Development of an Educational Resource for Nursing Staff and Unlicensed Personnel on the Identification and Prevention of Urinary Tract Infections within Residents Living in Long Term Care

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Abstract

Background: Urinary tract infections (UTIs) occur within the genitourinary system and lead to serious infections resulting in hospitalization and death. Older adults are at a higher risk of developing UTIs due to decreased immunity, this may further be exacerbated by increased rates of bladder and bowel incontinence. UTIs are among the most frequently diagnosed infections in older adults and may be preventable or less severe if detected early and modifiable risk factors are addressed. **Purpose:** To develop an educational resource focused on the identification and prevention of UTIs for Long Term Home (LTCH) staff working with older adults and their family members. **Methods included:** 1) an integrative literature review 2) an environmental scan of resources related to UTIs available online within Canada and internationally 3) consultation interviews with key stakeholders and 4) the development of the educational resource. **Results:** Findings highlighted the need for an educational resource to support LTCH staff and families in being able to identify and prevent UTIs in older adults. The literature revealed that LTCH staff may experience knowledge deficits in identifying clinical signs and symptoms of UTI, and preventative measures. The findings from the methods informed the educational resource consisting of two infographics for LTCH staff. These infographics covered UTI risk factors for older adults, prevention interventions, special nursing considerations, the clinical signs and symptoms of infection, and diagnostic testing requirements. **Conclusion:** The development of the educational resource is to support LTCH staff to provide evidence-informed care to prevent and identify UTI's within older adults living in LTCH.

Keywords: *urinary tract infections, older adults, long term care, in-person education*

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Completing this project has been a fulfilling journey. One of my passions in nursing is working with older adults and in this project, with the help of many Long-Term Care Home Staff, I was able to create a resource that I hope will have a positive impact on the geriatric population of Newfoundland and Labrador now, and in years to come.

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Introduction

Urinary tract infections (UTIs) are among the most frequently diagnosed infections in older adults living within Long Term Care Homes (LTCH) (Ashraf et al., 2020; Latour et al., 2020). Older adults (e.g., over 65 years of age) are particularly susceptible to UTIs as they can experience decreases in immunity and due to risk factors such as bladder and bowel incontinence, and functional decline (Genao & Buhr, 2012). Specific individual changes such as decreases in estrogen production in older woman (i.e., decreases ability to suppress growth of bacteria) and increases in prostate sizes in older men (i.e., the inflammation of the prostate can form urinary stones which can trap bacteria) have also been linked to UTI development (Genao & Buhr, 2012). There can be additional likelihood for UTI development in LTCH residents who medically require an indwelling urinary catheter as it increases the risk for bacteria in the urine by 3-10% per day after catheter insertion (Niël-Weise et al., 2012).

This project is an important undertaking as UTIs are a serious health concern for older adults living within LTCHs. UTIs can lead to decreases in mental and physical health and increases hospitalization and death for older adults (Gharbi et al., 2019; Palacios-Cena et al., 2021; Wagenleher et al., 2018). Solutions must be implemented to help prevent UTIs from developing which can have impacts on the population of interest. Registered Nurses (RNs), Licenced Practical Nurses (LPNs), and Personal Care Attendants (PCAs) work directly with older adults everyday within LTCH; therefore, they can make positive change in the care being provided to older adults. Currently at Eastern Health there is a focus on quality improvement with respect UTIs within the older adult population. New policies have been recently developed and published surrounding the identification and treatment of UTIs (Eastern Health [EH] 2023a, EH 2023b). Through the completion of a literature review, environmental scan, and consultation

report it was determined that UTIs are a health concern for older adults and that LTCH staff have learning needs with respect to identifying the clinical signs and symptoms of UTIs, along with prevention methods (Lee et al., 2018; Mody et al., 2017). Therefore, a need exists to develop an educational resource aimed at nursing staff (i.e., RNs and LPNs) and unlicensed personnel (PCAs) on the identification and prevention of UTIs within the older adult population living in LTCH.

