>Before we get to the questions, I sent you a pathway of MMC – have you had a chance to fill it out?</p> <p style="padding-left: 40px;">(if yes) I'd like to take 10 minutes to discuss this [use table of prompts]</p> <p style="padding-left: 40px;">(if no) I'd like to take the first 10 minutes to fill it out.</p>																																																					
	<table border="1"> <thead> <tr> <th></th> <th>What</th> <th>Who is responsible?</th> <th>Where does this happen? [prompts]</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Stock of MMC</td> <td>Assesses stock levels</td> <td><i>Always the same person?</i></td> <td><i>Is there only one store?</i></td> </tr> <tr> <td>Orders of MMC</td> <td></td> <td><i>When does this happen?</i></td> </tr> <tr> <td>Receives Delivery of MMC</td> <td></td> <td><i>Happens in pharmacy – are you notified?</i></td> </tr> <tr> <td>Storage of MMC</td> <td></td> <td><i>Multiple places?</i></td> </tr> <tr> <td rowspan="2">Diagnosis</td> <td>Flexible cystoscopy</td> <td></td> <td></td> </tr> <tr> <td>Provides diagnosis information and counselling</td> <td></td> <td></td> </tr> <tr> <td rowspan="6">Surgery: TURB</td> <td>Consents patient</td> <td></td> <td></td> </tr> <tr> <td>TURB</td> <td></td> <td></td> </tr> <tr> <td>Completing Op notes (Indicating contraindications)</td> <td></td> <td><i>What are the notes like?</i></td> </tr> <tr> <td>Deciding to Prescribe MMC</td> <td></td> <td></td> </tr> <tr> <td>Writing prescription: Completing Drug Kardex</td> <td></td> <td><i>Someone different to prescription?</i></td> </tr> <tr> <td>First opportunity for MMC instillation</td> <td></td> <td><i>If don't offer – why? Location/ logistics/ contraindications What needs to happen if MMC given here?</i></td> </tr> <tr> <td rowspan="3">Post-Surgery</td> <td>Patient goes to recovery</td> <td></td> <td><i>Does recovery take place in 2 places? – Recovery ward then day case ward.</i></td> </tr> <tr> <td>Reads prescription</td> <td><i>What about junior doctors?</i></td> <td></td> </tr> <tr> <td>Assess for contraindications</td> <td><i>Does the same person</i></td> <td><i>What would be looked for?</i></td> </tr> </tbody> </table>		What	Who is responsible?	Where does this happen? [prompts]	Stock of MMC	Assesses stock levels	<i>Always the same person?</i>	<i>Is there only one store?</i>	Orders of MMC		<i>When does this happen?</i>	Receives Delivery of MMC		<i>Happens in pharmacy – are you notified?</i>	Storage of MMC		<i>Multiple places?</i>	Diagnosis	Flexible cystoscopy			Provides diagnosis information and counselling			Surgery: TURB	Consents patient			TURB			Completing Op notes (Indicating contraindications)		<i>What are the notes like?</i>	Deciding to Prescribe MMC			Writing prescription: Completing Drug Kardex		<i>Someone different to prescription?</i>	First opportunity for MMC instillation		<i>If don't offer – why? Location/ logistics/ contraindications What needs to happen if MMC given here?</i>	Post-Surgery	Patient goes to recovery		<i>Does recovery take place in 2 places? – Recovery ward then day case ward.</i>	Reads prescription	<i>What about junior doctors?</i>		Assess for contraindications	<i>Does the same person</i>	<i>What would be looked for?</i>
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Appendix 2. Interview Schedule

		<i>read and assess?</i>	<i>I'm not medically trained – can you give me more detail please</i>
	Collection of MMC kit and PPE (protection equipment)		<i>Is there a stock of MMC on the ward? Why not?</i>
	MMC preparation		<i>What happens for the preparation? What equipment is needed?</i>
	Instillation of MMC	<i>Is there anyone not allowed to do this?</i>	
	Record of time of instillation		<i>How is it recorded? Nurses notes?</i>
	Draining MMC	<i>Same person that instilled?</i>	
	Records in/complete instillation		<i>Does anyone double check this?</i>
	<p>Thanks for your input on that, its really helpful and has given us some context. Ready to continue to the questions?</p> <ol style="list-style-type: none"> 1. What is your full job title? 2. How long have you worked in this role? 		
Knowledge of MMC	<ol style="list-style-type: none"> 3. Briefly, can you tell me about <i>your</i> role in the use of MMC? How often/ is this a daily task? (If prescribe and administer) Do you tend to prescribe or administer more? Throughout this interview I would like you to focus on <<<i>behaviour done most</i>>>. 		
Memory, attention and decision processes	<ol style="list-style-type: none"> 4. Is prescribing/ administer MMC an automatic (<i>doing without realizing/ conscious thought</i>) part of your job? What [things] make it automatic/ not(<i>conscious thought</i>)? 5. What things do you consider when <u>making the decision</u> to prescribe/ administer MMC? 6. What information do you refer to when deciding to prescribe/ administer MMC? (patient notes/ protocols) Is it possible to miss relevant information? Tell me more 7. How do you remember to prescribe/ administer MMC? Is it possible to forget? - What/ where? (gain specifics/ mention of document – useful to see) 		
Intention	<ol style="list-style-type: none"> 8. <u>When</u> do you decide to prescribe/ administer MMC? Same point every time? Why at this time? 		
Skills	<ol style="list-style-type: none"> 9. What are the skills needed to prescribe/ administer MMC? Asides medical skills, what other skills are needed? Do you have these skills? 		

Appendix 2. Interview Schedule

	<p>10. Do you think you are adequately trained to give MMC? Is the training appropriate? When is it done? Who does it?</p>
Beliefs about capabilities	<p>11. How easy or difficult is it for you to prescribe/ administer MMC? What problems have you encountered?</p> <p>12. What would help <i>you</i> overcome these issues?</p>
Emotion	<p>13. How do you feel about prescribing/ administering MMC? Is it upsetting? Does it cause stress?</p>
Social professional role and identity	<p>14. Who is the most appropriate person to prescribe/ administer MMC? Do you think prescribing/ administering MMC is an <i>appropriate</i> part of your role? If not – whose role should it be?</p>
Motivation and goals	<p>15. How important is it to you that patients receive MMC? Mention evidence, what exactly?</p> <p>16. Is there any other tasks within your role that would conflict with prescribing/ administering MMC?</p>
Reinforcement	<p>17. How much does past experience [of MMC] influence whether or not you prescribe/ administer MMC?</p>
Beliefs about consequences	<p>18. What are the benefits of prescribing/ administering MMC? For you, for the patient, for your colleagues, for the department</p> <p>19. What are the consequences of not prescribing/ administering MMC? For you, for the patient, for your colleagues, for the department</p>
Environmental context and resources	<p>20. Do you think there is anything in the department environment or context that could affect you prescribing/ administering MMC? (Workload/ Time available/ Other resources)</p> <p>21. What about the stock of MMC, does this affect you prescribing/ administering MMC? Is it sufficient? Is it easy/straight forwards to access?</p> <p>22. Are there sufficient numbers of people trained in MMC instillations?</p> <p>23. To what extent is MMC prescription/ administration affected by these <u>departmental resources</u>?</p> <p>24. How about the patient/ patient related factors (characteristics) influence on MMC prescription/ administration? To what extent do patients affect your prescription/ administration?</p> <p>25. Is there anything that hinders you in the NHS from prescribing or administering MMC?</p>

Appendix 2. Interview Schedule

	<p>26. What about factors out_ with the department? E.g. health board/policy factors?</p> <p>To what extent do these external factors effect MMC prescription/ administration?</p>
Social influences	<p>27. What are the views of your colleagues around MMC? (Consultants? Nursing staff? Junior staff?)</p> <p>28. How about outwith this hospital - what is the view around MMC?</p> <p>29. What are the views of patients and patients' families?</p> <p>30. Has a patient ever influenced your prescription/ administration of MMC? (Refused treatment/ wanted to stop)</p>
Knowledge of guidelines	<p>31. Are you aware of any guidelines available on treating patients with NMIBC? (If Yes) What do the guidelines say? What do you think of these guidelines?</p> <p>Do you have local protocols? What do they say? Where located? Are they up to date?</p> <p>We know that there are times when guidelines/protocols are not or cannot be followed – can you tell me about when and why that might happen for MMC?</p> <p>(If No) Do you have local protocols? What do they say? Where located? Are they up to date?</p>
Optimism	<p>32. Do you think it is possible to make improvements to the adherence of MMC? Tell me more</p> <p>33. Do you believe 100% of eligible patients could receive MMC?</p>
Behavioral regulation	<p>34. Are there ways of working that make MMC prescribing/ administration easier? What would help?</p> <p>35. To achieve this, what do you think could be done differently? Who, when, where, how?</p>
	<p>36. Any other ideas/ things you would like to mention</p>

Appendix 3. SI-IVC Project coding manual – Version 1

Coding manual

This coding manual is for the study analysis: A UK multicentre theory-informed investigation into the barriers and facilitators of adhering to the strong guideline recommendations to offer immediate post-operative instillations of chemotherapy to eligible bladder cancer patients.

This coding manual was based on the final coding manual used to identify barriers and facilitators to delivery of an individualized dialysis temperature in the MyTEMP trial.(J. Pesseau et al., 2017)

Interviews schedule (appendix 2) for health care professionals were designed around 14-Domain TDF2 (Cane, O'Connor, & Michie, 2012) to identify barriers and facilitators of prescribing or instilling of offer immediate post-operative single instillation of intravesical chemotherapy (SI-IVC).

