BARRIERS & FACILITATORS OF ANTIMICROBIAL STEWARDSHIP IN LTC

A QUALITATIVE STUDY ON PERCEIVED BARRIERS AND FACILITATORS OF IMPLEMENTING AN ANTIMICROBIAL STEWARDSHIP INTERVENTION IN THE MANAGEMENT OF URINARY TRACT INFECTIONS IN A LONG-TERM CARE SETTING

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TITLE: A qualitative study on perceived barriers and facilitators of implementing an antimicrobial stewardship intervention in the management of urinary tract infections in a long-term care setting

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LAY ABSTRACT

Half of antibiotics prescribed in long-term care are not needed, leading to increased harm. It is unclear which strategies should be used to improve antibiotic prescribing. This project aims to identify facilitators, barriers and strategies in identifying and managing urinary tract infection in a long-term care facility as well as exploring the role of the pharmacist in this setting. We conducted focus groups and interviews to gather information and analyzed the transcripts to determine barrier and facilitator themes relating to urinary tract infection management and the role of the pharmacist. The main barrier themes were lack of access, lack of knowledge, ineffective communication, lack of resources and external factors while the main facilitator themes were education, effective collaboration, good communication, sufficient resources and access. For the pharmacist's role, the barrier themes were ineffective collaboration and communication. In addition, the pharmacist can play a role in education and antibiotic selection.

ABSTRACT

Background

50% of antibiotic courses in long-term care facilities (LTCFs) are unnecessary, leading to increased risk of harm such as Clostridiodes difficile infection and antibiotic-resistant organisms. Antimicrobial Stewardship (AS) interventions plays an important role in optimizing antibiotic use. Most studies to improve antibiotic prescribing in LTCFs showed modest and unsustained results. We aimed to identify facilitators, barriers and strategies in implementing a urinary tract infection (UTI)-focused AS intervention at a LTCF with the secondary objective of exploring the pharmacist's potential role(s) in this intervention.

Methods

A qualitative approach using conventional content analysis was used. Through purposeful sampling, we recruited different healthcare providers and administrators at Kensington Gardens. Interviewees attended focus groups or one-on-one interviews. Data were collected using a semi-structured interview guide. Data were analyzed inductively using a codebook modified in an iterative analytic process. Barrier and facilitator themes were identified from the transcripts and mapped using the COM-B (capability, opportunity, motivation and behaviour) model (Michie et al). Similarly, themes were identified from the transcripts regarding the pharmacist's roles in this intervention.

Results

Sixteen participants were interviewed. Most barriers and facilitators mapped to the opportunities domain of the COM-B model. The main barrier themes were lack of access, lack of knowledge, ineffective communication, lack of resources and external factors while the main facilitator themes were education, effective collaboration, good communication, sufficient resources and access. For the pharmacist's role, the barrier themes were ineffective collaboration and communication. Furthermore, the pharmacist can play a role in education and antibiotic selection.

Conclusions

A UTI-focused antimicrobial stewardship intervention in LTCF should consider strategies to improve access, knowledge, communication and collaboration in its design, having sufficient resources and addressing external factors in order to optimize the intervention's success. Pharmacists can play a role in education and antibiotic selection.

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TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

LIST OF ABBREVIATIONS AND SYMBOLS

Abbreviation	
AS	Antimicrobial stewardship
ASP	Antimicrobial stewardship program
BCW	Behaviour Change Wheel
COM-B	Capability, Opportunity and Motivation – Behaviour model
DOC	Director of Care
HCP	Healthcare professional
ICP	Infection control practitioner
KG	Kensington Gardens
LTCF	Long-term care facility
MD	Medical doctor
PAF	Prospective audit and feedback
PCA	Personal care attendant
RN	Registered nurse
RPh	Registered pharmacist
TDF	Theoretical domains framework
UTI	Urinary tract infection

DECLARATION OF ACADEMIC ACHIEVEMENT

This research project was conceived by the stakeholder group (Denis O' Donnell, Dr. Benjamin Kaasa, Nicoleta Paraschiv and Dr. Mark Goldstein) at Kensington Gardens (KG) as a quality improvement initiative. The project's objective was to identify barriers and facilitators that can be addressed in the design and implementation of a UTI-focused antimicrobial stewardship intervention at KG. As an antimicrobial stewardship (AS) pharmacist working in acute care in the past 5 years, I lent my expertise in terms of conducting a literature review for the project's background, creating the interview guide, participating in the focus groups and interviews and cleaning and interpreting the transcript data from the perspective of an AS practitioner. The focus group and interviews were conducted with the help of Annalise Mathers as the facilitator/interviewer while coding the transcript data was completed with the help of Denis O' Donnell and Maya Oren. The preliminary results were reviewed by my thesis committee, which included Drs. Lisa Dolovich, Kevin Brazil and Alexandra Papaioannou, and were further interpreted based on their comments. After data analysis, I then wrote the manuscript, once again with feedback incorporated from my thesis committee members. For my thesis defense, my thesis committee was joined by Dr. Cheryl Sadowski.

While results of this project have yet to be published, when they are, Drs. Dolovich, Brazil, Papaioannou and Sadowski will be listed as co-authors, as will the KG stakeholder group, Maya Oren and Annalise Mathers.

CHAPTER 1: INTRODUCTION AND BACKGROUND

Introduction:

This thesis aims to use an implementation science approach to identify facilitators, barriers and strategies in implementing a urinary tract infection (UTI)-focused antimicrobial stewardship intervention at a long-term care facility (LTCF) in Toronto. The background chapter will discuss the following topics:

1.1 Urinary tract infections in long-term care facilities

1.2 Antibiotic prescribing in LTCFs

1.3 Antimicrobial stewardship in LTCF

1.4 Behaviour change interventions

1.5 The role of the pharmacist in antimicrobial stewardship in LTCFs

Background:

1.1 Urinary tract infections in long-term care facilities

Urinary tract infection (UTI) is the most frequent reported infection in long-term care residents (Nicolle, 2016; Dwyer 2013). Canadian prevalence studies have reported an incidence of 2.9 to 13.9 antibiotic courses per 1000 patient days over 1 year (Loeb, 2001) to 5.9% of long-term care residents prescribed antibiotics (Daneman, 2011). Of the antibiotics prescribed for UTIs, 28% met the criteria for urinary tract infection with one third prescribed for asymptomatic bacteriuria (Loeb, 2001). Moreover, 63% of antibiotics courses were at least 10 days in duration with a five-fold variability in antibiotic use across the long-term care facilities studied (Daneman, 2011).

Asymptomatic bacteriuria is defined as a lack of symptoms or signs of UTI with a positive urine culture (Nicolle, 2016; Nicolle, 2019). A significant portion of long-term care residents have asymptomatic bacteriuria with a prevalence of 25- 50% in women and 15- 40% in men (Nicolle, 2000). In addition, majority of LTCF residents have cognitive impairment and are unable to provide a coherent history. This can lead to unnecessary antibiotic prescriptions for nonspecific symptoms not indicative of bacterial infections (Feldstein, 2018). Several prospective, randomized studies have found no clinical benefit in treating asymptomatic bacteriuria but instead promotes reinfection with more resistant bacteria as well as increased adverse drug events and risk of *Clostridiodes difficile* infection (Mody, 2014; Nicolle, 2016; Nicolle, 2019). Therefore, deferring antibiotic treatment, careful monitoring and assessment of other causes when the diagnosis of symptomatic UTI is questionable should be considered (Mody, 2014; Nicolle, 2019).

Infection is challenging to diagnose in the long-term care setting due to potential barriers to the appropriate diagnosis of UTIs. For instance, laboratory results can be delayed or missing, clinicians may not know how to interpret laboratory results and the clinical presentation of infection can be masked by comorbidities or age-related physiological changes (Nicolle, 2016; Backus, 2015; Feldstein, 2018). Typical presentations of UTIs include acute dysuria OR temperature >37.9 ^{0}C or 1.5 ^{0}C above baseline AND at least one of the following new or worsening symptoms: urgency, suprapubic pain, urinary incontinence, frequency, gross hematuria and costovertebral angle tenderness. The elderly may not be able to mount a fever or high white blood cell counts, report urinary symptoms or pain verbally, have chronic symptoms or have an

atypical presentation of infection (Nicolle, 2016; Backus, 2015). This atypical presentation that is very common in the LTCF setting usually refers to new onset delirium that should only be treated as a UTI in residents with an indwelling catheter as per the Loeb Minimum criteria for starting antibiotic therapy. However, many facilities the Loeb 2005 criteria due to time constraints and lack of training (Backus, 2015).

1.2 Antibiotic prescribing in LTCFs

The proportion of the Canadian population aged 65 years and older is expected to increase to 20.0% by 2024 (Statistics Canada, 2017). In this age group, 6.8% live in a long-term care facility or residence for senior citizens. Among Canadians aged 85 years and older, this proportion rises to 30.0% (Statistics Canada, 2017).

The elderly, particularly those residing in LTCFs, have a higher incidence of infection due to several factors. These include (1) age-related physiological changes such as incontinence, nutritional deficiency and immunological decline (2) co-morbidities (3) use of invasive devices such as catheters or feeding tubes and (4) institutional exposure (Martin, 2016; Nicolle, 2000). Antimicrobials are therefore frequently prescribed and are the second leading cause of adverse drug events among drug classes prescribed in the elderly in LTCFs (Nicolle, 2000). Literature suggests that 40-75% of the antibiotic courses prescribed in LTCFs are unnecessary or inappropriate, leading to significant harms from antibiotic overuse (National Collaborating Centre for Infectious Diseases, 2019). In Ontario, 50% of antibiotic courses in long-term care facilities were deemed unnecessary with 78% of residents receiving at least one antibiotic course annually and being treated

longer than necessary (Loeb, 2001; Daneman, 2013). Residents in LTCFs with higher antibiotic use were shown to experience a 24% increased risk of harm, which include *Clostridioides difficile* infection, allergic reactions and antibiotic-resistant organisms (Daneman, 2015). Antibiotic resistance in LTCFs can impact individuals, facilities, and public health in terms of quality of life, morbidity, mortality, and health care costs (van Buul, 2012). In the long-term care setting, the factors that drive inappropriate antibiotic prescribing are thought to be multifactorial (Parente, 2018). Unlike in the hospital setting, implementing antimicrobial stewardship (AS) strategies in LTFCs can be challenging as the physician, pharmacist and resident are not always present in the same location (Parente, 2018). A literature search showed no specific studies on the role of the nurse in AS in the long-term care setting.

1.3 Antimicrobial stewardship in long-term care facilities

Antimicrobial stewardship (AS) is defined as "coordinated interventions designed to improve and measure the appropriate use of [antibiotic] agents by promoting the selection of the optimal [antibiotic] drug regimen including dosing, duration of therapy, and route of administration" (Fishman, 2012). In Canada, many medium-to-large sized hospitals have effective antimicrobial stewardship programs (ASPs) while new models of ASPs are needed in non-acute settings such as long-term care (Heil, 2016). Antimicrobial stewardship is a required organizational practice for hospitals but not in non-acute settings (Accreditation Canada, 2019). A Cochrane review of interventions to improve antibiotic prescribing practices for hospital inpatients reported high-level evidence that ASPs can

effectively increase compliance with antimicrobial policies and decrease length of hospital stay as well as duration of antibiotic therapy without increasing mortality (Davey, 2017). In contrast, a systematic review of ASPs in long-term care facilities found fair to good quality evidence that NH ASPs reduce antibiotic prescriptions and increase adherence to guidelines. However, there was no evidence found that NH ASPs changed NH mortality rates, *C. difficile infection rates* or hospitalizations (Feldstein, 2018). Moreover, a recent meta-analysis of 11 studies demonstrated that AS strategies in long-term care were associated with an overall 14% decrease in antimicrobial use with the three most commonly implemented strategies to be educational materials, educational meetings, and guideline implementation (Wu, 2018). However, a systematic review of studies looking at improving antibiotic prescribing in LTCFs found that the results of most studies were modest and not sustained (Fleming, 2015). Therefore, there is a gap in evidence of AS strategies that lead to impactful and sustainable interventions in the long-term care setting.

Antimicrobial stewardship requires addressing a complex set of behaviours of a range of healthcare professionals from different clinical specialties (i.e. medicine, pharmacy, nursing) and different levels of experience at different time points across the continuum of care (Lorencatto, 2018). These timepoints include adhering to guidelines, assessing benefit versus risk, decisions around antibiotic initiation and review of antibiotic therapy (Lorencatto, 2018). The Medical Research Council guidance advocates using a systematic, theoretically-based approach to intervention design when developing and evaluating complex interventions. However, systematic reviews of ASPs have shown that behavioural and social influences are not given much consideration in the design and

evaluation of ASPs (Lorencatto, 2018). Moreover, few studies described successful antimicrobial stewardship implementation in LTCFs. The successes discussed were mainly in academic or hospital-affiliated LTCFs (Jump, 2017).

1.4 Behaviour Change Interventions

Successful behaviour change interventions can improve the implementation of evidence-based clinical practices (Lorencatto, 2018; Michie, 2011). Clinical practice is a form of human behaviour, which can be understood through application of behavioural and social sciences theories (Lorencatto, 2018). The Behaviour Change Wheel (BCW, see Figure 1) is a well-known behavioural science framework that is commonly used to promote a structured approach to designing behaviour change interventions (Lorencatto, 2018; Michie, 2011). It is a synthesis of 19 frameworks of behaviour change and can be applied to any behaviour in any setting (Michie, 2011). At the core of the BCW is the COM-B model. The COM-B model (see Figure 2) hypothesizes that three conditions must be met in order for a behaviour to occur: an individual has to have the Capability (i.e. knowledge and skills), Opportunity (physical and social) and Motivation to perform the behaviour (Lorencatto, 2018; Michie, 2011). Furthermore, both capability and opportunity can influence motivation (Michie, 2011). Capability refers to an individual's physical and physiological ability to undertake an activity. Opportunity represents all the factors external to the individual that trigger the behaviour or makes it possible. Motivation involves automatic and reflective brain processes that dictate the behaviour (Michie, 2011). Changing a behaviour will involve changing one or more of the components. The COM-B

components can be further described by 14 theoretical domains, which denote the range of factors that can affect behaviours (Lorencatto, 2018; Michie, 2011). These range from individual knowledge, skills, beliefs about capabilities, goals to broader physical and social contextual factors such as resource availability and professional boundaries and roles (Lorencatto, 2018; Michie, 2011). Therefore, an in-depth understanding of behaviours and the required change to bring out the desired behaviour would lead to the successful implementation of a UTI-focused antimicrobial stewardship intervention by individuals or teams within the long-term care setting.