Objectives

The overall goal of the practicum is to develop an educational resource for nursing staff (i.e., RNs; LPNs) and unlicensed personnel (i.e., PCAs) with respect to the identification and prevention of UTIs in older adults living within LTCH.

The key practicum objectives are:

1. Describe the risk factors that increase an older adult's susceptibility to developing a urinary tract infection and identify strategies that can be incorporated by staff nurses to decrease overall risk.
2. Identify nursing staff's learning needs with respect to caring for older adults experiencing or at risk of urinary tract infections.
3. Identify the facilitators and barriers to incorporating current or future interventions that are utilized as methods of reducing the overall risk of urinary tract infection development in older adults.
4. Develop a resource that includes critical information surrounding urinary tract infections with respect to the older adult, including nursing interventions that can be implemented by staff nurses
5. Demonstrate advanced nursing practice competencies.

Overview of Methods

To develop the educational resource a literature review, environmental scan, and consultations with key stakeholders were performed. The literature review examined the occurrence of UTIs within older adults living in LTCHs, the overall impacts of the infection on both the older adult and the health care system, the contributing factors that lead to UTIs, along with evidence informed interventions that can be implemented to both increase identification and prevention of UTIs within the older adult population. The purpose of the environmental scan was to determine if an already established resource for LTCH staff regarding the identification and prevention of UTIs in older adults residing within LTCHs was previously created and could therefore be potentially implemented. Finally, the consultation process allowed key stakeholders (e.g., RNs, LPNs, PCAs, Nurse Educators, and Infection Control Nurses) the opportunity to influence the educational resource by providing learning needs with respect to UTIs and older adults, along with determining the educational delivery method.

Findings from the literature review, environmental scan, and consultations helped informed the resource and solidified the need for its development.

Summary of the Literature Review

Methods

The completion of the literature review involved the search for articles from scholarly, peer-reviewed journals that examined the identification and prevention of UTIs within the CINAHL, PubMed, Scopus, Cochrane library, and Google Scholar databases. The research question that guided the search was: "What is known about identification and prevention interventions with respect to UTIs in older adults living in LTCH?" Articles were included in the review if they were English-language and peer-reviewed research from the allied health

profession; however, the focus was nursing research as the aim of the educational resource is to assist nurses and PCAs in the prevention and identification of UTIs. Research was only considered if it was published within the last ten years (i.e., 2013-2023) so that the most recently conducted research was utilized to inform the development of the practicum project. Older studies were considered if the outcomes measured were deemed appropriate and clinically relevant for this topic, and there were no recent publications. Initial searches of the databases resulted in over 1,300 articles which were then examined via their abstracts to determine relevance. A total of 26 articles were determined to be applicable as per the criteria outlined above and were then critically appraised for this literature review and were analyzed using the Public Health Agency of Canada (PHAC) critical appraisal tool kit (PHAC, 2014). A full copy of the literature review can be found in Appendix I of this report.

Incidence and Prevalence

Through the examination of the literature, it was determined that UTI in older adults was a significant health concern as there has been a statistically significant increase in UTI for both men and women from 2004 to 2015 ($p<0.05$; Ahmed et al., 2018). However, Caljouw et al. (2011) determined that women had a 1.7-fold increased risk of developing a UTI in comparison to men (Hazard Ratio 1.7, 95% CI 1.1-2.5; $p=0.012$). Overall prevalence rates of UTI ranged from 11.4% to 33.62% in older adults ≥60 years of age (Pinnell et al., 2021; Silva et al., 2021).