The descriptions of each of the domains are as defined in Cane, O'Connor & Michie 2012. Definitions of the constructs to guide coding were obtained from Additional file 1 from Pesseau et al. (2017).

Coding at domain level instructions:

- Read through whole transcription prior to coding (redact identifiable info, and check against audio file)
- Ensure text is addressing key behaviours (either prescribing or instilling), related actions. Text addressing both prescribing and instilling can be coded too.
- Get the general message from the text and code to the most appropriate domain.
- Include surrounding text so context is not lost.
- If relevant, code single word answers (e.g. yes/ no) along with question.
- Code first to domains, then wherever possible use the constructs within the domains to justify coding. Creating separate codes where appropriate (e.g. Knowledge and Knowledge of Guidelines)
- Code all responses, both positive and negative.
- Multiple domains can be coded at one time (aka Double Badging). Please use the decision rule column below to help your coding decision.
- Decisions rules and example quotes have been added throughout the coding of the data and offer clarifications of what should be coded into each domain.

Double coders:

- Double coding happens at domain level only
- Please code only highlighted sections but use wider context to inform coding decisions.

Arbiter and dispute meetings

- Coders should meet and settle disputes, but where a code cannot be agreed an expert will decide the correct code.

AACTT framework for specifying behaviours. (J Pesseau et al., 2019)

For prescribing;

- Action: prescribing SI-IVC
- Actor: Operating surgeon
- Context: within theatre or recovery or ward
- Target: low risk NMIBC patients
- Time: immediately following TURBT surgery

And instilling;

- Action: instilling SI-IVC
- Actor: Operating surgeon or cytotoxicity trained medical or nursing staff.
- Context: within theatre or recovery or ward
- Target: post TURBT patients who have been prescribed SI-IVC

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- Time: up to 24 hours following TURBT surgery

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Domain and explanation	Theoretical constructs within this domain (from Cane et al. (2012))	Decision rule	Sample quotes
<p>Nature of behaviour (<i>descriptive information only</i>)</p>		<p><u>Code to this domain:</u> Any description of the process of the prescribing and/or instilling</p> <p><u>Do not code to this domain:</u> Differentiate from ‘behavioural regulation’, routines or tools to manage the process should be coded as ‘Behavioural Regulation’</p>	<p>“he’s just finished the procedure, he’s put in a catheter, so he’s handed the mitomycin, the system that you’ve made it up for and he just connects it up.”</p>
<p>Knowledge (<i>an awareness of the existence of something</i>)</p>	<ul style="list-style-type: none"> – Knowledge (including knowledge of condition or scientific rationale): <i>an awareness of the existence of something</i> – Procedural knowledge: <i>knowing how to do something</i> – Knowledge of task environment: <i>knowledge of the social and material context</i> 	<p><u>Code to this domain:</u> Awareness of prescribing and/or instilling, the use of prescribing and/or instilling</p> <p>Awareness/ knowledge of how to prescribe/ administer prescribing and/or instilling</p> <p>Mentioning knowledge from experience</p>	<p>“is the patient well? is the urine okay? if the urine was very bloody, I would always seek medical staff advice. I’d be aware of cytotoxic mediations, there would be awareness around members of staff that are pregnant, maybe have to inform people that have young kids visiting. always make sure you’ve got the solution in case there is extravasation to hand, and then just be very careful in how you are handling it.”</p>
<p>Knowledge of guidelines (<i>specific awareness of the existence of clinical guidelines</i>)</p>	<ul style="list-style-type: none"> – Knowledge of guidelines – Knowledge of local pathways and protocols 	<p><u>Code to this domain:</u> Awareness of guidelines in general Any specific details of guidelines</p>	<p>“we are all aware that it needs to be given within six hours ideally, of having the surgery.”</p>
<p>Skills (<i>an ability or proficiency acquired through practice</i>)</p>	<ul style="list-style-type: none"> – Skills: <i>an ability or proficiency acquired through training and/or practice.</i> – Skills development: <i>the gradual acquisition or advancement through progressive stages of an ability or</i> 	<p><u>Code to this domain:</u> Comments of skills or the development of skills</p> <p>Comments of the simplicity</p>	<p>“there would be clear guidelines on how you need to watch three, get supervised for three, then you finally get signed off”</p> <p>“that’s just gained from experience of working</p>

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	<p><i>proficiency acquired through training and practice.</i></p> <ul style="list-style-type: none"> – Competence: <i>one’s repertoire of skills, and ability especially as it is applied to a task or set of tasks.</i> – Ability: <i>competence or capacity to perform a physical or mental act. Ability may be either unlearned or acquired by education and practice.</i> – Interpersonal skills: <i>an aptitude enabling a person to carry on effective relationships with others, such as an ability to cooperate, to assume appropriate social responsibilities or to exhibit adequate flexibility.</i> – Practice: <i>repetition of an act, behaviour, or series of activities, often to improve performance or acquire a skill.</i> – Skills assessment: <i>a judgement of the quality, worth, importance. Level or value of an ability or proficiency acquired through training and practice.</i> 	<p>(difficulty) of the skills or tasks related to outcome</p> <p>Comments of skill that have developed through <u>experience</u></p> <p>Comments about training around prescribing and/or instilling</p> <p><u>Do not code to this domain;</u> Differentiate with ‘Beliefs about capabilities’; comments about participants competence should be coded as ‘Beliefs about capabilities’</p>	<p>in urology.”</p>
<p><u>Social/professional Role and Identity</u> <i>(a coherent set of behaviours and displayed personal qualities of an Individual in a social or work setting)</i></p>	<ul style="list-style-type: none"> – Professional identity: <i>the characteristics by which an individual is recognised relating to, connected with or befitting a particular profession.</i> – Professional role: <i>the behaviour considered appropriate for a particular kind of work or social position.</i> – Social identity: <i>the set of behavioural or personal characteristics by which an individual is recognizable [and portrays] as a member of a social group.</i> 	<p><u>Code to this domain:</u></p> <p>Anything to do with duties or role</p> <p>Discussion of the appropriateness of tasks within role</p> <p>Anything that refers to parameters of their jobs/ what they are responsible for</p> <p><u>Do not code to this domain:</u></p>	<p>“ so my role is, I manage the ward, so ... with regards to mitomycin c ... I guess I am in charge of every member of staff on the ward, and if staff didn’t know what they were doing, it would be my job to show them, or get assistance, provide education, things like that.”</p> <p>“it’s just ... you check to see if it has been prescribed, the theatre nurses normally tell you, so that is it really, just part of your job.”</p>

Appendix 3. SI-IVC Project coding manual – Version 1

	<ul style="list-style-type: none"> – Identity: <i>an individual’s sense of self defined by a) a set of physical and psychological characteristics that is not wholly shared with any other person and b) a range of social and interpersonal affiliations (e.g. Ethnicity) and social roles.</i> – Professional boundaries: <i>the bounds or limits relating to or connected with a particular profession or calling.</i> – Professional confidence: <i>an individual’s belief in his or her repertoire of skills and ability especially as it is applied to a task or set of tasks.</i> – Group identity: <i>the set of behavioural or personal characteristics by which an individual is recognizable [and portrays] as a member of a group.</i> – Leadership: <i>the processes involved in leading others, including organising, directing, coordinating and motivating their efforts toward achievement of certain group or organization goals.</i> – Organizational commitment: <i>an employee’s dedication to an organisation and wish to remain part of it. Organisational commitment is often described as having both an emotional or moral element and a more prudent element.</i> 	<p>Differentiate from ‘Behavioural Regulation’ comments about checking or routines should be coded as ‘Behavioural Regulation’</p> <p>Differentiate with ‘Skills’; any comments of a particular skill not in the context of a role should be coded as ‘Skills’</p> <p>Differentiate with ‘Social Influences’; comments about seeking reassurance and social support, it should be coded as ‘Social Influences’</p>	<p>“if it was a new diagnosis, where it was an unexpected find, I would want somebody senior from the medical team to come and speak to them first before they start injecting a chemo kind of drug into them. I don’t think that is fair. there needs to be some communication with the patient first”</p>
<p>Beliefs about capabilities (acceptance of the truth, reality, or validity about an</p>	<ul style="list-style-type: none"> – Perceived competence: <i>an individual’s belief in her or her ability to learn and execute skills</i> 	<p><u>Code to this domain:</u> Any assessment of their competence (can or cannot do task)</p>	<p>“I’ve got more confidence in my ability to know when it can be instilled, and when it needs to wait a wee while, and that’s just</p>

Appendix 3. SI-IVC Project coding manual – Version 1

<p><i>ability, talent, or Facility that a person can put to constructive use)</i></p>	<ul style="list-style-type: none"> – Self-efficacy: <i>an individual’s capacity to act effectively to bring about desired results, as perceived by the individual.</i> – Perceived behavioural control: <i>an individual’s perception of the ease or difficulty of performing the behaviour of interest.</i> – Beliefs: <i>the thing believed; the proposition or set of propositions held true.</i> – Self-esteem: <i>the degree to which the qualities and characteristics contained in one’s self concept are perceived to be positive.</i> – Empowerment: <i>the promotion of the skills, knowledge and confidence necessary to take great control of one’s life as in certain educational or social schemes; the delegation of increase decision-making powers to individuals or groups in a society or organization.</i> – Professional confidence: <i>an individual’s beliefs in his or her repertoire of skills, and ability, especially as it is applied to a task or set of tasks.</i> 	<p>Comments of confidence in prescribing and/or instilling</p> <p><u>Do not code to this domain;</u> Differentiate with ‘Skills’; comments of skills, the development of, or simplicity (or difficulty) of prescribing and/or instilling, should be coded as ‘Skills’</p>	<p>gained from experience of working in urology.”</p>
<p>Optimism <i>(the confidence that things will happen for the best or that desired Goals will be attained)</i></p>	<ul style="list-style-type: none"> – Optimism: <i>the attitude that outcomes will be positive and that people’s wishes or aims will be ultimately fulfilled.</i> – Pessimism: <i>the attitude that things will go wrong and that people’s wishes or aims are unlikely to be fulfilled.</i> – Unrealistic optimism: <i>the inert tendency for humans to over-rate their own</i> 	<p><u>Code to this domain:</u> Optimism of own and others practice</p> <p>Optimism (negative) aka pessimism</p>	<p>Researcher -“Of course. Do you think, or do you believe a hundred percent of eligible patients could receive Mitomycin C?” Participant - “Yes, yes, they could.”</p>