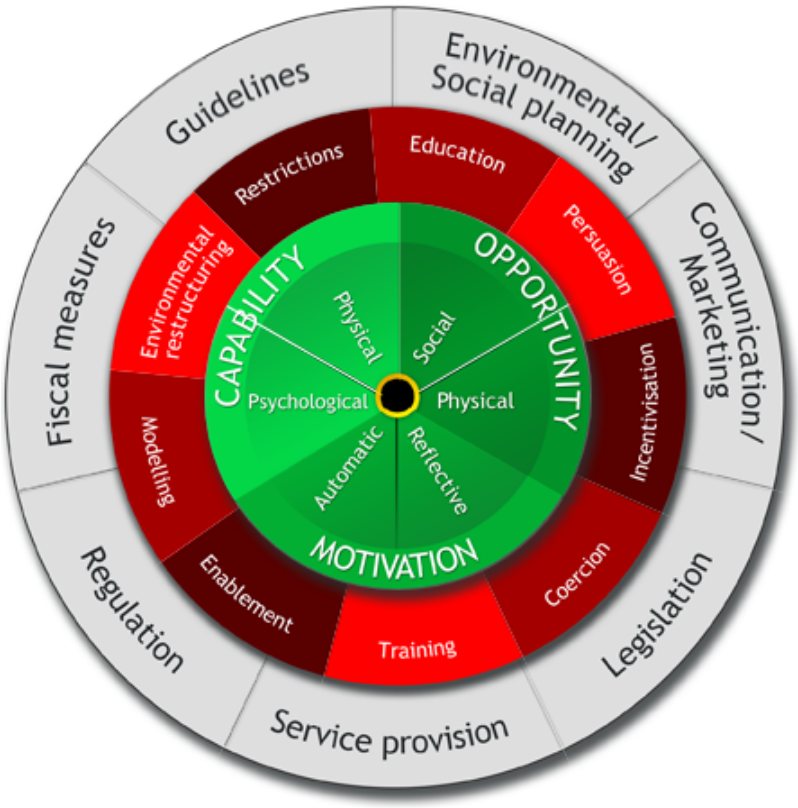


Figure 1. Behavioural Change Wheel (Michie, 2011)

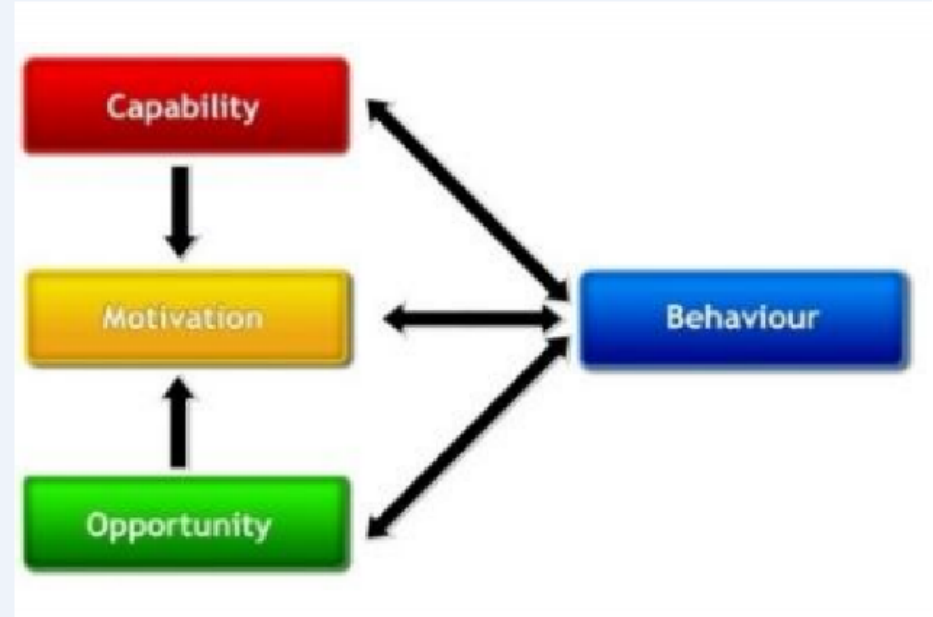


Figure 2: COM-B Model (Michie, 2011)

As mentioned, antimicrobial stewardship interventions require complex behaviour changes and require changing the behaviours of multiple healthcare providers at different time points in the patient care pathway (Rzewuska, 2019). A meta-synthesis review of qualitative studies in LTCFs found crucial factors that shaped decision making around antibiotic prescribing to include variations in knowledge and practice among health care professionals (HCPs), the unique LTCF context which includes the lack of diagnostic resources and on-site physicians and social factors such as the interaction between nurses, residents' families and doctors (Fleming, 2015). In addition, previous studies have examined the perceptions, facilitators and barriers to introducing antimicrobial stewardship related clinical pathways and antibiotic prescribing in the management of infections in LTCFs. A cross-sectional survey studying American long-term care facilities on nurse and

medical providers' perspectives on antibiotic stewardship concluded that antimicrobial stewardship interventions should promote and develop competency to implement alternative management approaches and to educate residents and families (Scales, 2017). A case study on 10 LTFCs in North America using a clinical pathway for UTI management reported skills training and education as facilitators and fear of change, lack of confidence and pressure from residents' family as barriers to using the clinical pathway (Lohfield, 2007). A mixed methods pilot study assessing the perceptions of antimicrobial stewardship in long-term care facilities used thematic framework analysis and identified six themes that can both promote and deter antimicrobial stewardship: practice patterns, external influences, infection control, leadership, communication and facility culture (Carter, 2017). Moreover, a Canadian study that used the Theoretical Domains Framework to assess barriers and facilitators contributing to antibiotic overuse in long-term care had these recommendations: 1) establish stakeholder buy-in; 2) align organization policies and procedures; 3) provide ongoing education and coaching to staff; 4) provide information and education to residents and families; 5) establish process monitoring with staff feedback and 6) deliver reminders (Chambers, 2019). All the above factors should be considered in designing applicable and sustainable AS interventions in LTCFs.

The Fleming study conducted in Ireland was one the first studies to map healthcare professionals' opinions of antibiotic prescribing in LTCFs to the theoretical domains framework (TDF) and used the behavioural change technique taxonomy to recommend intervention strategies (Fleming, 2014). The study found that antibiotic prescribing in LTCFs was affected by social and environmental challenges and that the essential driver

for change and antimicrobial stewardship in LTCFs was motivation. Moreover, interventions that would affect the domains identified by the TDF included education around guidelines, audit and feedback to measure performance and guidance by experts in the field (Fleming, 2014).

1.5 The role of the pharmacist in antimicrobial stewardship in long-term care facilities

Pharmacists practice in a broad spectrum of settings, including acute care, ambulatory and long-term care. Antimicrobials are prescribed in all these settings; therefore, pharmacists have the opportunity to contribute to optimizing antimicrobial regimens as the medication experts on the healthcare team (Parente, 2018). Unlike in acute care settings, the role of the pharmacist in antimicrobial stewardship in LTCFs is not as well-studied or well-defined. A qualitative study that questioned the knowledge and role of different healthcare professionals in antibiotic prescribing in LTCFs found that pharmacists were confident in the medicine management service they provided but were less enabled to further develop their clinical roles due to lack of time, training and guidelines in this area (Fleming, 2014). In addition, the pharmacist was found to be mainly involved in screening for drug interactions and providing drug information instead of influencing the antibiotic prescribing course (Fleming, 2014). Therefore, there is a potential expanded role for pharmacists to increase their antimicrobial stewardship activities in the long-term care facility setting.

Objectives:

The primary objective of this study is to identify facilitators, barriers and strategies in implementing a urinary tract infection (UTI)-focused antimicrobial stewardship intervention at a 350-bed, not-for-profit, long-term care facility using an implementation science approach. This is the first known Canadian study to systematically categorize barriers and facilitators on this topic and map them against the behavioural components of the COM-B model. The secondary objective of this study is to explore the pharmacist's potential role(s) in implementing a UTI-focused antimicrobial stewardship intervention in a LTCF setting. These research questions were conceived in discussion with the stakeholder group (Denis O' Donnell, Dr. Benjamin Kaasa, Nicoleta Paraschiv and Dr. Mark Goldstein) at Kensington Gardens as a quality improvement initiative. The project's findings will help inform the design and implementation process of a UTI-focused antimicrobial stewardship intervention at Kensington Gardens.

CHAPTER 2: METHODOLOGY

2.1 Implementation science approach

Implementation science is defined as "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and hence, to improve the quality and effectiveness of health services" (Eccles, 2006). Implementation science generally starts with an evidence-based practice (EBP) that is underutilized and then finds and tackles quality gaps at the provider, clinic or healthcare system level (Bauer, 2015). Its overall aim is on evaluating the course of implementation and its effects on the EBP of interest (Bauer, 2015). One type of evaluation is process evaluation, which solely defines the characteristics of use of an EBP (or lack thereof) (Bauer, 2015). Data can be gathered before, during and/or after the implementation and evaluated by the researcher without feedback to the implementation team and without intentionally affecting the ongoing process (Bauer, 2015). In addition, process evaluation can be undertaken in a purely observational study, such as planning an implementation strategy (Bauer, 2015). Another term used to describe implementation science is knowledge translation. In Canada, the Knowledge to Action Cycle serves as an outline in defining and describing knowledge translation (KT) as well as outlining strategies to promote KT capacity and implementation of KT activities (Government of Canada, 2019). In the Knowledge to Action Cycle, this study is situated within the action cycle with the goal of adapting knowledge to local context and assessing barriers to knowledge use in order to select, tailor and implement interventions (See Appendix B). Therefore, the use of the implementation science is fitting as an overarching approach in addressing the study's

primary objective of identifying barriers, facilitators and strategies in implementing a UTI-focused antimicrobial stewardship intervention.

2.2 Study design

This study used a qualitative descriptive approach to better understand the factors that facilitate or hinder the current uptake of EBP and potential strategies for an ASP approach to the diagnosis and management of UTIs within the study setting. The choice of a qualitative descriptive approach is appropriate for health environment research questions focusing on factual responses to 'who, what, where and why of events or experiences' and the factors that facilitate or hinder use in order to develop and refine interventions (Colorafi, 2016; Kim, 2017; Sandelowski, 2010). In addition, the qualitative descriptive approach focuses on low-interpretive description which allows researchers to stay close to the data with minimal alteration during analysis (Colorafi, 2016; Kim, 2017; Sandelowski, 2010). This aids readers who are familiar with the topic to recognize their own experience of the phenomenon in the findings (Coflorafi, 2016; Kim, 2017). Therefore, this approach aims to lead to 'true understanding' or 'ultimate truth' of the event being researched (Colorafi, 2016; Kim, 2017; Sandelowski, 2010). Other basic features of the qualitative descriptive approach include: (a) a broad range of choices for theoretical or philosophical orientation (b) the use of any sampling technique with most commonly used being purposeful sampling techniques (c) the use of observations, document review or minimal to semi-structured interview or focus group questions (d) content analysis and descriptive

statistical analysis and (e) a descriptive summary that best fits the data (Colorafi, 2016; Kim, 2017; Sandelowski, 2010).

2.3 Theoretical framework

Many implementation studies aim to identify barriers and facilitators of EBP adoption under naturalistic conditions (Bauer, 2015). Naturalism is also the common theoretical framework for qualitative descriptive studies (Sandelowski, 2010). It is defined as the need for a commitment to studying a phenomenon in a way that is as free of pretence as possible (Sandelowski, 2010). In addition, qualitative content analyses are mostly based on the factist perspective, which assumes that data are usually accurate and truthful indications of the reality of the studied phenomenon (Sandelowski, 2010).

2.4 Setting

Kensington Gardens (KG) is a 350-bed, not-for-profit long-term care facility located near Kensington Market in Toronto, Ontario, Canada. It is the long-term care component of the organization Kensington Health, which is a non-profit, health and community care organization in Canada providing a diverse range of services including long-term, hospice and community care, cancer screening, ophthalmology and eye tissue processing for transplant. Kensington Garden's vision is to be recognised as a leader in promoting quality of life by improving the health of its community though working with clients and other providers to deliver a continuum of long-term care and complementary programs for seniors (Kensington Health, 2014). The facility values excellence in quality

practices, respect resident's individuality and teamwork in sharing ideas, knowledge and expertise within the organization and the greater community. Kensington Health employees are encouraged to continuously look for ways to improve processes and initiate new projects to enrich the experience of people in their care. To this end, the organization holds an annual Kensington's Quality Day dedicated to quality improvement and overcoming quality challenges. In addition, Kensington Gardens is a participant in education and research projects to improve long-term care delivery (Kensington Health, 2014). The two physicians who are part of the stakeholder group and also study participants specialized in Family Medicine and have admitting privileges at the University Health Network (Toronto). The physicians who serve Kensington Gardens are not always present to do a physical exam on residents and rely on nurses to communicate resident's symptoms. There are locum physicians who are on-call during off-hours who may not be familiar with the residents' baselines. The consultant pharmacist at Kensington Gardens completed her Doctor of Pharmacy designation and a Board of Pharmacy Specialties in Geriatric Pharmacy certification. She attends medication management committee meetings and provides the group with information on increased antibiotic use.

Medical Pharmacies is the pharmacy provider for residents of Kensington Gardens. Aside from providing dedicated and seamless transition in dispensing and delivery of medications to long-term care homes, Medical Pharmacies also provides extensive clinical research, new clinical programs and support advanced technologies such as Digital Pen prescription ordering system and Electronic Medication Administration System (Medical Pharmacies, 2019). The company's goal is to improve resident care and operational

efficiencies for caregivers and administrators (Medical Pharmacies, 2019). The dispensary pharmacy is open Monday to Saturday 9:00 am to 6:30 pm for medication dispensing and delivery. Outside of these hours, a local community pharmacy on contract with Medical Pharmacies provides emergency coverage. There is also an on-call pharmacist available 24/7. On the other hand, there is a consultant pharmacist assigned to Kensington Gardens who visits the home for a day and a half weekly. The consultant pharmacist performs clinical duties, which include quarterly medication reviews with physicians, education, auditing drug processes, participating in committees and addressing dispensing errors and incidents as required with administrators or resident's family.

2.5 Sampling and sample size

Qualitative studies typically involve purposeful sampling for identifying and selecting of information-rich cases related to the phenomenon of interest (Sandelowski, 1995). Convenience sampling refers to locating any convenient cases who meet the required criteria and selecting those who respond on a first-come-first-served basis until the sample size target is achieved (Robinson, 2014). The disadvantage of unjustified generalizations from a broad sample can be minimized by defining the sample geographically (Robinson, 2014). Furthermore, there are no power calculations that can determine sample size a priori in qualitative studies (Sandelowski, 1995). Instead, the adequacy of sample size is relative. It is based on ascertaining whether a sample is too small or too large for the intended qualitative outcome (Sandelowski, 1995). Sample sizes may not be too large as to prevent a declaration of having completed a detailed analysis of

data nor too small as to not achieve data saturation (Sandelowski, 1995; Francis, 2010). Large sample sizes in qualitative studies are generally deemed to be over 50 (Sandelowski, 1995). Moreover, there are proposed principles for deciding when data saturation occurs, which involve (1) stating a minimum sample size for the initial analysis and (2) stating how many additional interviews will be conducted without new ideas emerging as the stopping criterion (Francis, 2010).

A purposeful, convenient sampling strategy was employed over a two-month period to recruit interviewees or focus group participants to seek out a broad range of perspectives on elements that can influence the implementation of an AS intervention in UTI diagnosis and management at Kensington Gardens. The sampling strategy used was purposeful in limiting eligible participants to the LTCF of interest but convenient in that all study volunteers were interviewed. All clinicians and administrators working at Kensington Gardens who are involved in the diagnosis and management of UTIs were eligible for inclusion in the study with clinician roles for recruitment identified during an initial stakeholder meeting. The study was advertised internally using e-mail communication. All interviewees who volunteered for the study were interviewed with no further exclusions. Each interviewee was scheduled for a focus group session that lasted an hour or a one-on-one interview for 30 minutes. Consent was obtained by three members of the research team (AC, DOD, AM) prior to the focus group or interview (see Appendix C1 for consent form).

Interviews were conducted with the aim of achieving data saturation. The initial analysis sample included at least 10 interviewees with a stopping criterion of three further

interviews with no new themes emerging, which was defined as point of data saturation. The expected sample size was no larger than 30 participants to achieve data saturation.

2.6 Data collection and storage

A literature review of antimicrobial stewardship (AS) interventions in UTI at LTCFs and associated barriers and facilitators in the implementation of AS intervention(s) was conducted. The findings from the review were used to develop a semi-structured interview guide (see Appendix C2). Using semi-structured interviews to gather qualitative data collection is commonly used in the Implementation Science approaches (Bauer, 2015). In summary, the questions probed the current process of UTI diagnosis and management at Kensington Gardens and the factors that will influence the design and the uptake of an AS intervention(s). An iterative process of modifying the interview questions was conducted based on previous interview responses to ensure comprehensiveness of the interview guide. Also, the interview guide included a number of questions relating to the pharmacist's role(s) in UTI diagnosis and management at Kensington Gardens for the study's secondary objective. The focus group sessions were about one hour in duration while the one-on-one interviews took up to 30 minutes. AM served as the main facilitator for these sessions with AC and DOD present to help with data collection, clarifying questions or modification of interview questions for future sessions. The focus groups and interviews were audiotaped for the purpose of transcribing data for analysis. AC cleaned all the transcripts based on the audiotapes and made modifications to the transcripts accordingly to ensure that the transcribed data was consistent with the audiotapes prior to

data analysis. The audiotapes were destroyed within 30 days after transcription. All transcripts and physical notes from the focus groups or interviews were stored in a locked file cabinet. Soft versions of study-related documents were password protected and stored in a password-protected USB key and work laptop. This study was approved by the University of Toronto Research Ethics Board on May 15, 2018.