Impacts

UTIs had a variety of impacts which effected the older adult and health care system. It was determined by Gharbi et al. (2019) that older adults experiencing a UTI who did not receive an antibiotic for treatment, or who had treatment delayed by 7 days, had significantly higher rates of bloodstream infections ($p=0.001$). The authors determined that older adults not treated

with antibiotics had significantly higher risk of death in comparison to individuals started on antibiotics immediately after a UTI diagnosis (adjusted Odds Ratio 2.18, 95% CI 2.04-2.33; $p<0.001$). Overall, Hu et al. (2019) described the rate of mortality for participants with nosocomial UTI to be 1.43%. Other causes of concern related to UTI for the older adults involved the increased risk for delirium which was reported to be associated with UTI infection even in the presence of potential confounders (OR 2.67, 95% CI 2.12-3.36; $p<0.001$; Krinski et al., 2021). Along with potential decreases in overall mental health as it was reported within the literature that individuals experiencing a UTI had an increased risk for both depression and anxiety (Renard et al., 2014; Wagenleher et al., 2018).

Due to the negative impacts of the UTI on the older adult there can be increases in rates of hospitalization which can therefore lead to increases in overall hospital cost. It was reported by Palacios-Cena et al. (2021) that between 2001 to 2018 there was a statistically significant increase in hospital admissions related to UTI for both men and women ($p<0.001$). The risk for UTI was also related to higher hospital admissions even when controlling for factors such as demographics and clinical variables ($p=0.0003$). Because of these increases in hospital admission, it was reported that in 2011 it was estimated that the cost UTIs in the United States was $2.8 billion for the general population (Simmerting et al., 2017). In the year 2021 older adults in Newfoundland and Labrador (NL) accounted for 23.1% of the population, an increase from 16.3% in 2012 (Statistics Canada, 2023). There has been a steady rise in the older adult population within NL and with the estimation that “Canada will need an additional 199,000 long term care beds by 2035” (Conference Board of Canada, 2017, p. 5) the health care concern of UTI cannot be overlooked.

Contributing Factors

A variety of contributing factors are attributable to the development of UTI in older adults. It was reported within the literature that older adults living with an indwelling urinary catheter had higher incident rates of UTI (33.8 per 100 person years, 95% CI, 22.3-51.3) versus those without (14.4 per 100 person-person years, 95% CI, 10.5-22.3; Adomi et al., 2019). This agreed with data presented by Cotter et al. (2012) as they discovered that the presence of an indwelling urinary catheter was found to be associated with UTI development ($p<0.0001$). Other modifiable risk factors associated with UTI included urinary incontinence (Hazard Ratio 1.5, 95% CI 1.0-2.1; Caljouw et al., 2011), physical disability (Hazard Ratio 1.7, 95% CI 1.1-2.5; Caljouw et al., 2011), and dehydration (Odds Ratio 40.0; $p<0.001$; Silva et al., 2021).

Additional contributing factors related to UTIs involved nursing staffs knowledge. One knowledge deficit related to the clinical signs and symptoms of UTI. It was determined by Lee et al. (2018) that after RNs, LPNs, and unlicensed personal received 15 minutes of in person education regarding the diagnostic criteria related to a UTI diagnosis in older adults (i.e., clinical signs and symptoms; interpretation of urine culture results), the number of inappropriate treatments of UTI decreased from 90% to 62.9% ($p=0.003$). These results indicate confusion among LTCH staff regarding the clinical signs and symptoms of UTI. Other areas of learning needs include prevention interventions involving indwelling urinary catheters (Mody et al., 2017) and hydration (Lean et al., 2019). After LTCH staff received education regarding infection control interventions, catheter-associated UTI rates decreased from 6.42 infections per 1000 catheter-days at baseline, to 3.33 infections per 1000 catheter-days twelve months later (incidence rate ratio, 0.46, 95% CI 0.36-0.58; $p<0.001$; Mody et al., 2017). While UTI development in LTCH residents increased from 9 days during the preintervention period, to 121

days twelve months after education was provided to LTCH staff on the importance of hydration in older adult residents (Lean et al., 2019). LTCH staff either has a lack of knowledge regarding indwelling urinary catheter care and hydration management, or they required additional information to properly perform the prevention interventions in clinical practice.