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	<i>abilities and chances of positive outcomes compared to those of other people</i>		
<u>Beliefs about consequences</u> <i>(acceptance of the truth, reality, or validity about outcomes of a Behaviour in a given situation)</i>	<ul style="list-style-type: none"> – Beliefs: <i>the thing believed; the proposition or set of propositions held true.</i> – Outcome expectancies: <i>cognitive, emotional, behavioural, and affective outcomes that are assumed to be associated with future or intended behaviour. These assumed outcomes can either promote or inhibit future behaviours.</i> – Characteristics of outcome expectancies: <i>characteristics of the cognitive, emotional and behavioural outcomes that individuals believe are associated with future or intended behaviours and that are believed to either promote or inhibit these behaviours. These include whether they are sanctions/rewards, proximal/distal, valued/not valued, probable/improbable. Salient/not salient, perceived risks or threats.</i> – Anticipated regret: <i>a sense of the potential negative consequences of a decision that influences the choice made: for example, an individual may decide not to make an investment because of the feelings associated with an imagined loss.</i> – Consequents: <i>an outcome behaviour in</i> 	<p><u>Code into this domain:</u> Comments of the expected outcome (e.g. Reduced risk of recurrence)</p> <p>Consequences of prescribing and/or instilling for patients, themselves, or the department</p> <p><u>Do not code to this domain:</u> Differentiate with ‘Knowledge’; any description of the what prescribing and/or instilling does, should be coded as ‘Knowledge’</p> <p>Differentiate with ‘Goals’; any comment on importance/ ensuring prescribing and/or instilling happens should be coded as ‘Goals’</p> <p>Differentiate between ‘Reinforcement’; past experiences affecting behaviour should be coded as ‘Reinforcement’</p>	<p>“it is definitely added workload, and it’s actually a nuisance, if I can say, because you have to wait for the urine to clear”</p>

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<p>Reinforcement (increasing the probability of a Response by arranging a dependent relationship, or contingency, Between the response and a given stimulus)</p>	<p><i>a given situation.</i></p> <ul style="list-style-type: none"> – Incentives: <i>an external stimulus, such as condition or object, that enhances or serves as a motive for behaviour.</i> – Punishment: <i>the process in which the relationship between as response and some stimulus or circumstance results in the response becoming less probable; a painful, unwanted or undesired event or circumstance imposed as a penalty on a wrongdoer.</i> – Consequents: <i>an outcome of behaviour in a given situation.</i> – Reinforcement: <i>a process in which the frequency of a response is increased by a dependent relationship or contingency with a stimulus.</i> – Contingencies: <i>a conditional probabilistic relation between two events. Contingencies may be arranged via dependencies or they may emerge by accident.</i> – Sanctions: <i>a punishment or other coercive measure, usually administered by a recognized authority that is used to penalise and deter inappropriate or unauthorized actions.</i> 	<p><u>Code to this domain:</u> Comments of punishments/ outcomes to themselves, the department, the patient which affects them prescribing and/or instilling</p> <p>Learning from or being affected by <i>their own</i> past experience of the prescribing and/or instilling</p> <p><u>Do not code to this domain:</u> Differentiate ‘Environmental context and resources’; comments of changes to environment over time should be coded as ‘Environmental context and resources’</p>	<p>“as a nurse, we are accountable for our own actions, so if we are not happy to do something, we need to say that we are not happy, because obviously we are putting our registration at risk by instilling something we are not quite sure what it is. so, very much, the onus is on the staff nurse.”</p> <p>“I would make sure I would always seek advice from somebody, so I wouldn’t let something negative put me off doing it again.”</p>
<p>Intentions (a conscious decision to perform a behaviour or a resolve to act in A certain way)</p>	<ul style="list-style-type: none"> – Stability of intentions: <i>ability of one’s resolve to remain in spite of disturbing influences.</i> – Stages of change model: <i>a model that proposes that behaviour change is accomplished through five specific</i> 	<p><u>Code to this domain:</u> Comments on being inclined or not to prescribing and/or instilling</p> <p>Any description of future practice or comments of what the participant</p>	<p>“that’s all we want to do. we’ve got the patients’ best interests at heart, and we just want to make them better, and improve their quality of life.”</p>

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	<p><i>stages.</i></p> <ul style="list-style-type: none"> – Trans-theoretical model and stages of change: <i>a five-stage theory to explain changes in people’s health behaviour. It suggests that change takes time, that different interventions are effective at different stages, and that there are multiple outcomes occurring across the stages.</i> 	wants to do or has a preference to do	
<p>Goals <i>(mental representations of outcomes or end states that an Individual wants to achieve)</i></p>	<ul style="list-style-type: none"> – Goal priority: <i>order of importance or urgency of end state toward which one is striving.</i> – Goal/target setting: <i>a process that establishes specific time-based behavioural targets that are measurable, achievable and realistic.</i> – Goals (autonomous or controlled): <i>the end state toward which one is striving: the purpose of an activity or endeavour. It can be identified by observing that a person ceases or changes their behaviour upon attaining this state; proficiency in a task to be achieved within a set period of time.</i> – Action planning: <i>the action or process of forming a plan regarding a thing to be done or a deed.</i> – Implementation intention: <i>the plan that one creates in advance of when, where and how one will enact a behaviour.</i> 	<p><u>Code to this domain:</u> Any comment on importance or ensuring prescribing and/or instilling is given</p> <p>Anything that shows behaviour is a goal</p> <p>Comments on prescribing and/or instilling being a priority or not a priority</p>	<p>“If I get phoned and asked to do it, I will do it as soon as I possibly can”</p> <p>Researcher - “...is there any tasks within your role that would conflict with you instilling mitomycin c? Participant - “no.”</p>
<p>Memory, Attention and Decision processes <i>(the ability to retain</i></p>	<ul style="list-style-type: none"> – Memory: <i>the ability to retain information or a representation of a past experience, based on the mental</i> 	<p><u>Code to this domain:</u> Descriptions of when prescribing and/or instilling would take place</p>	<p>“I think it’s because -- I wouldn’t say it is unusual, but it isn’t like a common thing, so because it’s not so frequent, you do always</p>

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<p><i>information, focus selectively on aspects Of the environment and choose between two or more alternatives)</i></p>	<p><i>processes of learning or encoding retention across some interval of time, and retrieval or reactivation of the memory; specific information of a specific task.</i></p> <ul style="list-style-type: none"> – Attention: <i>a state of awareness in which the senses are focussed selectively on aspects of the environment and the central nervous system is in a state of readiness to respond to stimuli.</i> – Attention control: <i>the extent to which a person can concentrate on relevant cues and ignore all irrelevant cues in a given situation.</i> – Decision making: <i>the cognitive process of choosing between two or more alternatives, ranging from the relatively clear-cut to the complex.</i> – Cognitive overload/tiredness: <i>the situation in which the demands placed on a person by mental work are greater than a person’s mental abilities.</i> 	<p>Description of decision process</p> <p>Any description of tools/ things that prompt memory or decision processes.</p> <p>When/ why it would be easy to forget/ remember</p> <p>Comments of prescribing and/or instilling being habit, routine, default.</p> <p><u>Do not code to this domain:</u> Differentiate from ‘Behavioural Regulation’; routine or sequence of actions should be coded as ‘Behavioural Regulation’</p>	<p>remember that you’ve got to give it.”</p>
<p><u>Environmental context and resources</u> <i>(any circumstance of a person's situation or environment that Discourages or encourages the development of skills and Abilities, independence, social competence, and adaptive behaviour)</i></p>	<ul style="list-style-type: none"> – Environmental stressors: <i>external factors in the environment that cause stress.</i> – Resources or material resources: <i>commodities and human resources used in enacting a behaviour.</i> – Organizational culture or climate: <i>a distinctive pattern of thought and behaviour shared by members of the same organization and reflected in their</i> 	<p><u>Code to this domain:</u></p> <p>Comments in relation to environment/ systems of working</p> <p>Changes over time in relation to environment/ systems of working</p> <p>Continuity of stock</p> <p>Availability to resources</p>	<p>“we are a very busy surgical ward. the whole process for a nurse to give mitomycin, so it’s in for an hour, you’ve got the prep up time, which is about 10-15 minutes, so it takes a lot of nursing time.”</p> <p>“there is a high level of activity in the ward, you’ve got staff lunches, patient lunches, visitors start coming in. That would be the same for tea time.”</p>