2.7 Data Analyses

A) Conventional content analysis

Conventional content analysis was used to analyze the words and phrases from the focus group and interview transcripts. It is generally used in studies with the aim to describe a phenomenon, which is aligned with the qualitative descriptive approach for this study (Hsieh, 2005). In conventional content analysis, preconceived categories are avoided, instead allowing the categories, names of categories and new insights to emerge from the data (Hsieh, 2005; Erlingsson 2017). Also, this approach is described as inductive category development (Hsieh, 2005). The advantage of this approach to content analysis is the ability to obtain information directly from study participants without imposing preconceived perspectives on the research question (Hsieh, 2005). By using content analysis, data can be counting frequency of codes (Vaismoradi, 2013). It is possible to attain a theme based on the frequency of its occurrence in the data. This methodology is seen as objective, systematic and relates to the surface meaning of the data (Bloor, 2006). However, the frequent occurrence of codes should be interpreted with caution as it may only imply a readiness or capability of interviewees to contribute more on the topic (Loffe,

2004). On the other hand, a challenge of this type of analysis is failing to identify crucial categories leading to an incomplete understanding of the context. This is termed as credibility within the naturalistic paradigm of trustworthiness. Credibility can be established through activities such as triangulation, peer debriefing and member checking (Hsieh, 2005). In addition, there is no standard step-wise process for content analysis that can be applied to the data, however, a guidance document suggested 1) approaching the data with open-mindedness and being cognizant of one's biases 2) using one's intuition 3) focusing on difficult to categorize data as it can inform description of context and 4) undertaking triangulation by collaborating with others during the analysis stage (Erlingsson, 2017).

Data analysis began with reading each transcript repeatedly to achieve immersion into data and to obtain a sense of the entire process of UTI diagnosis and management at Kensington Gardens. Then, each transcript was read word by word to derive codes by first highlighting the exact words from the transcript to capture key concepts. As this process continued, labels for codes emerged from the data that were reflective of important concepts. These labels and their definitions often came directly from the highlighted texts. These codes became the initial codebook. Data was analyzed iteratively until no new code emerged. The codebook was revised continuously throughout the coding process. Codes were then sorted into categories based on how different codes are related and linked. These emergent categories were then used to group codes into themes. The final codebook can be found in Appendix C3.

The initial coding plan was to have three coders (AC, DOD, MO) independently and iteratively code an initial set of 3 transcripts, then discuss codes and resolve discrepancies as a group. The input from multiple coders with two pharmacist coders working in different settings (AC in hospital and DOD in long-term care) and one non-pharmacist coder reduced the possibility of missing key codes and categories. Intercoder reliability is commonly used in content analysis and was first introduced as a measure for improving reliability (Vaismoradi, 2013). It refers to the extent to which more than one coder independently classifies data in the same way as fellow coders. However, this reliability check only implies that two coders can apply the same subjective perspective to the text, and does not necessarily establish the objectivity of codes (Vaismoradi, 2013). There are no defined coding agreement targets, however, studies have used 85-90% agreement. Once coding consistency was established with a goal of 85% agreement, the remaining transcripts was to be coded by one person (AC). However, by the 4th transcript, the coding agreement target was not reached. The revised coding plan was to assign each remaining transcript to two coders with one of the coders being AC for each transcript. Codes, definitions and sorting into categories were discussed and discrepancies resolved as a group. The codebook was continually revised during the coding process until no new code emerged and all code discrepancies were resolved. The software NVivo ® version 12 for MAC was used to organize the data and produced the final codebook. Findings from each transcript were summarized into 1-2 pages and reviewed by the interviewees and focus group participants as member checking in order to establish trustworthiness of the findings. For the quantitative aspect of content analysis, the most frequently mentioned

barriers and facilitators to implementing a UTI- focused ASP intervention were identified, stratified by interviewee's job title and examples of representative interview quotes provided. For the qualitative aspect of content analysis, the resulting barrier and facilitator codes were analyzed and grouped into larger themes. In addition, all identified barriers and facilitators were mapped to the COM-B model and analyzed. The resulting findings from these steps led to the emergence of the main barrier and facilitator themes for the study. In addition, potential strategies emerged from the data to address or support the most commonly identified barriers and facilitators to implementation. These findings also were summarized.

B) Map to COM- B model

All identified barriers and facilitators were mapped to components of behavior as described in the COM-B (capability, opportunity, motivation and behavior) model contained within the Behavior Change Wheel (BCW). As previously mentioned, successful behaviour change interventions can improve the design and implementation of evidence-based clinical practices (Michie, 2011; Lorencatto, 2018). The Behaviour Change Wheel is a behavioural science framework that is commonly used to encourage a structured, theory- and evidence-based approach to designing behaviour change interventions (Michie, 2011; Lorencatto, 2018). It is a combination of 19 frameworks of behaviour change and can be applied to any behaviour in any setting (Michie, 2011). At the center of the BCW is the COM-B model. The COM-B model hypothesizes that three conditions must be met in order for a behaviour to occur: an individual has to have the Capability (i.e. knowledge and

skills), Opportunity (physical and social) and Motivation to perform the behavior (Michie, 2011; Lorencatto, 2018). Capability refers to an individual's physical and physiological ability to undertake an activity. Opportunity represents all the factors external to the individual that trigger the behaviour or makes it possible. Motivation involves automatic and reflective brain processes that dictate the behaviour (Michie, 2011). Changing a behaviour will involve changing one or more of the components. The COM-B components can be further described by 14 theoretical domains, which denote the range of factors that can affect behaviours (Lorencatto, 2018; Michie, 2011). These range from individual knowledge, skills, beliefs about capabilities, goals to broader physical and social contextual factors such as resource availability and professional boundaries and roles (Lorencatto, 2018; Michie, 2011). Therefore, an in-depth understanding of behaviours and the required change to bring out the desired behaviour would lead to the successful implementation of a UTI-focused antimicrobial stewardship intervention by individuals or teams within the long-term care setting.

C) Pharmacist's role in UTI-focused AS intervention

The semi-structured interview guide included questions on the current workflow as well as the potential roles of the consultant/clinical and dispensary pharmacists involved in the care of Kensington Gardens' residents in a UTI-focused ASP intervention. The responses from the interviews were analyzed in a similar method as the responses pertaining to the barriers and facilitators of UTI diagnosis and management. Labels for codes emerged from the data that were reflective of the key pharmacist roles. These labels

and their definitions often came directly from the highlighted texts. These coded responses were analyzed to generate key themes from the data and were also measured quantitatively using counts.

CHAPTER 3: RESULTS

3.1 General

There was a total of 16 staff members who volunteered to participate, half of whom were registered nurses, while the rest were physicians (2), pharmacists (2), directors of care (2) and infection control practitioners (2). All 16 volunteers consented to be interviewed.

3.2 Quantitative Analysis of Barriers

The focus groups and interviews captured a diverse range of experiences at Kensington Gardens. The barrier codes are defined in the final codebook (see Appendix C3). The most commonly identified barriers from the interview data (see Table 1) with selected quotes representative of each of the most common barriers summarized below (See Appendix A1). In addition, these common barriers were further sorted based on the job title of the interviewee at Kensington Gardens who identified the barrier (see Table 1). The three most commonly identified barriers were family pressure, access to resident's medical information and delays in results of tests ordered for UTI work up.

Table 1: Most Commonly Identified Barriers of Implementation

Most Commonly Identified Barriers	Frequency of response	MD	RN	RPh	DOC	ICP
Family Pressure	21	√	√	√	√	√
Access information	18	√	√	√		√
Test delay	15	√	√	√	√	√
Workload	14	√	√	√	√	
Communication	10	√	√	√	√	
Patient factors	9	√	√	√	√	√
Bias HCP	8	√		√	√	
Time	7	√	√	√	√	
Knowledge HCP	7	√		√	√	√
Presence	6	√	√	√	√	

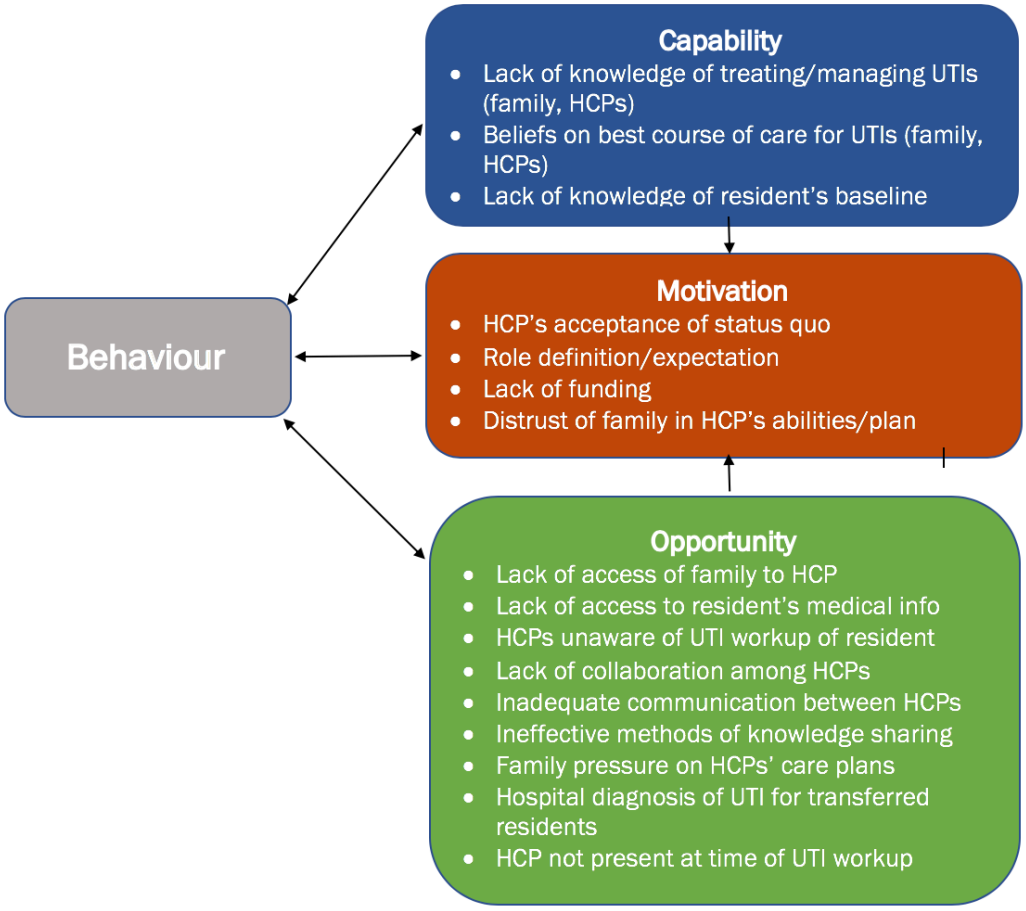
Legend: MD= medical doctor; RN= registered nurse; RPh= registered pharmacist; DOC= director of care; ICP= infection control practitioner

3.3 Qualitative Analysis of Barriers (COM-B)

All identified barriers were mapped to the COM-B model (see Figures 3 & 4) and summarized in table form (see Appendix A2). Capability-related barriers included insufficient knowledge of clinicians to diagnose and manage UTIs, knowledge biases of residents' families as well as clinicians and the lack of knowledge of the resident's baseline which led to overdiagnosis or delayed diagnosis of UTI. Opportunity-related barriers

included the lack of access of residents' families to clinicians, the delay or lack of access of clinicians to resident's test results, suboptimal collaboration and inadequate communication methods within the healthcare team, the lack of communication and medical information from hospitals on transferred residents, ineffective methods of knowledge sharing on UTI and on suspected resident cases of UTI and lastly, family pressure to treat a UTI. In addition to clinician's lack of drive to change, other motivation-related barriers included unclear role definition and expectations, a lack of funding to address staff shortages and expand clinical roles as well as the distrust of resident's family in the healthcare team. The majority of the barriers identified mapped to the Opportunity section of the COM-B model. This suggests that the staff at Kensington Gardens to be a fairly capable and motivated group. Opportunity refers to external factors outside of the individual that prompt behaviour (Michie, 2011). Furthermore, opportunity can refer to the environment (physical) or the culture (social) at Kensington Gardens. Looking closely at the barriers mapped to Opportunity, the majority can be addressed by streamlining or improving current processes, which is more likely to be sustainable long-term as these are not affected by a turnover in staffing.

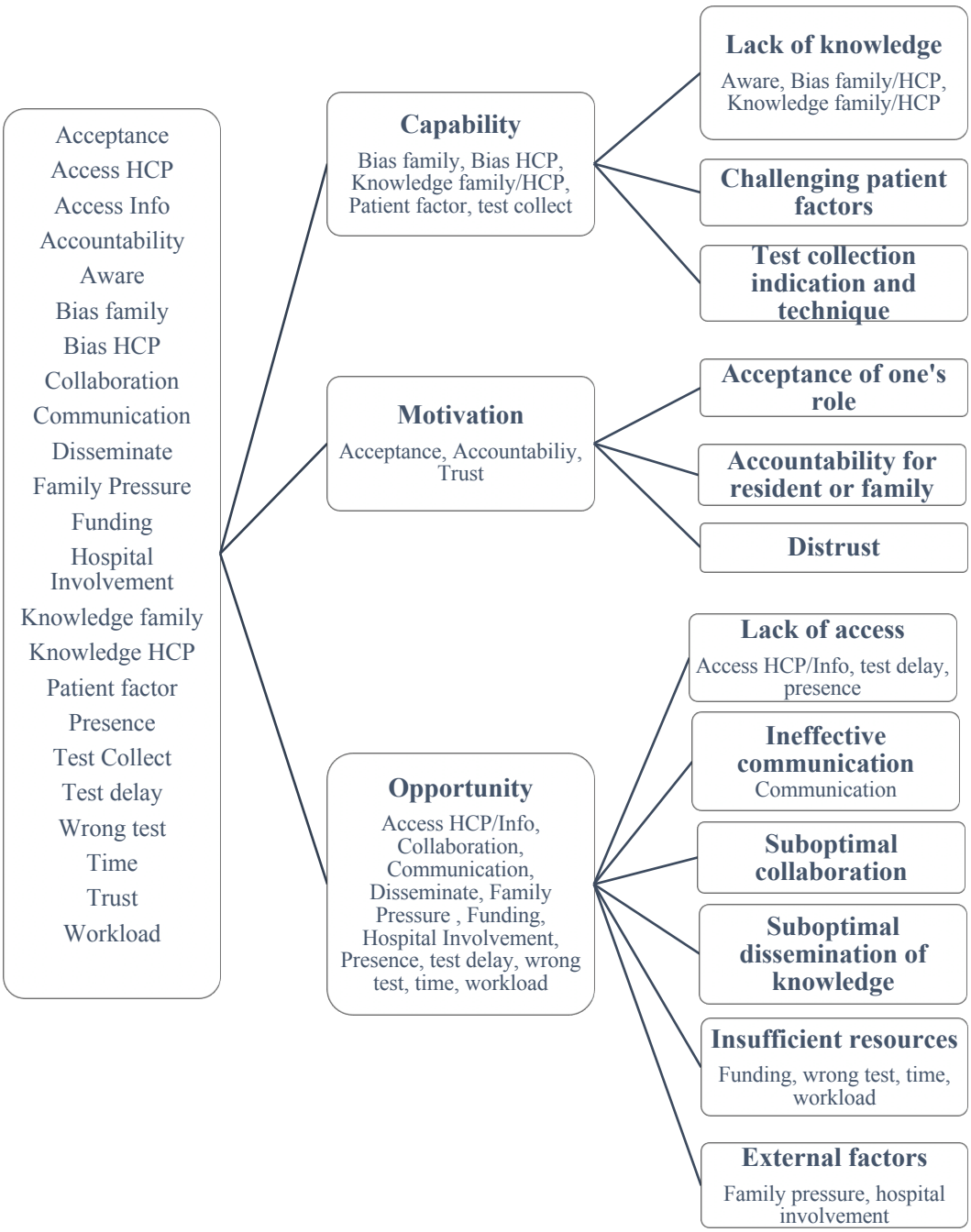
Figure 3: Barriers of Implementation mapped to COM-B model



3.4 Qualitative Analysis of Barriers (Themes)

The barrier codes with definitions and the frequency of references from the transcripts can be found in Appendix C3. The categories that emerged from grouping barrier codes and mapping to COM-B were as follows (see Figure 4).