Interventions

Six articles were selected to inform the literature review regarding interventions related to UTI. This included two medium quality systematic reviews (Meddings et al., 2017; Wu et al., 2020), and 4 quantitative studies. Two of the quantitative studies were of weak design including two medium quality uncontrolled before and after (UCBA) designs (Freeman-Jobson et al., 2018; Viner & Gautam, 2020), while the remaining two studies were strong designs with one high quality randomized control trial (Arnold et al., 2021) and one medium quality randomized control trials (Pasay et al., 2019). Each of the studies were analyzed using the PHAC (2014) tool kit as previously discussed.

It was noted in the literature that LTCH staff have demonstrated knowledge deficits with respect to accurate identification of UTI clinical signs and symptoms which can lead to direct or indirect effects on UTI identification (Lee et al., 2018; Philips et al., 2012). Based on the findings of the two-medium quality UCBA studies of weak design conducted by Freeman-Jobson et al. (2016) and Viner & Gautam (2020), there was weak evidence to support the incorporation of in person education surrounding assessment and management of UTI in older adults. Overall, the education demonstrated improvement in foundational knowledge of UTI involving assessment and management (e.g., UTI diagnosis criteria). With respect to education involving the clinical signs and symptoms of UTI, two randomized control trials (i.e., strong design) of high quality (Arnold et al. 2021) and medium quality (Pasay et al. 2019) were

determined to have strong evidence in relation to UTI identification. The goal of the authors educational interventions was focused on antimicrobial stewardship, specifically that only patients with a UTI received treatment. The authors determined that the educational interventions focusing on the clinical signs and symptoms of infection were able to successfully decrease antibiotic prescriptions for suspected UTI. This was an important finding as it indicates that more patients were being treated inappropriately with antibiotics prior to the education intervention, meaning that patients were being treated for UTI when they did not actually have the infection.

In terms of prevention of UTI, it is key that a focus is placed on modifiable risk factors such as dehydration, incontinence, and in appropriate use of indwelling urinary catheters (Adomi et al., 2019; Caljouw et al., 2011; Silva et al., 2021). Based on the finding of two systematic reviews of medium quality (Meddings et al., 2017; Wu et al., 2020) it was determined that there was moderate evidence that individual or multimodal interventions focusing on prevention methods (e.g., infection control, hydration, catheter removal protocols) and the incorporation of advanced care nurses (i.e., Nurse Practitioner, infection control nurse) can have positive effects on reducing overall UTIs incidence in older adults living in LTCH. Meddings et al. (2017) described that a multimodal intervention that focused on hand hygiene, improve antimicrobial use, incorporation of a standardized definition of catheter associated UTI, and multi drug resistant organism surveillance had success in decreasing catheter associated UTI. While Wu et al. (2020) described the incorporation of a nurse practitioner providing supportive management to LTCH staff as an influencing factor in increasing hydration, while another study described by Wu et al. (2020) demonstrated increases in fluid intake in LTCH residents by encouraging them to drink 1500mL per day. Meddings et al. (2017) made recommendations of increased fluid intake as a supportive strategy to decrease overall incidence of UTI.

From the findings of the literature review the educational resource should focus on the assessment and management of UTI (Freeman-Jobson et al., 2016; Viner & Gautam, 2020), identification of the clinical signs and symptoms of UTI (Arnold et al., 2021; Pasay et al., 2019), and prevention methods such as hand hygiene, improved antimicrobial use, incorporation of a standardized definition of catheter associated UTI, multi drug resistant organism surveillance, and hydration management (Meddings et al., 2017; Wu et al., 2020). Overall, according to Table 4 of the PHAC Tool Kit (PHAC, 2014), it was determined that there was moderate evidence that suggests that in person or online education provided to LTCH staff will decrease rates of UTI development and increase the accuracy of identifying the infection within the older adult population.

Summary of the Environmental Scan

Methods

The completion of the environmental scan included a search for information from reputable sources which had a focus on UTI and older adults living in LTCH. The focus of the search included information pertaining to the identification and prevention of UTI in older adults. Information was obtained from the Eastern Regional Health Authority, the maritime provinces (i.e., Nova Scotia, New Brunswick, and Prince Edward Island), and globally (i.e., Canada and internationally). The inclusion of the maritime provinces provided the ability to compare current nursing practices within these various health organizations, to that of the Eastern Regional Health Authority in Newfoundland, as these geographical areas are cultural similar and have comparable demographics, which may better inform the development of the resource. Whereas the global search allowed for the inclusion of additional resources which may be beneficial for resource development.