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	<p><i>language, values, attitudes, beliefs and customs.</i></p> <ul style="list-style-type: none"> – Salient events or critical incidents: <i>occurrences that one judges to be distinctive, prominent or otherwise significant.</i> – Person x environment interaction: <i>interplay between the individual and their surroundings.</i> – Barriers and facilitators: <i>in psychological contexts, barriers or facilitators are mental, emotional or behavioural limitations or strengths in individuals or groups.</i> 	<p>Documentation (and explanation of document context)</p> <p>Comments of capacity and busyness of the department</p> <p>Description of limitations or difficulties regarding resources</p> <p><u>Don't code to this domain:</u> Differentiate with 'Nature of behaviour'; descriptions of resources should be coded as 'nature of behaviour'</p> <p>Differentiate with 'Belief about consequences'; mention of "added workload", or other consequences of instilling, should be coded 'Belief about consequences'. "Workload" comments relating the department or working environment should remain as 'Environmental context and resources'</p> <p>Differentiate between 'Behavioural Regulation', documentation described as a barrier/ facilitator should be coded as 'Environmental context and resources', whereas comments about documents being use as a strategy to ensure behaviour</p>	
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		is completed, should be coded as 'Behavioural Regulation'	
<p>Social Influences <i>(those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours)</i></p>	<ul style="list-style-type: none"> – Social pressure: the exertion of influence on a person or group by another person or group – Social norms: <i>socially determined consensual standards that indicate a) what behaviours are considered typical in a given context and b) what behaviours are considered proper in the context.</i> – Group conformity: <i>the act of consciously maintaining a certain degree of similarity to those in your general social circles.</i> – Social comparisons: <i>the process by which people evaluate their attitudes, abilities or performance relative to others.</i> – Group norms: <i>any behaviour, belief, attitude or emotional reaction held to be correct or acceptable by a given group in society.</i> – Social support: <i>the apperception or provision of assistance or comfort to others, typically in order to help them cope with a variety of biological, psychological and social stressors. Support may arise from any interpersonal relationship in an individual's social network, involving friends, neighbours, religious institutions, colleagues, caregivers of</i> 	<p><u>Code to this domain:</u> Any comments regarding someone else influencing prescribing and/or instilling Influences from patients, colleagues, or others</p> <p><u>Do not code to this domain:</u> Differentiate with 'Knowledge'; patient factors that are not socially influencing for example, "patient has an allergy", should be coded as 'Knowledge'</p>	<p>" sometimes if it is a rosy colour of urine, that's when we call it a rosé wine, but it's a rosy colour, I might sometimes want senior advice to see if it is okay to give it"</p>

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	<p><i>support groups.</i></p> <ul style="list-style-type: none"> – Power: <i>the capacity to influence others, even when they try to resist this influence.</i> – Intergroup conflict: <i>disagreement or confrontation between two or more groups and their members. This may involve physical violence, interpersonal discord, or psychological tension.</i> – Alienation: <i>estrangement from one's social group; a deep seated sense of dissatisfaction with one's personal experiences that can be a source of lack of trust in one's social or physical environment or in oneself; the experience of separation between thoughts and feelings.</i> – Group identity: <i>the set of behavioural or personal characteristics by which an individual is recognizable [and portrays] as a member of a group.</i> – Modelling: <i>in developmental psychology the process in which one or more individuals or other entities serve as examples (models) that a child will copy.</i> 		
<p>Emotion <i>(a complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant</i></p>	<ul style="list-style-type: none"> – Fear: <i>an intense emotion aroused by the detection of imminent threat, involving an immediate alarm reaction that mobilizes the organism by triggering a set of physiological changes.</i> – Anxiety: <i>a mood state characterized by apprehension and somatic symptoms of</i> 	<p><u>Code to this domain:</u></p> <p>Description of emotion when doing prescribing and/or instilling</p> <p>Description of emotion when not offering SI-IVC</p>	<p>“ no one likes to give mitomycin c.”</p> <p>“I guess, guilt, I suppose, that you have failed to give a drug which would benefit the patient, so you’ve just got that on your conscience. had I did this, would this have happened, or you’ve always got that, what if</p>

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<p><i>matter or event)</i></p>	<p><i>tension in which an individual anticipates impending danger, catastrophe or misfortune.</i></p> <ul style="list-style-type: none"> – <i>Affect: an experience or feeling of emotion, ranging from suffering to elation, from the simplest to the most complex sensations of feelings, and from the most normal to the most pathological emotional reactions.</i> – <i>Stress: a state of physiological or psychological response to internal or external stressors.</i> – <i>Depression: a mental state that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration.</i> – <i>Positive/negative affect: the internal feeling/state that occurs when a goal has/has not been attained. A source of threat has/has not been avoided, or the individual is/is not satisfied with the present state of affairs.</i> – <i>Burn-out: physical, emotional or mental exhaustion, especially in one’s job or career, accompanied by decreased motivation, lowered performance and negative attitudes towards oneself and others.</i> 	<p>Comments of liking or disliking prescribing and/or instilling</p>	<p>...?”</p>
<p><u>Behavioural Regulation</u> <i>(anything aimed at managing or changing objectively</i></p>	<ul style="list-style-type: none"> – <i>Self-monitoring: a method used in behavioural management in which individuals keep a record of their</i> 	<p><u>Code to this domain:</u> Anything to do with routine or justifying tasks that are being carried</p>	<p>“we do a safety brief prior to the list and they may say, if they know it’s like a bladder tumour, they may say, “I’ll need Mitomycin at</p>

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<p><i>observed or measured actions)</i></p>	<p><i>behaviour, especially in connection with efforts to changes or regulate the self; a personality trait reflecting an ability to modify one's behaviour in response to a situation.</i></p> <ul style="list-style-type: none"> – Breaking habit: <i>to discontinue a behaviour or sequence of behaviours that is automatically activated by relevant situational cues.</i> – Action planning: <i>the action or process of forming a plan regarding a thing to be done or a deed.</i> 	<p>out, and recognising deviating from prescribing and/or instilling</p> <p>Comments about tasks or sequences of tasks that related to prescribing and/or instilling</p> <p>Descriptions of tools or pathways are followed</p> <p>Comments of the use of strategies to aid prescribing and/or instilling</p> <p><u>Do not code to this domain:</u> Differentiate with 'knowledge'; any descriptions of how things work, or general explanation of tasks should be coded as 'knowledge'.</p>	<p>the end”, so when we’re writing in our safety brief, we’re writing this down against each patient, so you’re not going to forget because you know for Mr Smith you’ve got to go and make up a Mitomycin to be given at the end.”</p>
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References

- Cane, J., O'Connor, D., & Michie, S. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science*, 7(1), 1-17. doi:doi:10.1186/1748-5908-7-37
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Appendix 4. Consent to surgery form

Private & Confidential

Patient Consent Form for Clinical Procedures & Healthcare Interventions

Version 1.0

Surname ▶			◀ CHI / Unit No
First Names ▶			
Address ▶			◀ Gender
			◀ Date of Birth
			◀ Post Code
Bar Code ▶	PATIENT LABEL SHOULD BE USED IF AT ALL POSSIBLE AND PLACED CAREFULLY WITHIN BRACKETS		

Hospital/Location	
Responsible Clinician	
Ward / Dept	Age

- This form is to be used in association with the NHS Grampian: 'Policy for Obtaining Consent for Clinical Procedures and Healthcare Interventions'
- Please review sections 1-6 and complete all that are applicable.

PLEASE FILE IN SECTION B

1

1a. Proposed procedure or treatment

(include brief explanation if medical term is not clear to patient/guardian/relative)

1b. Possible additional procedures which may be required

(include brief explanation if medical term is not clear to patient/guardian/relative)

2

Statement of health professional

I have explained the purpose of the procedure/treatment to the patient/child and parent/guardian/relative (delete as appropriate). In particular, I have explained:

2a. The intended benefits:

2b. The known side effects and significant risks:

2c. The patient has been supplied with the following information (e.g verbal instructions, leaflets etc.)

2d. That during the course of the proposed procedure(s)/treatment circumstance(s) may require an additional procedure(s) - see section 1b above.

2e. I have also discussed alternative procedure(s)/treatments (including no treatment) and any particular concerns the patient may have.

I confirm this patient/parent/guardian has the capacity to give consent: YES NO
(refer to Section 14 of policy)

Signed

Date

Name (PRINT)

Professional Reg. No

Designation

3

Statement of Interpreter / Signer / Communicator (if appropriate)

I have interpreted the information in sections 1, 2 and 5 to the patient/parent/guardian to the best of my ability and in a way in which I believe he/she can understand.

Signed (where possible)

Date

Name (PRINT)

Guardian/relative

NHS Approved Translator

Language Line

Other: _____

4

Statement of Patient / Parent / Guardian

Please read this form carefully. If you wish to have a copy please ask. If you have any further questions, do ask - we are here to help you. You have the right to change your mind at any time, including after you have signed this form. Further information regarding the process of consent can be found in the NHS Grampian Consent Policy, which is available on NHS Grampian's public internet site or upon request from your clinician.

4a. I understand and agree to the procedure(s) described on this form.

4b. I understand that, although you cannot give me a guarantee that a particular person will perform the procedure, the person will have appropriate training and/or supervision.

4c. I understand that if my procedure(s) / treatment involves an anaesthetic, I will have the opportunity to discuss the details of this.

4d. I understand that an additional procedure(s) may be required and this has been explained in Section 1b.

4e. I understand that if unforeseen circumstances occur I may require alternative / additional procedure(s) / treatment but these will only be carried out to save my life or to prevent serious harm to my health.

Patient's / Parent's / Guardian's signature

Date

Name (PRINT)

Relationship to patient

- Young people/children may also like to sign here if they have given consent for their parent/guardian to sign.
- A witness should sign below if the patient is unable to sign but has indicated his or her consent.
- Telephone consent can also be witnessed here.