Figure 4: Sorting of Barrier Codes into Categories



Matching the categories in the figure above with the most commonly identified barriers of implementation (see Table 1) led to the emergence of the main barrier themes:

Theme #1: Lack of Access

The lack of timely access to medical information pertinent to appropriate diagnosis and management of UTI was a key theme that emerged from the interview data. The results of ordered tests may be delayed or inaccessible to clinicians at Kensington Gardens.

"*We don't have lab work. So like we don't have their swabs. We don't have the culture reports, sensitivity reports to recommend something possibly even, either more specific to that treatment"* [Pharmacist 1]

"*We have lab work but sometimes it's outdated, we don't have the real time lab work that's available because we don't have the online access or the nurses don't necessarily fax that to us"* [Pharmacist 1]

The lack of ready access to a physician outside of regular hours is another barrier related to access. There are physicians on call, however, they often defer UTI workup and management overnight or over the weekend until the regular physician is working due to lack of access to medical information on the residents suspected of having a UTI.

"And the reason I do it is not to be rushed but to get hold of the floor's doctor who knows the resident best, because if you call the other one (on-call doctor) they will say okay, just give them drink and then call the floor doctor the next day" [Focus group nurses 1]

In addition, the lack of access of physicians to residents when the former are off-site is another barrier to appropriate diagnosis of UTI.

"Another barrier is the fact that we're not in the long-term care centre and we can't really sit and explain or review or see the patient ourselves which then hinders the diagnosis" [Physician 2]

Theme #2: Lack of Knowledge

Lack of knowledge was identified as an important theme as it encompasses several areas of insufficient knowledge: 1) resident's baseline 2) up-to-date evidence on UTI diagnosis and management 3) suspected UTI cases. UTIs can be challenging to diagnose in the elderly population, particularly in residents with dementia as they may not exhibit the typical symptoms of UTI or be able to express their symptoms verbally. In addition, the resident's baseline appeared to be not documented well, updated regularly or readily accessible to clinicians at the time of diagnosis.

" I can see where the nurses sometimes struggle with, but not just here but I think it's throughout long-term care in general. Is anytime you have a huge population of residents

here with dementia with BPSD, so anytime you see a change in any of their behaviours the first thing a lot of nurses do is request for urine sample. And so I think that definitely generates a lot of false positives of for UTIs unfortunately" [Pharmacist 1]

Furthermore, evidence-based practice is constantly changing, therefore, it can be a struggle to keep up one's current knowledge. It can be even more of a challenge for casual staff to keep their knowledge up-to-date.

"We're really in a challenge here where you know not even the frontline staff know exactly what we need to do, you know what qualifies, what doesn't qualify" [Pharmacist 2]

Moreover, for the consultant pharmacist who is only at Kensington Gardens for a day and a half weekly, the lack of knowledge on a potential UTI case can be a barrier in optimizing their role in UTI diagnosis and management.

"I feel like patient care management often slips, you know would slip through my fingers ultimately because I wasn't present for that moment" [Pharmacist 2]

Theme #3: Ineffective Communication

The lack of effective communication between several parties also emerged as a key theme among the barriers to implementation: 1) within the healthcare team 2) between the

healthcare team and resident's family 3) between the healthcare team and laboratory staff 4) between the team at Kensington Gardens and hospital staff.

The lack of access to a physician and pharmacist outside of regular hours is challenging. The nurses sometimes take on the role of the messenger to relay discussion points on UTI management between the dispensary pharmacist and physician or between resident's families and physician. Moreover, there are some resident's families who prefer to discuss the care plan of their loved ones with a physician instead of the nurse in charge of the resident.

"It's in the system but it's not quick like that's a delayed thing where you get a call six hours later oh by the way, you know that antibiotic you recommended well the pharmacy just called and said we can't use that one" [Physician 1]

"... whatever reason in certain peoples' mind they may not be swayed unless they hear it from a physician and that is a culture, that's a cultural change just in our society in general" [Physician 2]

There is also a lack of effective communication methods between the healthcare team at Kensington Gardens and laboratory staff where tests are sent out externally. This leads to the previously identified barrier theme of lack of access to timely medical information pertinent in appropriate UTI diagnosis and treatment.

"We (nurses) call them up to say what happened to my lab result and they (the lab) said oh it was contaminated but they don't feel the need to tell us" [Focus group nurses 2]

When residents are transferred to a hospital for further care, there is a lack of communication on diagnosis and care plan for residents when they return to the long-term care facility. UTIs are commonly identified as the culprit of the resident's deterioration, and this makes the nurses at Kensington Gardens question their knowledge of UTI signs and symptoms.

"A barrier on communication with the hospital might be a problem or if we transferred the resident to hospital sometimes we don't have any information how the resident is doing" [Focus group nurses 2]

Theme #4: Lack of resources

The lack of resources related to the lack of funding, unavailability of proper test and the lack of time and heavy workload related to high HCP to patient ratios.

A lack of time to optimally perform one's role in UTI diagnosis and management was identified by all types of interviewees. The lack of time is partly due to creep in expectation of clinician's roles as well as lack of funding and lack of resources for ideal staffing levels which emerged from the interview transcripts.

"There's one nurse for 25 residents and it's just they have so much to do and it's unfair to put a huge burden of education on their role as well without more supports" [Physician 2]

"I think it's just the resources with time with one like consultant pharmacist coming in 1 and ½ days managing 350 residents" [Pharmacist 1]

"Families of course expect that nurses be on top of the clinical aspect of care but because they take so much time dealing with missed clothing, damaged clothing, missing hearing aids, appointments, communication around appointment bookings it takes so much time from nurses that sometimes because of the family expectations and again being customers, service focused and wanting to be respectful and professional and also maybe it's expectations it's hard to juggle all and sometimes maybe they are rushed when there is a concern that there is a change in their status" [Director of Care 2]

Theme 5: External Factors

External factors outside of the healthcare team included family pressure as well as interactions with the hospital for transferred patients that influence the resident's care for their current UTI in addition to future workup of similar presentation.

"*I have a resident in, like right now…the family is aware of her chronic UTI. So even if there is no signs and symptoms the family wants it checked every 2 weeks. And…we have to respond to the result "* [Focus group nurses 1]

"*I think family definitely plays a huge role because I've also seen incidents like where the families really advocate for an antibiotic. And then you do it because…there's pressure to"* [Pharmacist 1]

"*The other thing is I think sometimes they get jaded with some of the results that come back…I've heard doctors say it too, every time you send a resident out to hospital they come back with quote, unquote, urosepsis. So even though they weren't going in for that, they come back with that diagnosis. So I think that adds to the nurses worry that oh are we not treating the UTIs enough here and they're being sent out?"* [Pharmacist 1]

"*They just went to the hospital, they just give the antibiotic and come back. So I wasted my time, the poor resident bring him to the hospital which is very unfamiliar surroundings right. And it exacerbate more, changes more the behaviours, it makes it worse. It's a waste of time"* [Focus group nurses 1]

3.5 Quantitative Analysis of Facilitators

Again, the focus groups and interviews captured a diverse range of experiences at Kensington Gardens. The facilitator codes are defined in the final codebook (see Appendix C3). The most commonly identified facilitators from the interview data were summarized with selected representative quotes summarized (see Tables 2 below and Appendix A3). These commonly identified facilitators were further sorted based on the job title of the

interviewee at Kensington Gardens who identified the facilitator. The three most commonly identified facilitators were effective communication among the healthcare team, ongoing education for the healthcare team and good collaboration within the healthcare team.

Table 2: Most Commonly Identified Facilitators of Implementation

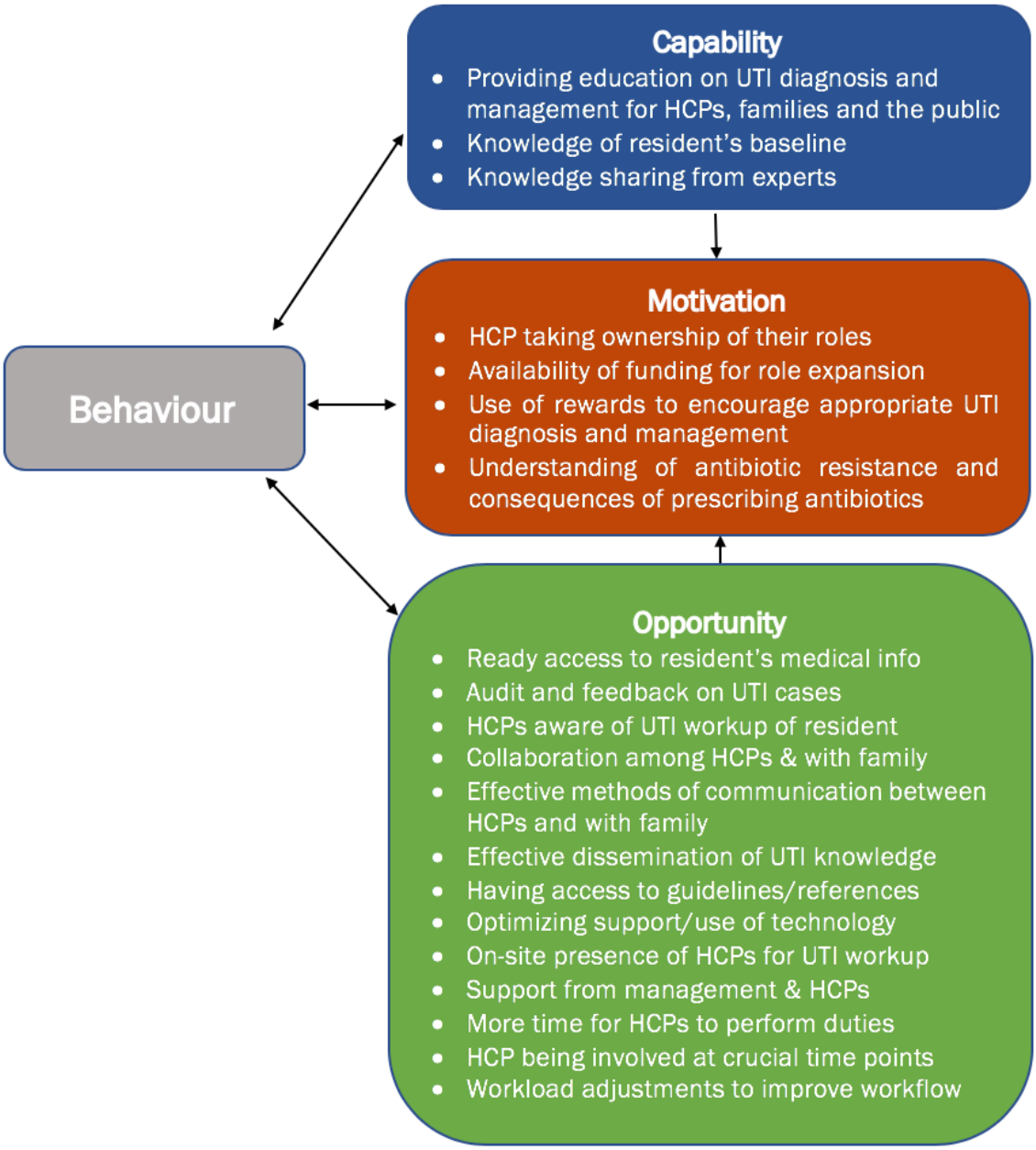
Most Commonly Identified Facilitators	Frequency of response	MD	RN	RPh	DOC	ICP
Communication HCP	21	√	√	√		√
Education HCP	19	√	√	√	√	√
Collaboration HCP	15	√	√	√	√	√
Education Family	14	√	√	√	√	√
Guide	12	√	√	√	√	√
Collaboration Family	8		√	√	√	
Support PCA	7	√	√			
Workload changes	6		√	√	√	
Presence	6	√		√	√	√
Familiarity	5		√			

Legend: MD= medical doctor; RN= registered nurse; RPh= registered pharmacist; DOC= director of care; ICP= infection control practitioner

3.6 Qualitative Analysis of Facilitators (COM-B)

All the identified facilitators were mapped to the COM-B model as seen in the figure below (see Figures 5 & 6) and summarized in table form (see Appendix A4). Capability-related facilitators included educational opportunities for clinicians on UTI particularly from experts in the field and for resident's families and the public on antibiotic resistance, UTI and consequences of prescribing antibiotics and having knowledge of the resident's baseline to help with appropriate diagnosis of UTI. Opportunity-related facilitators included ready access to resident's test results, audit and feedback on UTI cases, timely awareness of suspected UTI cases, good collaboration within the healthcare team and with residents' families, effective communication methods between healthcare professionals and with residents' families, effective dissemination of the latest evidence updates on UTI, having access to guidelines and references at work, optimizing the use of technology to support decision making, the on-site presence of physicians and pharmacists for a UTI work-up, ongoing support from management to front-line clinicians, the involvement of clinicians at crucial time points in the resident's care, increased time for clinicians to perform their roles optimally as well as workload adjustments to improve one's workflow. Lastly, motivation-related facilitators included clinicians taking ownership of their optimal roles, the availability of funding for role expansion and the use of rewards to encourage appropriate UTI diagnosis and management. Similar to barriers, majority of the facilitators identified mapped to the Opportunity section of the COM-B model. Looking closely at the facilitators mapped to Opportunity, majority offer potential solutions to improving current processes of UTI diagnosis and management at Kensington Gardens.

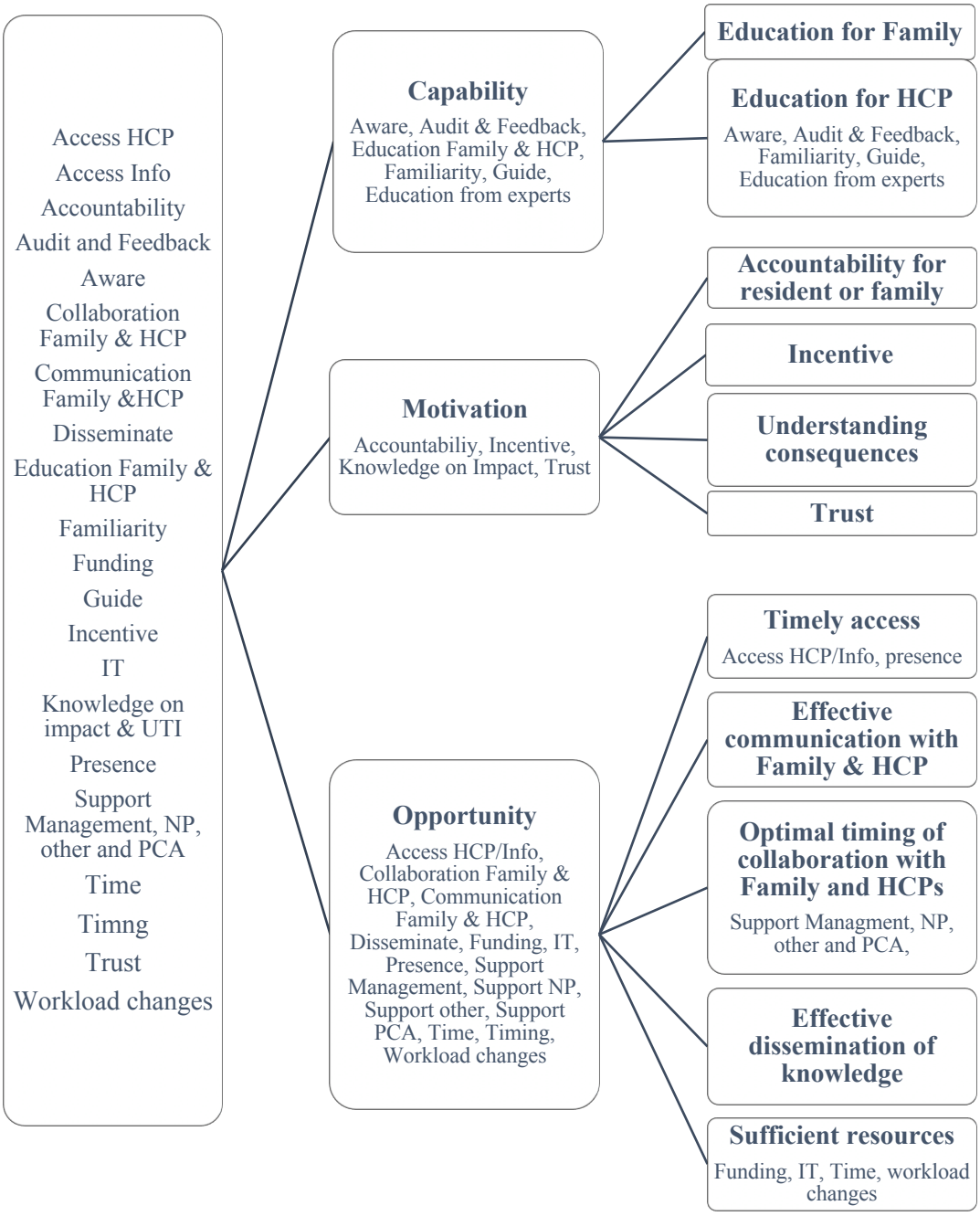
Figure 5: Facilitators of Implementation Mapped to COM-B model



3.7 Qualitative Analysis of Facilitators (Themes)

The facilitator codes with definitions and number of references from the transcripts can be found in Appendix C3. The categories that emerged from grouping facilitator codes and mapping to COM-B were as follows (see Figure 6).