Within the Eastern Regional Health Authority in Newfoundland an outdate online module for RNs, LPNs, and PCAs and a pamphlet for families, which focused on UTI and older adults, was provided by a Nurse Educator and Regional Program Director within the Eastern Regional Health authority (EH, n.d. a; EH, n.d. b). They also provided additional resources which included a UTI policy (EH, 2023a) and medical directive (EH, 2023b). The search of the maritime provinces yielded a total of five sources but only one webpage within Prince Edward Island revealed relevant content with respect to the project's overall goals, and this included a Care Pathway which specifically focused on LTCH residents experiencing a potential UTI without an indwelling urinary catheter (Health PEI, 2015). The global search found a total fifteen webpages across Canada and the United States, but only five were deemed to be relevant to the identification and prevention of UTI in older adults living in LTCH. This included UTI education materials from the Registered Nurses Association of Ontario (Cowie, 2011), Public Health Ontario [PHO] (2019), British Colombia [BC], (2015) California Department of Public Health [CDPH], (2019), along with a clinical practice guideline created by Alberta Health Services [AHS], (2015).

Although many reputable sources existed, there was no singular all-inclusive educational resource which could be implemented into practice. A full copy of the environmental scan report can be found in Appendix II of this report.

Key Findings

A manifest content analysis was undertaken to examine the various concepts within the resources discovered during the environmental scan. Codes were predetermined prior to the completion of the environmental scan based on a recent literature review and included *education,*

identification, prevention, and residents/families. From these codes key themes related to UTI were created with respect to the materials analysed in the environmental scan.

In terms of education AHS (2015), Cowie (2011), and CDPH (2019) included the modifiable and nonmodifiable risk factors of UTI. CDPH (2019) also discussed the risk associated with urinary catheters whether it be an indwelling catheter or straight catheter which can be viewed as a modifiable or nonmodifiable risk factor depending on specific circumstances involving the older adult. With respect to the clinical signs and symptoms of infection, all resources except CDPH (2019) examined this topic within the education provided. EH (n.d., b), AHS (2015), and PHO (2019) went a step further and covered the non-specific signs and symptoms of UTI which is key for differencing between UTI and asymptomatic bacteraemia (i.e., presence of bacteria in the urine with no accompanying clinical signs and symptoms of UTI). Overall, the resources had similar signs and symptoms to describe UTI in older adults, but there were some disagreement as small differences existed. Lastly, the CDPH (2019) resource examined the potential complications that may occur if an older adult is diagnosed with a UTI.

Regarding UTI identification, the resources examined screening tools and the appropriateness of urine cultures based on those screening tools. Four resources examined the differences in the clinical signs and symptoms between an older adult living with and without an indwelling urinary catheter (ASH, 2015; EH, n.d. b; EH, 2023a, EH, 2023b). One other resource only discussed the signs and symptoms that are present in non-catheterized older adults (Health PEI, 2015). The screening tools in the EH resources were based off the Infection Prevention and Control Canada Long Term Surveillance Tool Kit indicating that there is content validity. This was not the case for the Health PEI (2015) screening tool as it was not clear how the resource was developed; therefore, it should be examined with caution. On the other hand, the ASH

(2015) resource utilized a well-known and validated screening tool called the Loeb Criteria. Based off the screening tool criteria, the EH (n.d. b; 2023b) and ASH (2015) determined when urine cultures and antibiotics are appropriate for older adults potentially experiencing a UTI.