Signed

Witness name (PRINT)

Date

5

5a. Statement of health professional

In the course of the procedure(s)/treatment planned, blood transfusion is or may be required: YES NO

Appropriate information regarding blood transfusion, such as that provided by the Scottish Blood Transfusion Service, has been given to the patient: YES NO

Possible alternatives to transfusion have been discussed: YES NO

Signed

Date

Name (PRINT)

Professional Reg. No

Designation

5b. Statement of Patient / Parent / Guardian

I understand and agree to blood transfusion as described: YES NO

Patient's / Parent's / Guardian's signature

Date

Name (PRINT)

6

Confirmation of consent

(to be completed when the patient is admitted for the procedure/treatment, if the patient has signed the form in advance)

On behalf of the clinical team treating the patient, I confirm he/she has no further questions and wishes the procedure/treatment to go ahead.

Signed

Date

Name (PRINT)

Professional Reg. No

Designation

Appendix. 5 TURBT Pro Forma (EXAMPLE)

TURBT Op Note

Name:
DOB:
Hospital Number:

Date:

Consultant:

Anaesthesia:

Anaesthetist: Dr.

Operation:

Surgeon:

Supervisor: (scrubbed/ un-scrubbed) **Supervisor completed op: Yes/ No**

Indication: First cystoscopy/ new tumour / recurrence / check

Findings (delete or circle accordingly):

Tumour number: 1 2 3 >3

Appearance: papillary/ solid/ mixed/
Red patch

Size of largest tumour (mm):
<5 5-10 10-30 >30

Site(s):
R UO L UO Trigone Bl. neck

posterior wall anterior wall

R lateral wall L lateral wall

Urethra Dome Diverticulum

Complete resection: yes / no / not sure / Biopsy and diathermy only

Extra-peritoneal perforation: yes / no / thin wall/ cystoscopy only

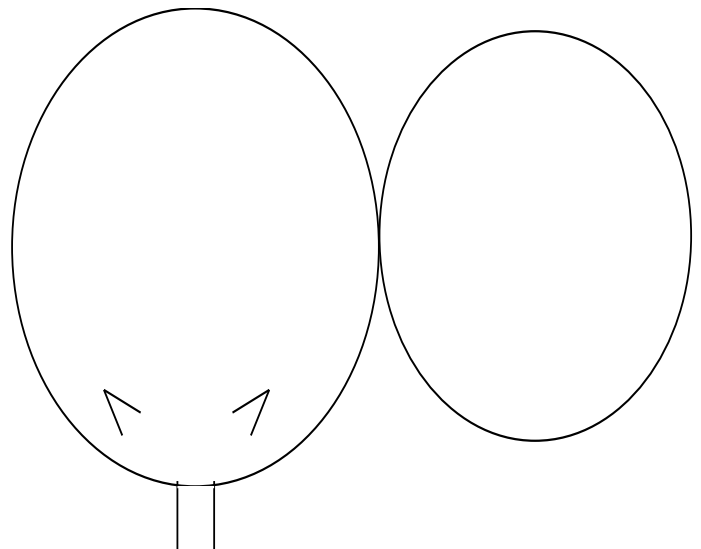
EUA: cTa cT1 cT2 cT3 cT4 (2) Bladder mobile: yes / no / not sure

PATIENT FIT FOR RADICAL SURGERY: YES / NO

- Postoperative Instructions:** (1) Irrigation: yes / no
(2) Intravesical 40mg Mitomycin C within 24 hours: yes / no
(3) TWOC after 24H: yes / no If **no** keep catheter for ___ days
(4) MDT referral : yes / no
(5) Needs imaging: yes / no If **yes**, please specify:
(6) Other:

- Follow up (Please tick):** (1) GA cystoscopy urgent/ in 6 weeks/ in 3 months
(2) GA cystoscopy + Biopsy/ diathermy (urgent)
(3) TURBT (urgent)/ TURBT
(4) Flexible cystoscopy in 3 months
(5) Pending histology and MDT decision

Signature + initials:



Appendix 6: Summary table of relevant domains, specific beliefs, reason for relevance and illustrative quotations				
Domains of the TDF	Specific beliefs	Frequency (utterances/ participants)	Criteria met	Illustrative quote
Prescribing Behaviour				
Behavioural Regulation	I supply a post-op plan of care specifying Mitomycin C to be instilled	23/10	Conflicting beliefs present, different forms/ process used across sites	<p><i>you would usually write [MMC] down as part of your operation notes. (Int 16, Site 6, Consultant)</i></p> <p>-----Conflicting process-----</p> <p><i>we prepare and sign for the request that mitomycin for the eligible patient, on their drug chart. (Int 25, Site 7, Registrar)</i></p>
	I write Mitomycin C onto consent form of potential patients before the TURBT to help myself plan ahead	13/6	Conflicting beliefs present, some write on the forms, some don't have to. Also, evidence of strong beliefs that may impact on prescribing	<p><i>We tend to include mitomycin C on the consent form, so we'll say, "TURBT plus or minus mitomycin C" (Int 29, Site 7, Registrar)</i></p>
	A plan to prescribe Mitomycin C is made usually before TURBT	27/14	Conflicting beliefs present: variation in forms and processes	<p><i>you have to plan to do it, you've got to plan to do it, you've got to make sure that the patients are consenting to do it. (Int 18, Site 2, Consultant)</i></p> <p>-----Conflicting belief-----</p> <p><i>so you just have to think ahead. But ideally, also, you wouldn't prescribe it before you know you want to give it, if that makes sense (Int 13, Site 1, Registrar)</i></p>
Environmental Context and Resources	Mitomycin C is stipulated on Mitomycin C documents	34/20	Frequently mentioned and Conflicting beliefs present	<p><i>there's a specific bladder cancer op note, that is like a proforma, it's tick boxes and a bladder diagram, and part of the post op treatment is mitomycin - yes or no? (Int 27, Site 4, Consultant)</i></p> <p><i>we tend to put it on the notes, although I have to say, many of the op notes I see just say, "Post-op mitomycin". (Int 7, Site 3, Consultant)</i></p> <p>-----conflicting belief-----</p> <p><i>Researcher - the op notes, they've got a bit written out that says 'Mitomycin C'? Participant – No. (Int 16, Site 6,</i></p>

SI-IVC Project – Supp. Results table V1

				<i>Consultant)</i>
	Paperwork used for Mitomycin C prescription are not easily available or intuitive	9/6	Conflicting beliefs present	<i>knowing where to prescribe it is a bit difficult. Because part of the reason it's not been given in my previous practice is because it's on the wrong bit of the drug chart or it's not on the theatre pathway paperwork or whatever. (Int 20, Site 6, Registrar)</i>
Memory, Attention and Decision Processes	Op notes, consent forms act as prompts to remind me to prescribe MMC	15/9	Conflicting beliefs present, different forms/ process used across sites	<p><i>Researcher - how do you remember to prescribe mitomycin C?</i></p> <p><i>Participant - So, what I do is I put on the consent form that they're to have instillation of mitomycin C (Int 19, Site 6, Registrar)</i></p> <p>-----Conflicting process-----</p> <p><i>there's all the request forms laid out in front of you in theatre, ready to be filled in as a visual prompt. (Int 27, Site 5, Registrar)</i></p>
Reinforcement	My past experience does not affect my prescribing practice today	15/11	Some conflicting beliefs present and potentially clinically significant	<i>So you do hear horror stories, but that's very, very extreme. You should never change practice on anecdotes. (Int 6, Site 4, Consultant)</i>
Social Influences	Nurses will remind me to prescribe	6/5	Evidence of strong beliefs that may impact on prescribing	<p><i>So, it does happen as routine and the nurses are so good with it, they'll say, "Are you giving mitomycin C?". (Int 18, Site 2, Consultant)</i></p> <p>-----other quote-----</p> <p><i>I tell the scrub nurse and the anaesthetist and also remind myself to say, you know, "Please, as part of the WHO checklist, can you make sure I prescribe it before the patient leaves theatre?". (Int 20, Site 6, Registrar)</i></p>
	The consultant preference of using Mitomycin C can influence Mitomycin C adherence	24/10	Evidence of strong beliefs that may impact on prescribing	<i>there's different consultants have different ideas. (Int 1, Site 1, Nurse)</i>
	The decision to prescribe Mitomycin C is usually lead by the supervising consultant	19/9	Evidence of strong beliefs that may impact on prescribing	<p><i>...after the operation when I check [with supervising consultant], "Are you happy for me to give mitomycin?", providing they say yes, I would give it. (Int 29, Site 7, Registrar)</i></p> <p>-----Other Quote-----</p>

SI-IVC Project – Supp. Results table V1

				<p><i>I think the decision-making is still consultant-led. (Int 13, Site 1, Registrar)</i></p> <p>----- Other Quote-----</p> <p><i>Researcher - And what are the views of your other colleagues around mitomycin C then?</i></p> <p><i>Participant - "Let [Consultant Name] decide". [other staff] have very little input (Int 24, Site 5, Consultant)</i></p>
Instilling Behaviour				
Behavioural Regulation	A safety brief ensures all staff are aware of Mitomycin C patients	11/6	Some conflicting processes differ due to where Mitomycin C is instilled	<p><i>They will be checked at the beginning of the theatre list, so when we go into theatre at the beginning of the day – before day theatre or in-patient theatre – we'll highlight to the staff the bladder tumour resections which we think are likely to require Mitomycin, at the beginning of the theatre brief at the beginning of the day. (Int 18, site 2, Consultant)</i></p> <p>-----Conflicting Process-----</p> <p><i>On the ward, they have a -- I don't know what you would call it - it's a sheet of the ward and all the patients and the details about the ward and on there, what's happening. So, you would put that on there that they require mitomycin C. Then, if there is a change of shift, obviously you pass that over to your colleagues on the next shift. (Int 8, Site 3, Nurse)</i></p>
	I refer to Op notes that provide post-op instructions about Mitomycin C	12/7	Frequently mentioned by instillers and evidence of strong beliefs that may impact on instilling behaviour	<i>I would always check that it had been prescribed by the medical staff. I would always check that it had been prescribed and that the patient was definitely to get it before I went near the patient, even. (Int 30, Site 5, Nurse)</i>
Environmental Context and Resources	Mitomycin C instillation is directly affected by the process of ordering and delivery of Mitomycin C to place of instilling	39/13	Frequently mentioned, conflicting process across sites	<i>There are barriers to the patient receiving the mitomycin in the most timely fashion, and I would say those are pharmacy barriers, such as getting the drug (Int 15, Site 3, Registrar)</i>
	Pharmacy do not allow the Mito-in device	8/3	Conflicting beliefs present, different processes across sites	<i>We've been doing it probably two or three years now, we've been doing it with the Mito-In system. It's revolutionised what we do. It took a long time to persuade our pharmacy colleagues</i>