Figure 6: Sorting of Facilitator Codes into Categories



Matching the categories in the figure above with the most commonly identified facilitators of implementation (Table 2) led to the emergence of the main barrier themes:

Theme #1: Education

Acquiring education was frequently identified as a facilitator throughout the interviews to partially address the previously mentioned barrier of lack of knowledge. Tailored and ongoing education for clinicians, particularly from experts in the fields of UTI and long-term care. It was highlighted that physicians, nurses and pharmacists can all take a more active role in educating their peers and the rest of the healthcare team. Audit and feedback on UTI cases was mentioned as an educational and reflective strategy that can be employed for educating clinicians. In addition, using a standard algorithm for UTI diagnosis as well as having a list of commonly used antibiotics for treating UTI were promoted as helpful tools to use in educating clinicians.

"Number one would be general education which and I am going to just say this out front. None of these alone are, in my opinion, would, are going to be enough so one general education so that in our kind of area that could be presentations to frontline clinicians so nurses, physicians, etcetera so just kind of conversations around that and then also to the family council and to resident councils" [Physician 2]

"we could do a better job of highlighting that and that gets back to the point of kind of the, I see, for antibiotic stewardship the strong value of case reflection and case discussion. I can't remember the last time one of my patients had C. Diff. in long-term care…but I'm sure it must happen and I'm sure it will happen to me cause I do use antibiotics…having that kind of feedback of …could it have been prevented in a, you know clearly in a

conversational non-punitive way…long-term care if people get sick they just get sent to a hospital..sometimes the kind of, the downstream you know what you see afterwards they're not always, that's not always..fully internalized by the care providers" [Physician 2]

"These are the ten most common medications prescribed by antibiotics, here are the three most common things; UTI, skin infection and urine infection..these are what our recommendations are you know just simple…and here's your second lines… you really very quickly could very effectively put together a flow sheet for people on the frontlines and like myself who work in long-term care in the community and say if you don't know exactly…maybe just have a look at this protocol" [Physician 1]

Moreover, knowledge of a resident's baseline, particularly behaviour, facilitated early identification and more accurate diagnosis of possible UTI.

"*So at least if it's your attending physician really is, because you're the regular on the floor, you know already the baseline and you can relate the changes to that doctor, there's no problem"* [Focus group nurses 1]

In addition, general education to the public and residents' families on antibiotic resistance and UTI was emerged from the data as helpful to address the knowledge gap in this area and enhance collaboration with the healthcare team.

"…definitely organization wide education for everyone, how everyone can play a part including families. Many residents may have private caregivers, we have volunteers, how everyone can play a part around identification of change and what could that, what that change could, what does it mean, what is causing the change and UTIs being I guess one cause and then education on antibiotics resistance and doing some, I think there is a lot of, I think being a caregiver, a family member, when you see your loved one not well you want everything done; right. You want everything to be done and you want anything that's possible to be offered" [Director of Care 2]

Theme #2: Communication

Effective communication methods within the healthcare team were highlighted as facilitators to appropriate UTI diagnosis and management. For instance, some nurses were aware of specific UTI-related questions that one physician always asks and this made it easier to determine if a resident had a UTI or not. In addition, the nurses used SBAR (Situation, Background, Assessment and Recommendation) in order to promote clearer handover of care for their residents. Furthermore, the dispensary pharmacist sent memos to the nursing staff that helped to inform them of drug interactions and monitoring parameters.

"I think the things that facilitate me think this decision are when staff are already aware of some of these questions and so when they're, when they have, like report symptoms to me that they already, the people who I work with frequently they already know what I'm

going to ask and so they kind of have actually looked into those things already so those, that's a particular facilitator." [Physician 2]

"It's a drug interaction and all those things. So it's very informative for us too with that paper that comes with the antibiotic that you know please monitor days" [Focus group nurses 1]

Theme #3: Collaboration

Good collaboration among the healthcare team members and with residents' families and laboratory staff was another important theme that emerged to facilitate implementation of a UTI-focused AS intervention. Collaboration was most effective when staffing was regular and members have a prior relationship with each other and trust has been built. Collaborating with residents and their families to create care plans for residents can partially address the barrier of family pressure previously mentioned. In addition, the team in the long-term care facility can expand beyond a physician/nurse model to include the pharmacist even if the latter are not on-site using a rounds-format or UTI case reviews.

"When you have consistent staffing that PSWs would notice that change, report to the staff, to the nurse who knows the resident and they would quickly act on it." [Director of Care 2]

"…don't think we necessarily physically have to be here all the time. But I think somehow being involved in the initial step may help to just kind of, we just need to know, that's all it is. If they make that extra phone call let's say. More of like a team approach that would be easier for us to play a role I think. But right now it's definitely just like a, like a nurse and physician team." [Pharmacist 1]

"ultimately, we are working towards collaborative medication reviews, you know having, and pharmacists do rounding with physicians, just as they do in hospitals" [Pharmacist 2]

"I think probably one of the things that I have felt in my experience has worked best with antibiotic stewardship is actual review of cases and having conversations with the prescribing nurse and physician whether that be like antibiotic stewardship rounds where people are actually approached and said oh you prescribed this antibiotic, it's now been two or three days, I'm going to reflect back on these are the symptoms, these are the symptoms now, what made you choose this, did you consider using other antibiotics, did you consider doing a shorter duration, did you consider not treating at all? Perhaps now we should stop treating because the culture is negative so having actual, a second check and approaching physicians who have the prescribing powers and then the nurse on the floor as well just because they're involved in the, in helping diagnose for those kinds of reflections." [Physician 2]

Theme #4: Sufficient resources

The identified resources that would facilitate the uptake of an AS intervention were increased funding for consistent staffing to alleviate high resident to HCP ratios and allow more time for HCPs to carry out their roles optimally and leveraging information technology tools.

"now there's some funding available for clinical work (for pharmacists) in long-term care so that was, but at the time that didn't exist so I feel things are evolving" [Pharmacist 2]

"*When you have consistent staffing that PSWs would notice that change, report to the staff, to the nurse who knows the resident and they would quickly act on it"* [Director of Care 2]

"*one factor that causes UTI is because of poor hygiene. And if you have the manpower, let's say …5 resident and 1 PCA"* [Focus group nurses 1]

"*here are some softwares…that there's more of a direct communication or ability for the pharmacist to text, text message the doctor that is prescribing something, you know if you have quick, efficient communication with the pharmacist"* [Physician 1]

Theme #5: Access

Complementary to the barrier theme of lack of access, timely access to medical information from other HCPs and the laboratory that are pertinent in appropriately diagnosing and managing UTI was a key theme that emerged from the interview data.

"*often times when they're (nurses) aware of the questions that I (physician) often will ask they'll already have the answers for me and they'll have vitals ready, they'll have how much food and drink they've eaten, those types of things that can help a lot"* [Physician 2]

"*another thing that would help is in the lab report we mentioned earlier that there should be a good communication…with them in a way they would report to us if there is positive results regardless right away"* [Focus group nurses 2]

In addition, the physician presence of other HCPs facilitated the resident's family in having access to medical information and the opportunity to discuss care plans face-to-face.

"most of the families are coming on evenings, yes, so having that option you know that yes, we can meet with, our NP meeting with the families cause again as I talk yes, it's better to have face-to-face conversation than over the phone" [Director of Care 1]

3.8 Strategies

Strategies to address identified barriers and support identified facilitators to implementation of a UTI-focused AS intervention at Kensington Gardens emerged from the interview transcripts. These strategies pertaining to the most commonly mentioned barriers and facilitators are sorted and summarized below (See Appendix A5 and A6).

Majority of these strategies are processes that can be continued or improved to promote the uptake of an AS intervention and sustain its long-term adoption into practice at Kensington Gardens. Moreover, these strategies target different clinicians at Kensington Gardens as well as external collaborators in the care of residents, such as residents' family members, laboratory personnel and hospital staff. Strategies that emerged from the data were matched to the corresponding main barrier and facilitator themes to implementation of a UTI-focused AS intervention below (Table 3).

Table 3 : Strategies mapped to main barrier and facilitator themes to implementation

	Theme	**Strategies**
Barriers	Lack of Access	• Have external laboratory call KG for all types of urine culture results (positive, negative, contaminated) • Create LTCF-specific antibiogram • Increase ready access to resident's medical information for on-call physician • Increase availability of HCPs to resident's family for discussions
	Lack of Knowledge	• Provide continuing education for regular and casual staff on UTI diagnosis and management • Establish resident's baseline (cognition, functional ability, urine culture colonization) and reassess resident's baseline regularly • Call the pharmacist when there is a suspected UTI case for workup
	Inadequate Communication	• Hospitals to share information for transferred residents • External lab to call KG for all types of urine culture results (positive, negative, contaminated)

		• Use a team approach in communicating the care plan for the resident
	Lack of resources	• Address staff shortage • Hire more PCAs • Reduce resident's family's expectations for non-clinical care • Assign casual staff to the same floor/residents • Increase trust of resident's family in interprofessional team to save time for physicians in joining discussions
	External Factors	• Educational sessions and handouts for resident's family • Availability of HCPs for discussions on expectations and care plans • Debriefing from hospital for admitted residents regarding their diagnosis and hospital stay
Facilitators	Education	• HCPs to attend continuing education events regularly • Train PCAs and nurses to identify acute symptoms and changes in resident's condition (BayCrest program) • Provide organization-wide education for both clinical and non-clinical staff • Educate clinical staff on: o Behavioural interpretation using an expert speaker o Encouraging fluids first and non-medication strategies (i.e. cranberry juice) for residents with behavioural changes o Global awareness and consequences of inappropriate antibiotic use o How to interpret an antibiogram o Use of protocol to standardize UTI workup and management o Best UTI practices endorsed by experts • Educate prescribers on:

		○ 10 most common antibiotics prescribed ○ 3 most common indication for each antibiotic ○ Second line antibiotic options • Educate residents, residents' families and non-clinical staff on: ○ Consequences of inappropriate antibiotic use ○ How everyone can play a role in identifying changes in resident's baseline ○ Best UTI practices endorsed by experts • Having face-to-face conversations with an HCP (i.e. nurse practitioner during evening shifts) • Physicians and pharmacists to be more involved in educating residents' families • Identifying nurses as educators as families know them well from daily interactions • Using family council meetings to do education
	Communication	• Use of SBAR for nursing communication • PCAs to communicate changes in resident's baseline to nurses • Use of notes and messages to communicate between HCPs (i.e. reminders from pharmacists to nurses regarding supplies and drug interactions) • Call to pharmacist when there is a UTI workup
	Collaboration	• PCAs to communicate changes in resident's baseline to nurses • Highlight how everyone can play a role in identifying changes in resident's baseline • Inclusion of pharmacist in the physician-nurse team in UTI workup • Nurses being aware of questions physician will ask for UTI workup

		• Review of UTI cases with the healthcare team • Viewing families are reliable sources of information on residents when there is no readily available information on residents • Having an HCP champion to guide families through UTI diagnosis and management
	Sufficient resources	• PCAs are very good at picking up changes in resident's baseline and communicating this to the nurses • Assigning regular and casual staff to the same floors • Nurse practitioner to have some evening/night shifts • Improve ratio of PCAs to residents (i.e. 5 residents to 1 PCA)
	Access	• Assigning regular and casual staff to the same floors • Nurse practitioner to have some evening/night shifts • Improve ratio of PCAs to residents (i.e. 5 residents to 1 PCA)

3.9 Pharmacist's roles

The consultant and dispensary pharmacists' current roles in UTI diagnosis and management as well as potential roles in a UTI-focused AS intervention were elicited from all the interviews and focus groups using tailored questions from the interview guide. The consultant pharmacist visits Kensington Gardens a day and a half weekly to perform clinical duties, to participate in committees and to address dispensing incidents while the dispensary pharmacist receives the medication orders, assesses the medication for drug interactions with resident's current medications and for dosing adjustments and dispenses the medication to the long-term care facility.

3.9.1 Qualitative analysis of Pharmacist's roles

Currently, the dispensing pharmacist receives the antibiotic orders but is not involved pre-emptively in the decision by the prescriber on choice of antibiotic prescribed. Similarly, the consultant pharmacist is not involved at the time of antibiotic prescribing and currently assesses appropriateness of antibiotic therapy retrospectively a few days after the start of the therapy. These two pharmacist roles can both play a more active role in antibiotic selection at the time of prescribing.

From the interview transcripts, the themes of ineffective collaboration and communication with the rest of the healthcare team in antibiotic selection and management of residents' UTI as well as inadequate resources for the pharmacist to optimally care for residents emerged.

"if we can have a pharmacist upfront and say, look back, oh this resident has been on this antibiotic a month ago, like is this the right one again? Especially if it's a broad spectrum one, are we building resistance in any way? So I think having that info from the start, and having that pharmacist involved to look at the past history because sometimes physicians don't necessarily look at the past medications they've been on or antibiotics they've been on. I think that would be helpful too and selecting the best antibiotic for them" [Pharmacist 1]

"if (pharmacists) are able to somehow be incorporated from the start and have a role in a collaborative approach to selecting the antibiotic" [Pharmacist 1]

"…don't think we necessarily physically have to be here all the time. But I think somehow being involved in the initial step may help... If they make that extra phone call let's say. More of like a team approach that would be easier for us to play a role I think. But right now it's definitely just like a, like a nurse and physician team." [Pharmacist 1]

"I think it's just the resources with time with one like consultant pharmacist coming in 1 and ½ days managing 350 residents" [Pharmacist 1]

In addition, the facilitator theme of education was highlighted. The consultant pharmacist specifically was identified to be the pharmacist to take on the educator role with residents and their families as well as the rest of the healthcare team. The consultant pharmacist can provide education on antibiotic use and using audit and feedback of UTI cases.