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				<p><i>that this was okay. (Int 17, Site 2, Consultant)</i></p> <p>-----Conflicting Process-----</p> <p><i>Participant- Oh, in recovery, or in theatre, and nor have we been allowed to use the Mito-in device.</i></p> <p><i>Researcher - What device, what was that?</i></p> <p><i>Participant- The Mito-in device [...] Where you connect ... it's like a closed circuit so you can connect mitomycin up, and then draw the mitomycin up in a closed circuit and attach it directly to the catheter. We haven't been given permission for that either. (Int 7, Site 3, Consultant)</i></p> <p>-----highlighting the change to closed system-----</p> <p><i>we recently changed over to one that comes in a closed device, and it's Medac, it all comes readymade. It's in a bag, with a bottle and we attach [...] it, break the seals, put it through into the bag. [...] Because it's a closed system it's very rare that you would get any spillage, or anything, and it minimises risk, and it works a lot better. Whereas before, we had to draw up the sodium chloride with your syringe, and then put it into the bag, put it into the mitomycin, mix it and things like that, whereas this is a lot easier. (Int 21, Site 2, Nurse)</i></p>
	<p>Pharmacy do not allow us to store Mitomycin C</p>	<p>13/8</p>	<p>conflicting set ups across sites</p>	<p><i>This is the problem for the pharmacy, because they see it a cytotoxic drug it gets the same blooming chemotherapy protocols (Int 6, Site 4, C, not allowed to store MMC)</i></p> <p>-----Conflicting process-----</p> <p><i>That's one of the ways you'd make sure, so it has to be available... you have to take out of the pharmacy making it up because that causes difficulties and delays and wastage, so that has to be taken out of the equation. (Int 18, Site 2, C, allowed to store Mitomycin C in theatre)</i></p> <p>-----other quote-----</p>

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				<i>the pharmacy wouldn't have allowed us to do it unless there was a protocol. (Int 18, Site 2, Consultant)</i>
Our department has or has not got trained staff to instil Mitomycin C	57/27	Frequently mentioned and conflicting beliefs present	<p><i>Participant - yeah, there are, all the ward staff in ward 209, which is the normal ward, ward staff in also, 211 which is short stay unit and ward staff in ward 202 – which is our day case unit, all the staff are trained</i></p> <p><i>Researcher- all the nurses are trained</i></p> <p><i>Participant - perhaps not maybe the new – because we have a lot of bank staff, temporary locums, I wouldn't say all of them but the permanent staff are trained to do that (Int 4, Site 1, Consultant, site has trained staff)</i></p> <p>-----Conflicting beliefs-----</p> <p>--</p> <p><i>But not having nursing staff who can give it does make it harder. (Int 29, Site 7, Registrar)</i></p> <p>-----other quote-----</p> <p><i>Researcher - Are there sufficient numbers of people trained to instil mitomycin C?</i></p> <p><i>Participant - We could do with more. I'd say just about, yes, but we'd be better off with more. (Int 11, Site 3, Registrar)</i></p>	
Staff unavailability directly affects the instillation of Mitomycin C (mentioned as a general issue too)	31/11	Frequently mentioned	<p><i>There's four specialist nurses, one of them won't do any mitomycin C now because he's... me and him single handily run the prostate cancer service and all he does is prostate cancer, he does all the biopsies and the pre-op staging and MDTs and all that. And then the other three, one of them has a specialist interest, she's the bladder cancer specialist nurse, in fact she is actually learning to do flexible cystoscopy as we speak, we just don't have enough doctors to do it, so. And she does most of the BCG and mitomycin therapy, but not the immediate post-op dose because she's not available... (Int 6, Site 4, Consultant)</i></p>	

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				<p>-----other quote-----</p> <p>--</p> <p><i>The issue can be that you don't have anybody trained on a late shift or overnight (Int 8, Site 3, Nurse)</i></p>
	It is common that nurses do not want to be trained to instil Mitomycin C	11/9	Evidence of strong beliefs that may impact on the instilling behaviour	<p><i>we don't have a dedicated urology ward now, it's a mixture of general surgery, vascular and urology, so a lot of the nurses have never, ever seen it before. (Int 6, Site 4, Consultant)</i></p> <p>-----other Quote-----</p> <p><i>The recovery nurses didn't want to do it in recovery, so they had to return to the ward (Int 17, Site 2, Consultant)</i></p>
	We keep our own storage of Mitomycin C	46/24	Frequently mentioned, conflicting process across sites	<p><i>Researcher - You also said that was known as the drug room. Perfect. So, swiftly onto the storage of mitomycin C -- in the same place?</i></p> <p><i>Participant - Yes, so our drugs are ... obviously, our IV/intravenous(?) drugs are all kept in the same cupboard and they are all in alphabetical order, so, they are in with the rest of the other medications. (Int 2, Site 1, Nurse)</i></p> <p>----- conflicting process -----</p> <p><i>Participant – And kept as storage, because storage is in the pharmacy. We don't have any storage in the theatre. (Int 9, Site 4, Consultant)</i></p> <p>-----conflicting process-----</p> <p><i>Researcher -How about if the Mitomycin C isn't used immediately? Is it stored anywhere?</i></p> <p><i>Participant - It's returned back to pharmacy.</i></p> <p><i>Researcher – Is it kept anywhere on the ward or in the theatre?</i></p> <p><i>Participant – No. (Int 16, Site 6, Consultant)</i></p>

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	<p>Other department set up facilitate the Mitomycin C process</p>	<p>32/16</p>	<p>Frequently mentioned, and different processes across sites</p>	<p><i>Researcher - But the draining would only happen with your patients, it's not the done thing yet?</i></p> <p><i>Participant - Well there's a sort of ad hoc agreement, but there's not an official protocol out about it, which is why we have not got the supply of mitomycin down in theatre. (Int 6, Site 4, Consultant)</i></p> <p>-----conflicting process-----</p> <p><i>But, nowadays, all you really need to do is say, "We want to give it", prescribe it and sign it off and it happens (Int 17, Site 2, Consultant)</i></p>
	<p>The department chemotherapy guidelines do not allow Mitomycin C to be given in theatre</p>	<p>11/6</p>	<p>Conflicting beliefs present and evidence of strong beliefs that may impact on the instilling behaviour</p>	<p><i>Participant - Some of the doctors have been told off for giving it because even though they've been trained and have been signed off in other places, and have vast experience giving it, they haven't done a special course.</i></p> <p><i>Researcher - What -- are we talking junior doctors, or general?</i></p> <p><i>Participant - Mainly junior doctors. Even the consultants are not allowed to give it. (Int 7, Site 3, C, guidelines forbid theatre instillation)</i></p> <p>-----conflicting belief-----</p> <p><i>We had lots of meetings with pharmacy and clinical governance before we started doing this, and this has been felt to be the best way. (Int 21, Site 2, N, team changed guidelines to allow theatre instillations)</i></p>
<p>Goals</p>	<p>I have to consider task priorities when finding time to instil Mitomycin C</p>	<p>22/12</p>	<p>Frequently mentioned and some conflicting beliefs present</p>	<p><i>Researcher - Do you think there's anything within your environment that would affect you administering mitomycin C?</i></p> <p><i>Participant - No, no.</i></p> <p><i>Researcher - Workload or time pressure?</i></p>

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				<p><i>Participant - Workload, we can get very busy, but we have to prioritise our workload, and mitomycin C would be one of the top priorities. (Int 24, Site 2, Nurse)</i></p> <p>-----other Quote-----</p> <p><i>once I have five minutes I will go and administer it (Int 26, Site 7, Registrar)</i></p>
Belief about Capabilities	The more I instil Mitomycin C the more confident I feel	15/8	Frequently mentioned and conflicting beliefs present - but borne from confidence and experience	<p><i>I think through giving education, you get more confidence and therefore you'd have less apprehension to give the drug (Int 2, Site 1, Nurse)</i></p> <p>-----other Quote-----</p> <p><i>The more experienced you become the more confident you become and therefore the more confidence you can instil in the patient as well. (Int 5, Site 4, Nurse)</i></p>
Belief about Consequences	Instilling Mitomycin C is added workload for the Instiller	9/4	Evidence of strong beliefs that may impact on the instilling behaviour	<p><i>Researcher - it's just a case of it's an added workload?</i></p> <p><i>Participant - It's a completely added workload for nursing staff. (Int 2, Site 1, Nurse)</i></p>
Skills	Mitomycin C instillation training is provided in-house	96/27	Many conflicting beliefs present, different ways of training across sites	<p><i>Participant - All trained nurses, yes. All staff nurses that have been trained to give Mitomycin have had training just at local level. (Int 1, Site 1, Nurse)</i></p> <p>-----conflicting process-----</p> <p>--</p> <p><i>So, I received training from the Mito-in device rep when my hospital at the time, which was [Location], I think, [Location], were introducing it, so I feel fairly happy with that. (Int 7, Site 3, Consultant)</i></p> <p>-----conflicting belief-----</p> <p>-- <i>Everybody at this trust has to do a chemotherapy course at [Location] University. (Int 8, Site 3, Nurse)</i></p> <p>-----conflicting belief-----</p> <p><i>Researcher - Talk me through the training then, is it just a case</i></p>

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				<p><i>of seeing it done?</i></p> <p><i>Participant - Yeah, usually it's being instructed by a consultant who has used it before, or another senior trainee. (Int 13, Site 1, Registrar)</i></p>
Social/ Professional Role and Identity	Cytotoxically trained nurses (mostly) are currently responsible to instil	51/18	Conflicting belief of "roles" (who can and cannot instil)	<p><i>Researcher - Do you think you're adequately trained to give mitomycin C?</i></p> <p><i>Participant - Yes, we are better trained than the doctors. (Int 8, Site 3, Nurse)</i></p> <p>-----conflicting belief-----</p> <p><i>I've never been in a centre where the doctors give it, it's always been the nurses. I've never actually administered it. (Int 11, Site 3, Registrar)</i></p> <p>-----conflicting belief-----</p> <p><i>We don't have this sort of privilege given to the nurses (Int 26, Site 7, Registrar)</i></p>
Social Influences	A verbal 'handover' is used to pass on vital information to nurse taking over care	21/15	Frequently mentioned	<p><i>Researcher - someone would read the prescription that you have written that they need mitomycin C - who would read that?</i></p> <p><i>Participant - So, we'd normally instruct it on the post-op notes, and instruct the recovery staff to handover (Int 7, Site 3, Consultant)</i></p>
Overarching Behaviours				
Behavioural Regulation	Mitomycin C should be instilled in Theatre or Ward or no preference	24/14	Conflicting beliefs present	<p><i>I think we are all pretty keen to do it in theatre (Int 7, Site 3, Consultant)</i></p> <p>-----conflicting role-----</p> <p><i>We don't have this sort of privilege given to the nurses (Int 26, site 7, Registrar)</i></p>
Belief about	Mitomycin C needs to be	14/8	Evidence of strong beliefs that	<i>Because, obviously, the closer to theatre time it gets done, the</i>

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Consequences	given as soon as possible to benefit the patient		may impact on the behaviour	<p><i>more effective it is. (Int 5, Site 4, Nurse)</i></p> <p>-----other quote-----</p> <p><i>There is a window and the general feeling is that the earlier you can give it the better. (Int 13, Site 1, Registrar)</i></p>
	Patients receiving Mitomycin C is cost effective	21/10	Frequently mentioned and some conflicting beliefs present	<p><i>It's expensive (Int 1, Site 1, Nurse)</i></p> <p>-----conflicting belief-----</p> <p><i>less TURBTs, and that will have cost, like saving the costs... (Int 28, Site 5, Registrar)</i></p>
	The department could fail targets or QPIs	23/7	Evidence of strong beliefs that may impact on the behaviour	<p><i>Researcher - what are the consequences of not prescribing mitomycin C?</i></p> <p><i>Participant - We fail the QPIs, yeah (Int 6, Site 4, Consultant)</i></p> <p>-----other quote-----</p> <p><i>So QPI 3 says we need to give mitomycin C within 24 hours in at least 80% of patients... sorry, we've now moved it to 60%, but it's a high proportion of patients need to get that mitomycin C. (Int 25, Site 5, Consultant)</i></p>
	The use of Mitomycin C reduces workload for the Urology department	37/23	Frequently mentioned and some conflicting beliefs present	<p><i>Researcher - I am trying to think, how about benefits to the department, to the urology ward, of you giving mitomycin C.</i></p> <p><i>Participant - There is no benefit. (int 2, Site 1, Nurse)</i></p> <p>-----conflicting belief-----</p> <p><i>Researcher - How about benefits for the department or the overall hospital, are there any?</i></p> <p><i>Participant - I suppose if you successfully deliver mitomycin to every patient that it's appropriate for, in theory, you should be doing less GA TURBTs or reducts and more flexis, which are much less labour-intensive and much less harmful to the patient. So, I suppose there will be benefits. But separating those out into a tangible benefit I think is probably quite difficult. (Int 20, Site 6, Registrar)</i></p>

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Goals	Providing Mitomycin C is an important part of a patients treatment	45/25	Frequently mentioned and some conflicting beliefs present	<p><i>Researcher - How important is it to you that patients receive mitomycin C?</i></p> <p><i>Participant - I think it's very important. Yes, because it reduces the risk of recurrence by about 40%. (Int 3, Site 1, Consultant)</i></p> <p>-----conflicting belief-----</p> <p><i>Researcher - So, how important to you that patients receive a single instillation of mitomycin C, if they are eligible?</i></p> <p><i>Participant - Not a lot. No. (Int 9, Site 4, Consultant)</i></p>
	Providing Mitomycin C to eligible patients is a priority to me	15/12	Somewhat frequently mentioned, evidence of strong beliefs	<p><i>It would be a priority. When you're working on a shift, it would be one of those things that is a priority. (Int 8, Site 3, Nurse)</i></p>
Knowledge of Guidelines	Guidelines say Mitomycin C should be administered within 6 or 24h post surgery	40/22	Frequently mentioned, conflicting beliefs	<p><i>We are all aware that it needs to be given within six hours ideally, of having the surgery. (Int 2, Site 1, Nurse)</i></p> <p>----- conflicting belief-----</p> <p><i>Because you know that it's given, it's given appropriately, and the best efficacy for mitomycin is as soon as the procedure is done. It loses its efficacy after ... well, specifically... well I've read after 12-24 hours, it's not as useful. I've given it up to 24 hours after, but really the evidence is showing the sooner the better. (int 15, Site 3, Registrar)</i></p> <p>----- conflicting belief-----</p> <p><i>... because the current guidelines is it has to be given within 24 hours. (Int 25, Site 5, Consultant)</i></p>
	We also have local protocols OR pathways to refer to	48/25	Frequently mentioned and some conflicting beliefs present	<p><i>Right, I've found it and actually it's a protocol just for BCG, it's not for mitomycin C. [...] So, we don't have a local protocol for mitomycin. (Int 5, Site 4, Nurse)</i></p> <p>-----conflicting belief-----</p> <p><i>Researcher - Have you got any local protocols, or pathways, to follow?</i></p>

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				<p><i>Participant – Yeah.</i></p> <p><i>Researcher - Alright, and what do they say?</i></p> <p><i>Participant – They are the same, within the six hours, and the protocols were all drawn up that it would be trained nursing staff that would be administering it. (Int 24, Site 2, Nurse)</i></p>
Optimism	Providing Mitomycin C to all eligible patient sounds good in theory, however not realistic	25/16	Frequently mentioned and conflicting beliefs present	<p><i>Researcher - 100% of eligible patients could receive mitomycin C?</i></p> <p><i>Participant - No, no. So there are reasons you see because there are contraindications, there can be contraindications. So the patient may be eligible -- so when you say eligible, meaning there is no contraindication, correct?</i></p> <p><i>Researcher - Yes, I would say so.</i></p> <p><i>Participant - Yeah, so not 100%, no. I think when we've looked it, so the best we can do in this centre is 75%. (Int 25, Site 5, Consultant)</i></p>
Social Influences	Communication within the team is required in ensuring the Mitomycin C process happens	18/9	Conflicting beliefs (Reports of effective or poor communication)	<p><i>Participant – Sometimes the urology nurse, they are helpful with us as well. If something is missed by anyone at some point or if the circumstances change, they always inform us.</i></p> <p><i>Researcher - Right, okay. So, they keep you up to date. That's good.</i></p> <p><i>Participant – It's all in the teamwork (Int 10, Site 1, Registrar)</i></p> <p><i>-----conflicting belief-----</i></p> <p><i>Researcher - No-one is particularly positive or negative about it? We were talking about your colleagues and their views around mitomycin C.</i></p> <p><i>Participant - It's difficult for me to speak for my colleagues... If someone called me and said, "There's no-one trained, can you</i></p>

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				<i>come and do it?" I would, or I would arrange for someone trained to do it. But that doesn't seem to happen. If it doesn't happen, it just gets ignored rather than raised as an issue, which I don't think is correct. (Int 20, Site 6, Registrar)</i>
	Mitomycin C is an established practice, regarded positively in my hospital	55/23	Evidence of strong beliefs that may impact on the behaviour, one conflicting belief	<p><i>Participant - I think on the whole, positive, people seem to be embracing it.</i></p> <p><i>Researcher - Right, so everyone is quite accepting of it?</i></p> <p><i>Participant - I'd say, the majority, yeah. (Int 7, Site 3, Consultant)</i></p> <p>-----conflicting belief-----</p> <p><i>Participant - But the problem is I've got a couple of colleagues who don't do it, and I've got one colleague who refuses to use mitomycin altogether. [...] Yeah, he said, "Mitomycin causes horrible side effects for a 13% reduction in recurrence, it's not worth it". (Int 6, Site 4, Consultant)</i></p>
	The consultant preference of using Mitomycin C can influence Mitomycin C adherence	24/10	Evidence of strong beliefs that may impact on the behaviour	<p><i>there's different consultants have different ideas. (Int 1, Site 1, Nurse)</i></p> <p>-----conflicting belief-----</p> <p><i>And I have those skills and I've... whoever is with me in theatre if they are prescribing then they know as well, I tell them. (Int 31, Site 7, Consultant)</i></p>
Social/Professional Role and Identity	It is the consultant's responsibility to improve the Mitomycin C process	5/5	Evidence of strong beliefs that may impact on the behaviour	<p><i>Researcher - Okay. So what would need to happen for [improvement of Mitomycin C service] to be achieved?</i></p> <p><i>Participant – For this to be achieved, it needs to be looked at in terms of cost. There should be a business proposal for it and it should be led by [Consultant Name], he's the bladder cancer lead here. (Int 28, Site 5, Registrar)</i></p>

Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

No	Item	Guide questions/description	Page number within manuscript and quotation (if applicable)
Domain 1: Research team and reflexivity			
Personal Characteristics			
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group?	"Interviews were conducted by an experienced qualitative research fellow with a Masters in Heath Psychology (JD, female)" page 3
2.	Credentials	What were the researcher's credentials? <i>E.g. PhD, MD</i>	Interviews were conducted by an experienced qualitative research fellow with a Masters in Heath Psychology (JD, female) page 3
3.	Occupation	What was their occupation at the time of the study?	Interviews were conducted by an experienced qualitative research fellow with a Masters in Heath Psychology (JD, female) page 3
4.	Gender	Was the researcher male or female?	Interviews were conducted by an experienced qualitative research fellow with a Masters in Heath Psychology (JD, female) page 3
5.	Experience and training	What experience or training did the researcher have?	Interviews were conducted by an experienced qualitative research fellow with a Masters in Heath Psychology (JD, female) page 3
Relationship with participants			
6.	Relationship established	Was a relationship established prior to study commencement?	The gatekeepers, who were also participants, were within the network of the research team, which was useful for recruitment, but other participants were not known, and the researcher conducting the interviews was not known to the gatekeepers or other participants. Page 3
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? <i>e.g. personal goals, reasons for doing the research</i>	All gatekeepers were invited via email with a brief description of the study rationale and aims, and all participants gave verbal consent (telephone interviews) documented in consent forms saved on our shared drives – the research was approved by the college ethical review board. Page 3.

No	Item	Guide questions/description	Page number within manuscript and quotation (if applicable)
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. <i>Bias, assumptions, reasons and interests in the research topic</i>	See above for quotes about the interviewer. The interviewer/researcher was hired on the basis methodological skills and had no prior knowledge or worrying biases around the clinical topic
Domain 2: study design			
Theoretical framework			
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	<p>“The interviews were structured using the Theoretical Domains Framework (TDF). [24] The TDF is a comprehensive approach to exploring and explaining influences that prevent or enable desired behaviours, developed for implementation research, and incorporating over 30 theories of behaviour change clustered in 14 domains [25-27]” page 3</p> <p>And</p> <p>“analysis proceeded using a theory-based content analysis approach. [29]” page 4</p>
Participant selection			
10.	Sampling	How were participants selected? e.g. <i>purposive, convenience, consecutive, snowball</i>	<p>“Urology nurses, registrars and consultants in NHS hospitals were eligible. We purposively sampled Scottish sites as ‘critical cases’ [21] based on comparatively high, medium or low bladder cancer QPI rates, which indicate the percent of eligible patients receiving IPOIC, using the 2014 data (which was the most recent available at the time of study recruitment). Critical cases are those where the features represent instances where the phenomena of interest may stand out more clearly, are useful for identifying ideographic features. [21-23] We further used opportunistic sampling through our networks to identify English sites as there are no published QPI or similar data on IPOIC for eligible patients in England. At each site a gatekeeper was identified and invited to participate via email, who in turn invited the nurses, registrars and consultants responsible for IPOIC behaviours at their site.” Page 3</p>

No	Item	Guide questions/description	Page number within manuscript and quotation (if applicable)
11.	Method of approach	How were participants approached? e.g. <i>face-to-face, telephone, mail, email</i>	"At each site a gatekeeper was identified and invited to participate via email, who in turn invited the nurses, registrars and consultants responsible for IPOIC behaviours at their site." Page 3
12.	Sample size	How many participants were in the study?	7 sites, 30 participants. Results - Page 5
13.	Non-participation	How many people refused to participate or dropped out? Reasons?	No-one who was eligible to participate declined or dropped out.
	Setting		
14.	Setting of data collection	Where was the data collected? e.g. <i>home, clinic, workplace</i>	Workplace for interviewer and participant (telephone interviews)
15.	Presence of non-participants	Was anyone else present besides the participants and researchers?	No
16.	Description of sample	What are the important characteristics of the sample? e.g. <i>demographic data, date</i>	Provided in table 1
	Data collection		
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Provided in appendix 2. No formal pilot testing was done, but the schedule was discussed with clinical colleagues to ensure appropriateness and furthermore no issues with questions were raised during initial interviews, so no revisions were required.
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	No.
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	"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 [28] for management. " page 3.

No	Item	Guide questions/description	Page number within manuscript and quotation (if applicable)
20.	Field notes	Were field notes made during and/or after the interview or focus group?	Yes, the interviewer kept field notes.
21.	Duration	What was the duration of the interviews or focus group?	Provided in table 1
22.	Data saturation	Was data saturation discussed?	Yes, "Data saturation was reached after 21 interviews (i.e. no new TDF domains or belief statements were identified). The remaining 9 interviews were conducted before saturation was established." Page 5
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No, but the manuscript was reviewed by clinical colleagues, some of whom had participated as interviewees
Domain 3: analysis and findingsz			
Data analysis			
24.	Number of data coders	How many data coders coded the data?	he first six interviews were coded by two researchers independently (JD, SM) to ensure consistency. A third TDF-experienced researcher (ED) checked coding for the first six interviews, then checked a sample of coding for the remaining analysis, acting as arbiter where primary coders disagreed. Once data were categorised under TDF domains, common themes emerging within domains were organised under study specific 'belief statements'. Belief statements are a group of similar responses that may indicate a potential barrier or facilitator. [25] Belief statements and corresponding data were reviewed for consistency by a second researcher (SM) and independently checked by a third (ED). Summarised on Page 4
25.	Description of the coding tree	Did authors provide a description of the coding tree?	"A study specific coding manual based on the TDF (appendix 3) was created [28] and analysis proceeded using a theory-based content analysis approach. [32] Data were first deductively coded to the TDF. Then, inductively, belief statements were created and divided in to three categories according to whether they were related to prescribing or instilling behaviours, or over-arching behaviours

No	Item	Guide questions/description	Page number within manuscript and quotation (if applicable)
			<p>related to IPOIC services generally. The TDF domain and associated belief statements were judged to be relevant if: there was a high frequency of coding ($\geq 80\%$ participants); and/or there were conflicting statements; and/or there were strong beliefs which may impact behaviour.</p> <p>"Page 4</p> <p>and see Appendix 3</p> <p>"Table 2 overviews relevant TDF domains specific to behaviours. Six domains were relevant to overarching behaviours related to IPOIC 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 IPOIC behaviours, 41 to prescribing, and 51 to instilling." page 5</p>
P 426.	Derivation of themes	Were themes identified in advance or derived from the data?	<p>"analysis proceeded using a theory-based content analysis approach. [32] Data were first deductively coded to the TDF. Then, inductively, belief statements were created and divided in to three categories according to whether they were related to prescribing or instilling behaviours, or over-arching behaviours related to IPOIC services generally. The TDF domain and associated belief statements were judged to be relevant if: there was a high frequency of coding ($\geq 80\%$ participants); and/or there were conflicting statements; and/or there were strong beliefs which may impact behaviour.</p> <p>" page 4</p>
27.	Software	What software, if applicable, was used to manage the data?	<p>"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 [28] for management." p. 3</p>
28.	Participant checking	Did participants provide feedback on the findings?	Yes. A selection of participants reviewed the manuscript

No	Item	Guide questions/description	Page number within manuscript and quotation (if applicable)
Reporting			
29.	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. <i>participant number</i>	Yes, anonymised quotations are provided in appendix 6.
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	Yes, the findings are derived from the data.
31.	Clarity of major themes	Were major themes clearly presented in the findings?	Yes, we clarify that the TDF is the main organising framework used and we related themes to domains very explicitly in table 2 and in the throughout the results section, and extensively in appendix 6.
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	We provide a transparent statement about how we judged themes to be relevant: "Belief statements, and relatedly the TDF domains they were organised within, were judged to be relevant if: there was a high frequency of coding ($\geq 80\%$ participants); and/or there were conflicting statements; and/or there were strong beliefs which may impact behaviour." Page 4

Table 1: Participant characteristics

Site	Country	QPI adherence rate*	Interview number	Role	Years in <i>current</i> role	Main responsibility	Duration (mins)
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

*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

N/A = Not applicable; NR = Not reported

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, though 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	✗	✗

	<i>thought this was unrealistic)</i>		
Memory, attention and decision processes	✗	✓ <i>(Consent forms and operation notes act as prompts or reminders to prescribe MMC but the process and materials varied across sites)</i>	✗
Behavioural regulation	✗	✓ <i>(Four sites had consent forms or TURBT specific operation pro-forma notes to designate MMC, three did not. Such forms helped in planning SI-IVC)</i>	✓ <i>(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)</i>
Environmental context and resources	✗	✓ <i>(There were variations in the paperwork used to prescribe and document MMC with some finding the process easy and others noting difficulties)</i>	✓ <i>(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)</i>
Reinforcement	✗	✓ <i>(Prescribers drew on experiences of side effects, logistics, and suspicion of perforation in SI-IVC decision-making)</i>	✗
Beliefs about capabilities	✗	✗	✓ <i>(Experienced instillers found instilling easy and were confident, but less experienced ones found it more difficult)</i>
Skills	✗	✗	✓ <i>(Many instillers felt adequately trained and grew more confident with experience, though there were variations on how training was</i>

			<i>delivered, whereas others felt 'rusty' if instilling infrequently and required to revisit device manufacturer instructions)</i>
Emotion	✗	✗	✗
Intentions	✗	✗	✗

✓ denotes domain relevance