"we can use (consultant pharmacist) again to educate the families on spot… provide education to nurses on…proper antibiotics use" [Director of Care 1]

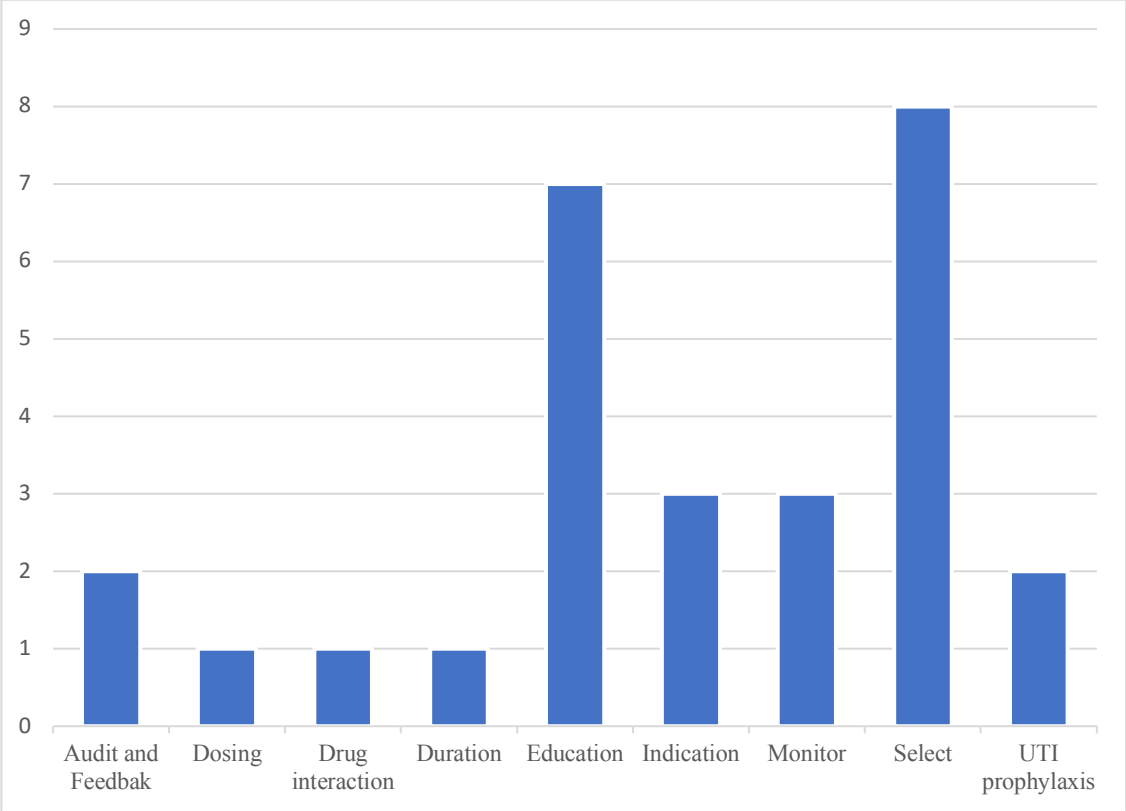
"be another voice to meet with families and patients to discuss this but probably one of the, a really helpful role may be also in terms of just education and suggestions through an antibiotic stewardship lens to physicians who are prescribing and also to nurses just to

provide education and some… language to use when they're discussing with patients and families" [Physician 2]

3.9.2 Quantitative analysis of Pharmacist's roles

The responses were classified according to type of intervention and frequency counted (see Figure 7). In total, there were a total of 28 responses relating to the pharmacist's roles. The top two responses for pharmacist's roles in UTI diagnosis and management are antibiotic selection at the time of prescribing (n= 8) and undertaking an educator role (n= 7). The top two responses were elicited across all types of interviewees irrespective of their job title. From the responses, the consultant pharmacist was identified by all interviewees to be the one to take on majority of these roles, as compared to the dispensary pharmacist.

Figure 7: Pharmacist's Role in UTI- focused AS intervention



CHAPTER 4: DISCUSSION AND CONCLUSION

Discussion

The study findings on barriers and facilitators of implementing a UTI-focused antimicrobial stewardship intervention uncovered the gaps in needs compared to the current resources available at Kensington Gardens. The main barrier themes of lack of access to timely and relevant medical information for diagnosis and management of UTI, lack of knowledge of residents' baseline and inadequate resources highlight the overarching theme of an ineffective system in connecting and supporting the healthcare team in making timely decisions and in caring for patients seamlessly. In addition, the barrier themes underscore the ineffective communication methods within the healthcare team at Kensington Gardens, between the healthcare team and the residents' families and between the healthcare team and external partners such as the laboratory where tests are sent and hospitals where residents are transferred when necessary. Similarly, for the pharmacist's role, the themes of ineffective collaboration and communication with the rest of the healthcare team in antibiotic selection and management of residents' UTI emerged. On the other hand, the strategies that emerged from the transcripts under the facilitator themes of education, effective collaboration and communication, sufficient resources and timely access to medical information and HCPs offer potential solutions to the barrier themes previously identified. These should be considered in the design of a UTI-focused antimicrobial stewardship intervention to increase the successful uptake and long-term sustainability of such an intervention.

To our knowledge, this is one of the first Canadian study to use a structured framework to investigate the barriers and facilitators of implementing a UTI- focused antimicrobial stewardship intervention in long-term care setting. The study's findings echo the findings of previous qualitative studies in this topic in that antimicrobial stewardship interventions require complex behaviour change of different healthcare providers in the continuum of patient care. The use of the COM-B model was useful in analyzing the identified barriers and facilitators in the context of behavioural change theory. Similar to findings from previous qualitative studies, main barrier themes of implementation were the lack of access to timely medical information and on-site physician, the lack of knowledge of current evidence in UTI diagnosis and management, ineffective communication methods and a lack of time to carry out one's roles optimally (Fleming, 2015; Carter, 2017; Chambers, 2019). In addition, main facilitator themes of implementation of continuing education undertaken by healthcare professionals and provided to residents' families, effective communication methods and good collaboration within the healthcare team and with residents' families and external organizations in the continuum of patient care were also similar to previous study findings (Scales, 2017; Lohfield, 2017; Chambers, 2019). Furthermore, some of the facilitator themes of implementation such as education and audit and feedback are recommended in the Society for Post-Acute and Long-Term Care Medicine's template for an Antimicrobial Stewardship Policy (Jump, 2017). However, the study mapped most of the barriers and facilitators to the opportunity component of the COM-B model. This indicates that external factors outside of the individual are the key drivers for change in implementing a UTI-focused antimicrobial stewardship intervention

in long-term care. This finding is in contrast to the one of the first studies to use a behavioural change theory to investigate the views of healthcare professionals in long-term care about antibiotic prescribing (Fleming, 2014). The Fleming study found motivation within the COM-B model to be the key driver for change and antimicrobial stewardship in long-term care. In addition, the Fleming study suggested that having all doctors, nurses and pharmacists involved in LTCFs be motivated to reflect on current practice by undertaking antibiotic surveillance in order to raise awareness of antimicrobial stewardship as a quality improvement item. Given the study finding of opportunity being the key drive to change, this implies that the healthcare team and staff at Kensington Gardens are fairly motivated and capable in the diagnosis and management of urinary tract infections. Instead, process changes to address the opportunity barriers identified should be considered in the design of a UTI-focused antimicrobial stewardship intervention at Kensington Gardens.

Furthermore, to our knowledge, this is first study to specifically explore the role(s) of the pharmacist in antimicrobial stewardship in the long-term care setting. From the interviews, both the dispensing and consultant pharmacist, can play a significant role in providing education and guidance on antibiotic selection at the time of prescribing. In terms of education, the consultant pharmacist can provide general education on antibiotic resistance and antibiotics to residents, resident's families and the rest of the healthcare team as well as providing education during audit and feedback sessions with physicians on urinary tract infection cases. Prospective audit and feedback (PAF) involves the assessment of antimicrobial therapy by trained individuals (usually physicians and/or pharmacists), who make recommendations to the prescriber in real time to optimize antimicrobial therapy

(PHO, 2018). While there is evidence that support the effectiveness of PAF (Wu, 2019; Fleming, 2015) in improving prescribing practices, PAF is resource-intensive and require adequate staffing and time for case review and communication of recommendations (PHO, 2018), which may not be available in the long-term care setting. In terms of guidance on antibiotic selection, both the dispensing and consultant pharmacists were thought to be experts in knowing the resident's allergies, prior antibiotic exposure and concurrent medications that may interact in order to recommend the optimal antibiotic choice to prescribe at the time of prescribing. The pharmacist's roles in antibiotic selection and education differ from roles mentioned in a previous qualitative study that found the pharmacist to be mainly involved in screening for drug interactions and providing drug information (Fleming, 2015).

Some limitations to the findings in this study should be noted. Firstly, the perspectives of residents and their families were not included. These groups are important stakeholders in the design and implementation of a UTI-focused antimicrobial stewardship intervention and there may have been additional barriers and facilitators not considered. Secondly, although there was a wide range of healthcare professionals and long-term care facility staff involved in the focus groups and interviews, half of the participants belonged to the nursing profession and therefore, may have more similar opinions. It may have been beneficial to have more perspectives of other members of the healthcare team such the physicians and pharmacists. Furthermore, the views of other members in the residents' circle of care were not identified in the stakeholder meeting on participants to interview and therefore, the views of the personal care attendants, laboratory staff and hospital staff

were not collected which may have provided further insights into barriers and facilitators. In particular, the perspectives of personal care attendants would be insightful as they work most closely with residents and would be able to detect any changes in residents' baseline more rapidly and accurately. In the LTCFs, personal care attendants assist residents in personal care such as dressing, bathing, feeding and toileting. Thirdly, all the data collected contain the self-reported perceptions of barriers and facilitations of implementation of the long-term care facility staff. In order to gather additional context for implementation of a UTI-focused antimicrobial stewardship intervention, it may have been useful to have collected observational data on the current diagnosis and management of UTI at Kensington Gardens. Moreover, coding was undertaken by an LTC pharmacist, a hospital pharmacist and a Master's student so inherent biases of the LTC pharmacist in coding responses for this study were minimized by the perspectives of the latter two. Lastly, not all of the identified barriers and facilitators to implementation of a UTI-focused antimicrobial stewardship intervention would be applicable to other long-term care facility given the unique setting, workflow and complement of staff at each facility.

Conclusion

Overall, this study contributed to current knowledge in the area of antimicrobial stewardship in long-term care by providing more evidence to support the importance of tailoring interventions to target the factors underlying barriers to behaviour change. Furthermore, the study contributed to the knowledge on gaps in the needs of the long-term care setting compared to availability of resources that hindered the provision of seamless

care. Stewardship interventions require complex behaviour changes of different health care providers within a supportive and enabling environment. An effective antimicrobial stewardship intervention in LTC setting should consider a multifaceted approach to improving access to timely medical information, increasing knowledge on UTI diagnosis, antibiotics and antibiotic resistance, promoting effective communication and good collaboration within the healthcare team and with residents and families. In addition, pharmacists can play a more active role in antibiotic selection at the time of prescribing and undertaking an educator role in a UTI-focused antimicrobial stewardship intervention.

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Appendix A: Tables

Table A1: Selected Quotes for Most Commonly Identified Barriers of Implementation

Most Commonly Identified Barriers	Selected Quotes
Family pressure	"Most of the time that's the challenge if the family, because they are the ones who are telling the doctor or the nurses that my mom has to be started on antibiotic"
Access info	"We don't have lab work. So like we don't have their swabs. We don't have the culture reports, sensitivity reports to recommend something possibly even, either more specific to that treatment"
Test delay	"We have lab work but sometimes it's outdated, we don't have the real time lab work that's available because we don't have the online access or the nurses don't necessarily fax that to us" "Well how long it's going to take the test? Well the test may come in a week and may be false positive as well"
Workload	" Families of course expect that nurses be on top of the clinical aspect of care but because they take so much time dealing with missed clothing, damaged clothing, missing hearing aids, appointments, communication around appointment bookings it takes so much time from nurses that sometimes because of the family expectations and again being customers, service focused and wanting to be respectful and professional and also maybe it's expectations it's hard to juggle all and sometimes maybe they are rushed when there is a concern that there is a change in their status " "There's one nurse for 25 residents and it's just they have so much to do and it's unfair to put a huge burden of education on their role as well without more supports" "they (consultant pharmacists) have other challenges so what do they do here you know they do the, you know they do the med reviews, they have other clinical duties in terms of you know auditing and managing education and managing drug, the structure, and then all the challenges around dispensing errors and med

	incidents and family challenges and all that stuff that comes up periodically so they have to manage all that stuff on the side in addition to reviewing all of the residents once every quarter" "I think it's just the resources with time with one like consultant pharmacist coming in 1 and ½ days managing 350 residents"
Communication	"We (nurses) call them up to say what happened to my lab result and they (the lab) said oh it was contaminated but they don't feel the need to tell us" "It's in the system but it's not quick like that's a delayed thing where you get a call six hours later oh by the way, you know that antibiotic you recommended well the pharmacy just called and said we can't use that one" "A barrier on communication with the hospital might be a problem or if we transferred the resident to hospital sometimes we don't have any information how the resident is doing"
Patient factor	"With elderly with dementia they don't treat them typical symptoms of UTI; right, they don't verbalize the signs of burning sensation or they are incontinent so we wouldn't be able to identify or assess that there is a frequency or any other typical symptoms; right, because of dementia and their impairment you don't have ability to get that input. You're not being able to hear oh I had a hard time going to the bathroom, it's burning or you know so that definitely it's a barrier to identification of UTIs" " I can see where the nurses sometimes struggle with, but not just here but I think it's throughout long-term care in general. Is anytime you have a huge population of residents here with dementia with BPSD, so anytime you see a change in any of their behaviours the first thing a lot of nurses do is request for urine sample. And so I think that definitely generates a lot of false positives of for UTIs unfortunately"
Bias HCP	" overall that urinary tract infections are blamed for everything and so in the challenges where I have in appropriately diagnosing it is that there's a lot of signs or symptoms that are presented to me as a reason for moving forward with testing that are not really on my list of those signs and symptoms that I would normally trigger for me concerning diagnosis and some of these I find in my mind a lot of families and in some of our colleagues are very fixed so it's very

	challenging for me to work with them and kind of explain my rationale for not doing further testing"
Time	"You're trying your best but sometimes it's impossible so you might be short and then you know being short you rush the care" "I would say that the success, like when you sit down and have a conversation with people the success rate is really quite high when you explain to them your rationale. I don't think that it's plausible that physicians are going to be able to do this on an as needed basis which is the reality unfortunately. I think our interdisciplinary colleagues could do a wonderful job with this although I would say there are a couple of concerns with that. One it takes time and for whatever reason in certain peoples' mind they may not be swayed unless they hear it from a physician and that is a culture, that's a cultural change just in our society in general"
Knowledge HCP	"We're really in a challenge here where you know not even the frontline staff know exactly what we need to do, you know what qualifies, what doesn't qualify" "You know we have a very medical model here and there's a symptom, there's a treatment. Well yeah, but sometimes treatment is tincture of time"
Presence	"I feel like patient care management often slips, you know would slip through my fingers ultimately because I wasn't present for that moment" "Another barrier is the fact that we're not in the long-term care centre and we can't really sit and explain or review or see the patient ourselves which then hinders the diagnosis"

Table A2: Barriers mapped to COM-B

Barriers	Description	COM-B
Acceptance	Being satisfied with status quo	Motivation-reflective
Access HCP	Inability of resident's family to talk to HCPs due to circumstances	Opportunity-physical
Access Info	Lack of access to resident's information that hinders HCP's ability to provide optimal care	Opportunity-physical
Accountability	HCP or family feeling responsible about expectations of their roles	Motivation-reflective
Aware	HCPs knowing about residents with possible UTI	Capability-psychological
Bias family	Resident's family has own subjective views on definition of UTI and its management	Capability-psychological
Bias HCP	HCP has own subjective views on diagnosing and managing UTIs	Capability-psychological
Collaboration	HCPs not working with each other to care for residents	Opportunity-physical
Communication	Lack of adequate communication between HCPs with regards to workup or care plan for patients	Opportunity-physical
Disseminate	Ineffective methods of sharing knowledge on UTI diagnosis and management to HCPs, resident's family and the general public	Opportunity-physical
Family pressure	Resident's family influencing the resident's care in a direction opposite of the medical team's original plan	Opportunity-social
Funding	Lack of money for activities that optimize UTI diagnosis and management	Motivation-automatic
Hospital involvement	Hospital involvement that leads to negative views on UTI	Opportunity-social
Knowledge Family	Resident's family expressed lack of knowledge in understanding and managing UTIs	Capability-psychological
Knowledge HCP	Lack of knowledge expressed by HCPs in appropriate diagnosis and management of UTI as well as negative impact of over treating UTI	Capability-psychological

Patient Factor	Resident characteristics that make UTI diagnosis and management more challenging to HCPs	Capability-psychological
Presence	Not being physically present at long-term care facility at the time of UTI diagnosis or management	Opportunity-physical
Test collect	Factors that hinder obtaining the best urine sample for testing	Opportunity – physical
Test delay	Not receiving test results in time to help with clinical decision making	Opportunity – physical
Test wrong	Incorrect test available to use in diagnostic assessment	Opportunity – physical
Time	Inadequate time available for HCPs to do their roles optimally	Opportunity – physical
Trust	Distrust or skepticism by resident's family in HCP's plan/abilities	Motivation-reflective
Workload	Issue of workload volume hindering diagnosis and management of UTI	Opportunity-physical

Table A3: Selected quotes for Most Commonly Identified Facilitators of Implementation

Most Commonly Identified Facilitators	Selected Quotes
Communication HCP	"I think the things that facilitate me think this decision are when staff are already aware of some of these questions and so when they're, when they have, like report symptoms to me that they already, the people who I work with frequently they already know what I'm going to ask and so they kind of have actually looked into those things already so those, that's a particular facilitator." "But like we report everything that we see like as per report we always tell them to, the communication is already in the progress note because like if you see it, the PCA reports to you, you do a little assessment obviously. You're going to do like foul urine, odor reported this shift so continue to monitor and then evening shift will get and we'll see." "S bar is like our, it's kind of what, when, how. It's yes, it's kind of in a laymen's term. So it's like what happened? What happened, like it's those yes. That you have to tell doctor, okay doctor this is what happened. So it's like the history of the say the situation. So we call S bar. 4 – Background, Assessment, Recommendation" "It's a drug interaction and all those things. So it's very informative for us too with that paper that comes with the antibiotic that you know please monitor days" "Another thing that would help is in the lab report we mentioned earlier that there should be a good communication- with them in a way they would report to us if there is positive results regardless right away"
Education HCP	"Number one would be general education which and I am going to just say this out front. None of these alone are, in my opinion, would, are going to be enough so one general education so that in our kind of area that could be

	presentations to frontline clinicians so nurses, physicians, etcetera so just kind of conversations around that and then also to the family council and to resident councils" "Organization wide education for staff, all staff not just nursing sometimes helps people who may see the change and direct that and may have a valuable information but maybe that's not coming weekly to the nurse so if it's how do you get that awareness of early identification of resident having an infection or when there is a change in their condition. It doesn't have to be a PSW. It could be a caregiver, it could be an activation person or yeah, a housekeeper. Anyone" "I do regular CME for long-term care. That's my go-to cause it applies to long-term care and to a lot of medicine and so I get what I perceive to be the most current information on a yearly basis" "We did have a program through Bay Crest, I don't know, and well some time ago where nurses and PSWs together were trained on identifying acute symptoms and like changes in condition and they talked about priorities and what would be a priority for a PSW to identify and report to the nurse versus what's not so urgent" "Give people at the frontline you know a graphic or an inkling sense of what that looks like- you know and is that an antibiogram who knows what it is but to give people a taste of that and people you know if they can comprehend that little piece and they can sort of parrot it then they'll often, you know capture it for themselves as a piece that they pride in and say oh yeah well look at we're managing UTIs so much better, 10% better or whatever it is."
Collaboration HCP	"It could be the opportunity; right, of where you have consistent staffing that PSWs would notice that change, report to the staff, to the nurse who knows the resident and they would quickly act on it." "Right now, the collaboration between our team leaders, our nurses and the doctors are very effective cause like it's because it's our team leaders, our nurses upstairs who really know the resident; right. The only thing when they call us or need us is when they, one just tells them what to do."

	"ultimately, we are working towards collaborative medication reviews, you know having, and pharmacists do rounding with physicians, just as they do in hospitals" "don't think we necessarily physically have to be here all the time. But I think somehow being involved in the initial step may help to just kind of, we just need to know, that's all it is. If they make that extra phone call let's say. More of like a team approach that would be easier for us to play a role I think. But right now it's definitely just like a, like a nurse and physician team." I" think probably one of the things that I have felt in my experience has worked best with antibiotic stewardship is actual review of cases and having conversations with the prescribing nurse and physician whether that be like antibiotic stewardship rounds where people are actually approached and said oh you prescribed this antibiotic, it's now been two or three days, I'm going to reflect back on these are the symptoms, these are the symptoms now, what made you choose this, did you consider using other antibiotics, did you consider doing a shorter duration, did you consider not treating at all? Perhaps now we should stop treating because the culture is negative so having actual, a second check and approaching physicians who have the prescribing powers and then the nurse on the floor as well just because they're involved in the, in helping diagnose for those kinds of reflections."
Education Family	"I mean definitely organization wide education for everyone, how everyone can play a part including families. Many residents may have private caregivers, we have volunteers, how everyone can play a part around identification of change and what could that, what that change could, what does it mean, what is causing the change and UTIs being I guess one cause and then education on antibiotics resistance and doing some, I think there is a lot of, I think being a caregiver, a family member, when you see your loved one not well you want everything done; right. You want everything to be done and you want anything that's possible to be offered" "And the doctor has to be more involved in explaining. It's like you know pick up the phone and just say you know I'm

	open to discussion if you want this okay. Explain the risk or the benefit of it right." "The third or kind of thing that would help is just general educational type of things so you know pamphlets. I think those are lower, in my experience they haven't always really helped but that's certainly something that could be, that I think would be helpful to look at or if they, if I wanted to say oh can you just give that pamphlet on why we don't order urine tests to everybody that might actually help to, for a family member just to look over that if the nurses or myself is struggling to discuss with them and it could also be used in more preventative type settings so in our yearly case conferences this is where we bring up a lot of different things." "number one would be the nurses on the unit. That would be ideal because they know the patients so well, they know the families so well, they're present every day and because of that face time and they know the resident so well that they would be ideal to provide that education." "number one would be general education which and I am going to just say this out front. None of these alone are, in my opinion, would, are going to be enough so one general education so that in our kind of area that could be presentations to frontline clinicians so nurses, physicians, etcetera so just kind of conversations around that and then also to the family council and to resident councils"
Guide	"We do have UTI guidelines, yes, for nurses. Again, you know to look at symptoms, yes, the resident has to have at least three symptoms in order to consider a UTI, yes, and if there is not. One of the symptoms because sometimes in elderly people it's not one of the criteria for an infection. We're looking at changes in behaviour" "It's mostly keeping up with the current practice, like the guidelines. We have like an antimicrobial like handbook or some sort of pocket guide that we use for ourselves. So but for us it's mostly knowledge and guidelines and like whatever information we gather from research yeah. So it's based on, just medical pharmacy's pocket book" "…give people some level of confidence you know that this is executive sponsors have endorsed this you know like key

	experts have said this is how we should do things, this is the best practice and we're following this procedure so that we'll make sure your mom is okay" "Here's your ten, these are the ten most common medications prescribed by antibiotics, here are the three most common things; UTI, skin infection and urine infection, here are the most, so these are what our recommendations are you know just simple, keep it simple stupid" "if the pharmacy has their own sort of protocol where you know bells and whistles that tweak them and then there's a Quinolone or you know or something that you know provides them with some information and says have you told the doctor about these other options you know maybe they want to try Amoxil, maybe they want Fosfomycin you know maybe" "First of all I think just my, the things that have helped me it's just a personal approach to diagnosing urinary tract infections so for me trying to really drill down to what I think is the important sign or symptom that will make my, make me change my management and then trying to come up with questions that I can ask the staff when I'm called."
Collaboration Family	"definitely organization wide education for everyone, how everyone can play a part including families. Many residents may have private caregivers, we have volunteers, how everyone can play a part around identification of change and what could that, what that change could, what does it mean, what is causing the change and UTIs being I guess one cause" "if you could have someone, a pharmacist or otherwise you know guide families around these difficult moments then it would serve your, serve, you know serve the home very well ultimately to have that you know if you could, you know, a champion if you like that would take responsibility for that individual and informing the family of their progress because their mom is feeling, looking a little off- I: Yeah. R: -and say you know what okay, we're going to watch her carefully and I'll let you know tonight how she's doing and then we can talk again tomorrow and so if we're not at this point by this point then we'll have to maybe think about some antibiotics or you know that kind of thing"

Support PCA	"they are the ears, eyes and everything, those PCAs redirect to them (nurses) any abnormalities that you would find to report it right away so that it will be addressed"
Workload changes	"it could be the opportunity; right, of where you have consistent staffing that PSWs would notice that change, report to the staff, to the nurse who knows the resident and they would quickly act on it." "that might be you know having a virtual pharmacist or having you know that kind of thing or having more regular visits perhaps or scheduled visits or better, that are more frequent than once a week or whatever it is that they have at that particular home." "the physician is required legally to review every medication, every resident's medication every quarter and there is a mandate for the pharmacist to do it as well so why not do it together you know as opposed to doing it in separate silos- I: Yeah. R: -it makes good sense and it's an efficient use of time and more productive ultimately. The concept of rounding does occur."
Presence	"you know even physicians have said you know what if I can just meet with the family then I'm 80% there." "I would say that the success, like when you sit down and have a conversation with people the success rate is really quite high when you explain to them your rationale." " I think (an NP) that will help again with supporting and reassuring them that he's up on the floor when they get suspicious about a UTI probably I guess and also having somebody you know assessing the resident on-the spot, yes, not just over the phone because physicians are not here every day, yes, so they rely on our nurses."
Familiarity	"So, knowing our resident is the most important things but because most of us we work in a regular floor and an opportunity that you would be able to identify those signs and symptoms that are different from the usual ones" "And the reason I do it is not to be rushed but to get hold of the floor's doctor who knows the resident best, because if you

	call the other one (on-call doctor) they will say okay, just give them drink and then call the floor doctor the next day"

Table A4: Facilitators Mapped to COM-B

Facilitators	Description	COM-B
Access information	HCPs having ready access to resident's information to help with clinical decision making	Opportunity-physical
Accountability	HCPs taking ownership in performing their roles	Motivation-reflective
Audit and Feedback	Review of UTI cases and providing feedback for improvement	Motivation-reflective
Aware	HCPs aware of potential UTI cases	Capability-psychological
Collaboration Family	HCP working with resident's family to optimize care of the resident	Opportunity-physical
Collaboration HCP	HCPs working together to diagnose and manage UTIs	Opportunity-physical
Collaboration Others	HCP or resident's family working with non-HCPs in diagnosing and managing UTIs	Opportunity-physical
Communication Family	Use of verbal or non-verbal communication methods with resident or resident's family to improving sharing of care plan	Opportunity-physical
Communication HCP	Use of verbal or non-verbal communication methods between HCPs to improve sharing of resident's information and care plan	Opportunity-physical
Disseminate	Effective methods of disseminating knowledge on UTI diagnosis and management to HCPs and the public	Opportunity-physical
Education Family	HCPs providing education to resident's family regarding appropriate UTI diagnosis and treatment	Capability-psychological
Education HCP	Continuing education sessions that HCPs attend to update their knowledge and skills	Capability-psychological
Familiarity	Having knowledge of resident's baseline or history to help with UTI assessment	Capability-psychological
Funding	Availability of money to hire HCPs for activities that optimize UTI diagnosis and management	Opportunity-physical
Guide	Having guidelines, checklist, references or policies available to help HCP perform their roles	Capability-psychological
Incentive	Use of rewards to encourage appropriate UTI diagnosis and management	Motivation-automatic

IT	Using technology or programs to help with clinical decision making	Opportunity-physical
Knowledge on impact	Understand consequences of antibiotic prescribing for UTI	Motivation-reflective
Education from experts	Use of expertise or knowledge of experts on UTI diagnosis and management	Capability-psychological
Presence	Being on-site at the NH	Opportunity-physical
Support Management	HCPs having support or mentorship from managers in UTI assessment and management	Opportunity-physical
Support NP	Having a nurse practitioner to help in diagnosis and management of UTI	Opportunity-physical
Support other	Availability of non-HCP, non-resident's family to help in diagnosis and management of UTI	Opportunity-physical
Support PCA	HCPs having personal care attendant to help in care of resident	Opportunity-physical
Time	Having more time to assess or manage UTIs	Opportunity-physical
Timing	HCP involvement a crucial time point in UTI diagnosis and management	Opportunity-physical
Trust	HCPs having trust in each other	Motivation-reflective
Workload changes	Workload changes that help optimize the diagnosis and management of UTI	Opportunity-physical

Table A5: Most Commonly Identified Barriers of Implementation and Strategies

Most Commonly Identified Barriers	Strategies
Family pressure	• Educational sessions and handouts for resident's family • Availability of HCPs for discussions on expectations and care plans
Lack of access to information for HCPs	• Resident's symptoms listed online • Lab to call back for all types of urine culture results (positive, negative, contaminated) • Create LTC-specific antibiogram • Access to resident's information for on-call physician
Test result delay	• Shorter turnaround time for urine culture results • Streamline process of urine culture results communicated to nurses • Online access to lab results
Heavy workload	• Address staff shortage • Reduce resident's family's expectations for non-clinical care • Assign casual staff to the same floor/residents • Hire more PCAs
Lack of communication	• Hospitals to share information for transferred residents • Lab to call back for all types of urine culture results (positive, negative, contaminated) • Avoid using the nurse as the middle person in conveying messages to/from physician, pharmacist and resident's family
Patient factors hindering appropriate UTI diagnosis	• Establish resident's baseline (cognition, functional ability, urine culture colonization) • Reassess resident's baseline regularly • Clarify resident's antibiotic allergies on admission
Bias of HCPs	• Education on UTI symptoms and diagnosis • Create a checklist of UTI signs and symptoms

	• Create a standard list of questions for UTI workup • Physician to explain rationale for no further workup • HCPs to have an open mind to listen to different perspectives
Inadequate time	• Address staff shortage • Increase trust of resident's family in interprofessional team to save time for physicians in joining discussions
Knowledge of HCPs	• Regular education for regular and casual staff on UTI diagnosis and management
Physical presence of HCPs	• Physicians to increase time spent discussing options and care plan with resident's family • Pharmacist to be present at time of prescribing

Table A6: Most Commonly Identified Facilitators of Implementation and Strategies

Most Commonly Identified Facilitators	Strategies
Good communication between HCPs	• Use of SBAR for nursing communication • PCAs to communicate changes in resident's baseline to nurses • Use of notes and messages to communicate between HCPs (i.e. reminders from pharmacists to nurses regarding supplies and drug interactions) • Call to pharmacist when there is a UTI workup

Education for HCPs	• Organization-wide education for both clinical and non-clinical staff
	• Train PCAs and nurses to identify acute symptoms and changes in resident's condition (BayCrest program)
	• Educate staff on:
	  ○ Behavioural interpretation using an expert speaker
	  ○ Encourage fluids first and non-medication strategies (i.e. cranberry juice)
	  ○ Global awareness and consequences of inappropriate antibiotic use
	  ○ How to interpret an antibiogram
	  ○ Use of protocol to standardize UTI workup and management
	• Educate prescribers on:
	  ○ 10 most common antibiotics prescribed
	  ○ 3 most common indication for each antibiotic
	  ○ Second line antibiotic options
	• HCPs to attend continuing education events regularly

Collaboration between HCPs	• PCAs to communicate changes in resident's baseline to nurses • Highlight how everyone can play a role in identifying changes in resident's baseline • Inclusion of pharmacist in the physician-nurse team in UTI workup

	• Nurses being aware of questions physician will ask for UTI workup • Review of UTI cases with the healthcare team

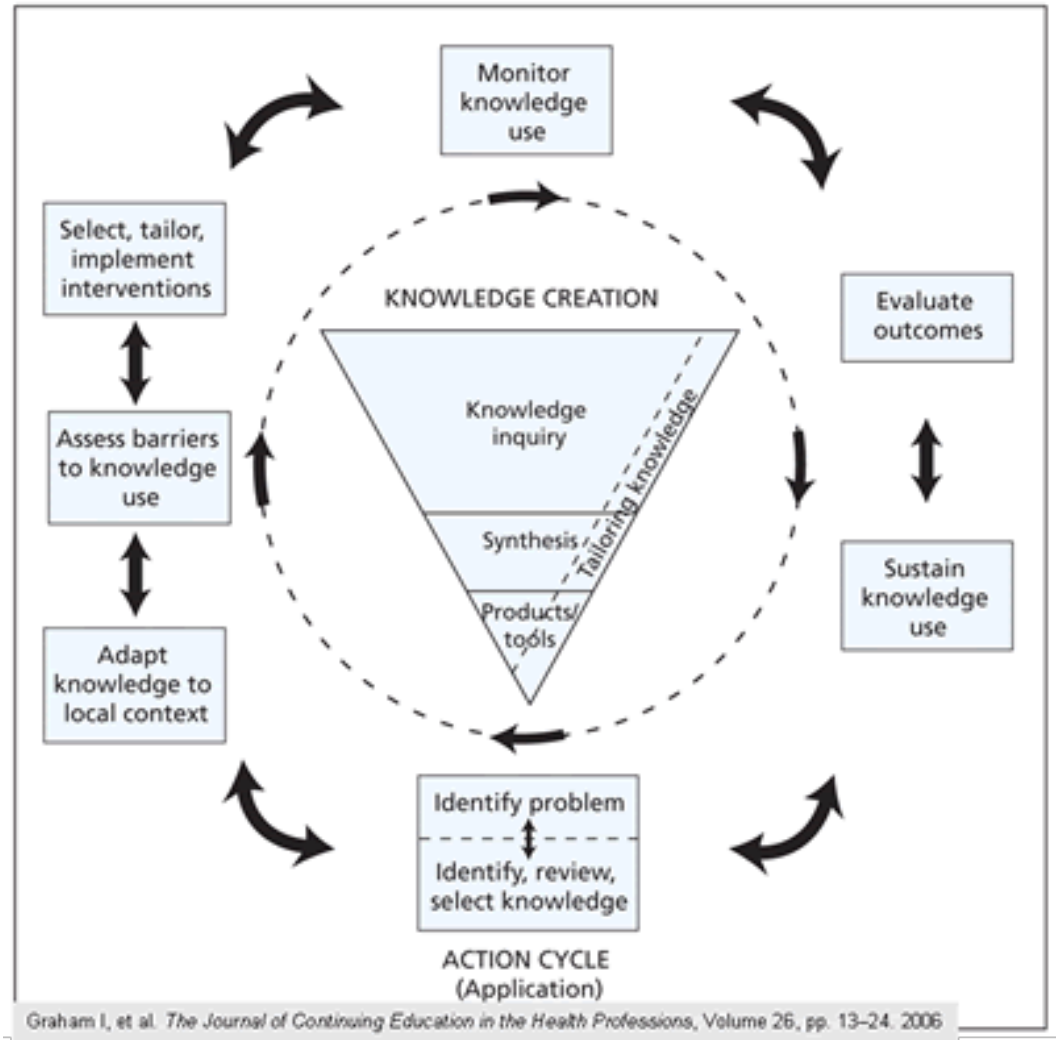
Education for resident's family	• Education on:
	  o Consequences of inappropriate antibiotic use
	  o How everyone can play a role in identifying changes in resident's baseline
	  o Best UTI practices endorsed by experts
	• Having face-to-face conversations with an HCP (i.e. nurse practitioner during evening shifts)
	• Physicians to be more involved in educating families
	• Nurses would be ideal provider of education as families know them well from daily interactions
	• Using family council meetings to do education

Guide for UTI diagnosis and management	• Create UTI guidelines on diagnosis and management o At least 3 symptoms to be considered a UTI • Pharmacist uses the medical pharmacy's pocket book on antimicrobials • Create guide for prescribers that include 10 most common antibiotics prescribed, 3 most common indication for each antibiotic and second line antibiotic options
Collaboration between HCPs and resident's family	• Highlight how everyone can play a role in identifying changes in resident's baseline • Families are reliable sources of information on residents when there is no readily available information on residents • Having an HCP champion to guide families through UTI diagnosis and management • Having a collaborative understanding of resident's care plan
Support from personal care attendants	• PCAs are very good at picking up changes in resident's baseline and communicating this to the nurses
Workload changes	• Assigning regular and casual staff to the same floors • Nurse practitioner to have some evening/night shifts • Improve ratio of PCAs to residents (i.e. 5 residents to 1 PCA)
Physical presence of HCPs	• Nurse practitioner can do on-site education with families in the evenings

	• Pharmacists readily involved in UTI workups if they are present on-site • Physicians to increase time spent with families discussing rationale for workup and care plan
Familiarity with resident	• Facilitates identification of different signs and symptoms from resident's baseline • Nurses know the residents very well and are reliable sources of information

Appendix B: Figures

Knowledge to Action Cycle



Appendix C:

C1: CONSENT FORM TO PARTICIPATE IN A RESEARCH STUDY

Study Title: A qualitative study on perceived barriers and facilitators of implementing an antimicrobial stewardship intervention in the management of urinary tract infections in a nursing home

Principal Investigator: Dr. Benjamin Kaasa

Contact Information: 416-603-5800 ext. 3434, Benjamin.kaasa@uhn.ca

Introduction:
You are being asked to take part in a research study. Please read the information about the study presented in this form. The form includes details on study's risks and benefits that you should know before you decide if you would like to take part. You should ask the study team member to explain anything that you do not understand and make sure that all of your questions have been answered before signing this consent form. Participation in this study is voluntary.

Purpose of Study:
The purpose of this study is to understand the current process of diagnosing and managing urinary tract infections (UTIs) and to identify facilitators and barriers that will inform the design and implementation of a UTI-focused antimicrobial stewardship intervention at Kensington Gardens.

Study Design:
Descriptive qualitative study

Study Visits and Procedures:
You will be part of one focus group that will take up to 90 minutes or a one-on-one interview session which will take up to 30 minutes.

The focus group facilitator and/or interviewer will ask questions from a semi-structured interview guide. Questions will relate to the current process of UTI diagnosis and management at Kensington Gardens and factors that will influence design as well as the

implementation of a new AS intervention(s). A second research staff may be present at focus groups in order to help with data collection.

Risks:
No risk greater than those experienced in ordinary conversations are anticipated.

Benefits:
Your participation may benefit you, other staff and patients at Kensington Gardens by helping to improve the diagnosis and management of UTIs. However, you may find no benefit in participating in this study.

Confidentiality:
Your focus group or interview will be audiotaped for the purpose of transcribing data for analysis. You will remain anonymous throughout the data reported and published. The other participants in the group will be asked to keep what was discussed in confidence, but this cannot be assured. Audiotapes will be destroyed within 30 days after transcription. All transcripts and physical notes from the focus groups or interviews will be stored in a locked file cabinet at the investigator's office. Soft versions of study related documents will be password protected and stored in a password protected USB key and work laptop.
The research study you are participating in may be reviewed for quality assurance to make sure that the required laws and guidelines are followed. If chosen, (a) representative(s) of the Human Research Ethics Program (HREP) from the University of Toronto may access study-related data and/or consent materials as part of the review. All information accessed by the HREP will be upheld to the same level of confidentiality that has been stated by the research team.

Voluntary Participation:
Your participation in this study is voluntary and will not affect your employment status with Kensington Gardens.

Withdrawal from the Study:
You may request to leave the study at any time. You can request that your data be destroyed provided that it is trackable and has not yet been ammonized and analyzed. If you are in a focus group, after the recording is complete, it is not possible to undo the words of participants that have influenced the discussion. Once the data is collected and anonymized, it will not be possible to remove your data. This likely will occur within one week of data collection.

Costs and Reimbursement:
There will be no reimbursements for participation in this study.

Conflict of Interest: none

Questions about the Study:

If you have any questions, concerns or would like to speak to the study team for any reason, please call: Dr. Benjamin Kaasa at 416-603-5800 ext 3434 or April Chan at 416-530-6000 ext 4536.

If you have any questions about your rights as a research participant or have concerns about this study, you can contact the Office of Research Ethics at ethics.review@utoronto.ca or 416-946-3273.

You will be given a signed copy of this consent form.

Consent:

This study has been explained to me and any questions I had have been answered.
I know that I may leave the study at any time. I agree to the use of my information as described in this form. I agree to take part in this study.

_____	_____	_____
Print Study Participant's Name	Signature	Date

My signature means that I have explained the study to the participant named above. I have answered all questions.

_____	_____	_____
Print Name of Person Obtaining Consent	Signature	Date

C2: Semi-structured interview guide

Introductions:

- Introduce self (research assistant or researcher working with others from Kensington Garden, Medical Pharmacies Inc, University of Toronto, McMaster University)
- This project is not funded but is an initiative of KG and data will contribute to a Master's thesis.
- The purpose of the study and today's focus group / interview is to understand the current process of diagnosing and managing UTIs at Kensington Gardens to help design an AS program for UTI.
- Go over the consent form and sign consent forms prior to starting the interview/focus group.
  - Mention: confidentiality, benefits/potential harms, permission to audiotape)
- Confirm role/title of the interviewees/participants and assign everyone a 'number' to facilitate the audiotaping and transcript process.

Questions:

1. Describe how UTIs are currently diagnosed and managed in your nursing home

2. What is/are your roles in relation to the diagnosis and management of UTIs?

3. What are facilitators to carrying out your role in diagnosing and/or managing UTIs?
   - Prompts:
     - What knowledge/system supports increase your confidence in carrying out your role?

4. What are barriers to carrying out your role in diagnosing and/or managing UTIs?
   - Prompts: What hinders you from doing your role?

5. How have you/do you try to overcome these barriers?
   - Prompts:
     - What knowledge/ support (system) help you overcome these barriers or would help you to overcome these barriers?

6. What are your views on antimicrobial stewardship (AS) and/or antibiotic resistance?
   - Prompts:
     - Define AS (if required): Antimicrobial stewardship is the appropriate use of antimicrobials to optimize clinical outcomes, combat resistant infections, avoid adverse drug events, and minimize costs. It is choosing the optimal antimicrobial drug regimen, dose, duration of therapy, and route of administration for the infection being treated. (reference:

http://www.publichealthontario.ca/fr/eRepository/ASP%20101%20September%207%202012%20FINAL.pdf)

- Provide examples (if required):
  - Stopping antibiotics in asymptomatic bacteriuria (bacteria in urine)
  - Shortening duration of antibiotics

7. Do you consider antimicrobial stewardship a priority in your daily tasks? Why or why not?
   - Prompt: How does it compare in terms of other duties and tasks at work? Walk me through list of priorities you encounter.

8. How can you better incorporate AS in your daily work and in managing UTIs?

   - Prompt: In what specific ways or methods can you do this?

9. How can the pharmacist play a role in AS? What about in managing UTIs?
   - Prompt: the clinical pharmacist working here is named Sherman.
     - If you have had an interaction with her, how does she support you in managing UTIs?
     - If you have not interacted with her, what do you think she can do to support you in managing UTIs?
   - 2nd prompt: the dispensing pharmacist is the one who fills the antibiotic prescription (for example, like the Shoppers Drug Mart or Rexall pharmacist)
     - If you have had an interaction with her, how does she support you in managing UTIs?
     - If you have not interacted with her, what do you think she can do to support you in managing UTIs?

Additional questions:

For the two RNs/Nicoleta/MDs who do outcome reporting to MOH:

- In your opinion, what are the most important clinical outcomes in tracking and managing urinary tract infections in the long-term care setting?
  - Probe: From the patient perspective? From the healthcare team's perspective?

- In terms of managing UTIs at the KG compared to an acute setting (i.e. hospital), what factors into the decision to send a patient to an acute setting?
  - Prompt: any objective criteria?

C3: Final codebook (version Dec 9, 2018 using NVivo)

Name	Description	Files	References
Barriers	Obstacles or circumstances that hinder appropriate assessment of treatment of UTIs	0	0
Acceptance	Being satisfied with status quo	1	1
Access HCP	Inability of resident's family to talk to HCPs due to circumstances	2	3
Access Info	Lack of access to resident's information that hinders HCP's ability to provide optimal care	5	18
Accountability	HCP or family feeling responsible about expectations of their roles	4	5
Aware	HCPs not alerted to residents with possible UTI	1	2
Bias family	Resident's family has own subjective views on definition of UTI and its management	3	4
Bias HCP	HCP has own subjective views on diagnosing and managing UTIs	4	8
Collaboration	HCPs not working with each other to care for residents	1	1
Communication	Lack of adequate communication between HCPs with regards to workup or care plan for patients	6	10
Disseminate	Ineffective methods of sharing knowledge on UTI diagnosis and management to HCPs, resident's family and the general public	1	2
Family pressure	Resident's family influencing the resident's care in a direction opposite of the medical team's original plan	8	21
Funding	Lack of money for activities that optimize UTI diagnosis and management	1	2
Hospital involvement	Hospital involvement that leads to negative views on UTI	4	5
Knowledge Family	Resident's family expressed lack of knowledge in understanding and managing UTIs	2	3

Name	Description	Files	References
Knowledge HCP	Lack of knowledge expressed by HCPs in appropriate diagnosis and management of UTI as well as negative impact of over treating UTI	5	7
Patient factor	Resident characteristics that make UTI diagnosis and management more challenging to HCPs	5	9
Presence	Not being physically present at long-term care facility at the time of UTI diagnosis or management	5	6
Test collect	Circumstances that hinder appropriate urine sample use and collection	3	3
Test delay	Not receiving test results in time to help with clinical decision making	6	15
Test wrong	Incorrect test available to use in diagnostic assessment	2	2
Time	Inadequate time available for HCPs to do their roles optimally	4	7
Trust	Distrust or skepticism by resident's family in HCP's plan/abilities	4	4
Workload	Issue of workload volume hindering diagnosis and management of UTI	7	14
Facilitators	Factors that help with appropriate assessment or treatment of UTI at NH	0	0
Access information	HCPs having ready access to resident's information to help with clinical decision making	2	3
Accountability	HCPs taking ownership in performing their roles	1	2
Audit and Feedback	Review of UTI cases and providing feedback for improvement	3	4
Aware	Being notified of potential UTI cases	2	5
Collaboration Family	HCP working with resident's family to optimize care of the resident	4	8

Name	Description	Files	References
Collaboration HCP	HCPs working together to diagnose and manage UTIs	6	15
Collaboration Others	HCP or resident's family working with non-HCPs in diagnosing and managing UTIs	1	1
Communication Family	Use of verbal or non-verbal communication methods with resident or resident's family to improving sharing of care plan	2	3
Communication HCP	Use of verbal or non-verbal communication methods between HCPs to improve sharing of resident's information and care plan	7	21
Disseminate	Effective methods of disseminating knowledge on UTI diagnosis and management to HCPs and the public	2	4
Education Family	HCPs providing education to resident's family regarding appropriate UTI diagnosis and treatment	6	14
Education HCP	Continuing education sessions that HCPs attend to update their knowledge and skills	7	19
Familiarity	Having knowledge of resident's baseline or history to help with UTI assessment	2	5
Funding	Availability of money for activities that optimize UTI diagnosis and management	2	2
Guide	Having guidelines, checklist, references or policies available to help HCP perform their roles	7	12
Incentive	Use of rewards to encourage appropriate UTI diagnosis and management	1	1
IT	Using technology or programs to help with clinical decision making	2	4
Knowledge on impact	Understand consequences of antibiotic prescribing for UTI	1	2
Knowledge on UTI	Use of expertise or knowledge of experts on UTI diagnosis and management	2	4
Presence	Being on-site at the NH	5	6

Name	Description	Files	References
Support Management	HCPs having support or mentorship from managers in UTI assessment and management	3	3
Support NP	Having a nurse practitioner to help in diagnosis and management of UTI	2	2
Support other	Availability of non-HCP, non-resident's family to help in diagnosis and management of UTI	2	2
Support PCA	HCPs having personal care attendant to help in care of resident	3	7
Time	Having more time to assess or manage UTIs	1	1
Timing	HCP involvement a crucial time point in UTI diagnosis and management	1	1
Trust	HCPs having trust in each other	2	2
Workload changes	Workload changes that help optimize the diagnosis and management of UTI	4	6
Outcome	Targets or measures of appropriate UTI diagnosis and management	4	10
RPh Role	Defining areas where RPh can expand their roles in diagnosis and management of UTIs	0	0
Audit and Feedback	Review of UTI cases and providing feedback for improvement	2	2
Dosing	Involvement in optimizing antibiotic dose for UTI	1	1
Drug interaction	Involvement in checking drug interaction between antibiotic prescribed and resident's current medication	1	1
Duration	Involvement in deterring optimal duration of antibiotics	1	1
Education	Involvement in educating residents, families and HCPs on assessing and managing UTIs	4	7
Indication	Involvement in confirming diagnosis of UTI	2	3
Monitor	Involvement in monitoring effect and safety of antibiotic prescribed	3	3

Name	Description	Files	References
Select	involvement in antibiotic selection based on patient factors	4	8
UTI prophylaxis	Involvement in preventing UTIs using both pharmacological and non-pharmacological agents	2	2
Workflow	Operations in diagnosing and managing UTIs	0	0
Diagnose	Diagnostic assessment undertaken to rule in/out UTI	9	36
General	Other processes relating to UTI not included in other workflow categories	9	33
Manage	Actions undertaken relating to treatment of UTI (including watchful waiting)	9	40
Metrics	Identification and monitoring measures related to antibiotic use and stewardship activities	3	5
Priority	Ranking of diagnosis and/or management of UTI in relation to other tasks	8	12
Prophylaxis	Actions undertaken to prevent UTIs in residents	3	4
Transfer	Process of assessing and transferring residents to hospital	6	7