There were many potential UTI prevention interventions discussed within the various resources that are discussed within this environmental scan. This included hydration (BC, 2015; CDPH, 2019; Cowie, 2011; EH, n.d a), appropriateness of urinary catheters (AHS, 2015; CDPH, 2019; Cowie, 2011; EH, n.d. a; EH, 2023a), catheter removal (ASH, 2015; CDPH, 2019; EH, 2023a), aseptic insertion (AHS, 2015; CDPH, 2019; EH, 2023a), catheter care (AHS, 2015; CDPH, 2019; Cowie, 2011; EH, 2023a), hand hygiene (AHS, 2015; BC, 2015; CDPH, 2019; EH, 2023a), interventions related to personal hygiene (BC, 2015; Cowie, 2011., EH, n.d. a), nutrition (CDPH, 2019), routine toileting (EH, n.d. a). and physical activity (Cowie, 2011).

Lastly, although a limited focus of the resources, the importance of the family and resident themselves was highlighted in a EH resource. This resource was a pamphlet targeted at families and residents and was entitled “What residents and Families in Long Term Care Need to Know About Urinary Tract Infections and Antibiotics” (EH, n.d. b). This resource focused on the clinical signs and symptoms of UTI, antibiotic appropriateness, and a variety of UTI prevention interventions.

Although there was a total of ten reputable resources, there was not a sufficient educational resource which included all the themes that were extracted in a manifest content analysis which focused on UTI identification in prevention. The environmental scan therefore supports the development of an educational resource for LTCH staff working directly with older adults living in LTCH.

Summary of Consultations

Methods

The completion of the consultation report involved consultations with key stakeholders within a LTCH in Newfoundland and Labrador's Eastern Regional Health Authority which provides service to residents with high levels of acuity. In total 4 RNs, 3 LPNs, 5 PCAs were interviewed to examine their experiences and learning needs with respect to caring for older adult residents experiencing a UTI, along with interviews involving two nurse educators and one infection control nurse to seek further expertise from leadership within the LTCH. Nurse managers were also contacted to take part in the consultation process but were unable to be reached during the time consultations were scheduled to be completed.

The consultation process involved semi structured interviews which were informed from insights gained from the literature review and environmental scan examining UTI and older adults living in LTCH. To accommodate each consultant's schedule and preference, the semi structed interviews took place in person within the facility, in an online forum, or via a phone call. The interviews were originally scheduled to be completed one on one; however, some interviews were conducted in group settings as per the request of the consultants from two units within the facility. The semi structured interview questions were tailored to the unique scope of practice for each category of consultant and included the following: RNs and LPNs; PCAs; Infection Control and Nurse Educator. To ensure confidentiality the Infection Control Nurse and Nurse Educators were referred to as Nurse Consultants (NCs) within the consultation report.

Data collected from the consultation interviews were handwritten in jot note form during the interview and expanded upon after the completion of the interview. After all interviews were conducted, a content analysis was performed whereby information was extracted, organized, and

synthesized from the interviews into key concepts (e.g., identification) and themes (e.g., resource contents) (Polit & Beck, 2021). A limitation of this consultation report included communication difficulties with the chosen facility which included the consultation email not being directly sent to all RNs, LPNs, and PCAs of the facility to consider being a potential consultee. A second limitation involved two units within the facility holding focus group session whereby various members of the interdisciplinary team could be interviewed at once. Although this helped increase participation in the consultation, it may have decreased the authenticity of the answers provided due to consultants concerns of providing information within a group setting (e.g., concerns of admitting a personal learning need in front of other staff). A full copy of the consultation report can be found in Appendix III of this report.

Key Findings

After the completion of the interviews, data underwent a content analysis to examine for recurring themes. A total of three themes emerged which included barriers to practice, resource content, and delivery methods.

Emergent Themes

Barriers to Practice. Through discussion with RNs and LPNs there appeared to be some lack of consistency regarding awareness of a new screening tool (i.e., policy and medical directive) that was recently released by the facility in May of 2023. This new screening tool was discussed by the NCs during their respective consultation interviews and was examined within a recent environmental scan (EH, 2023a, EH 2023b). Since this standardized protocol already exists (i.e., facility policy and medical directive), further education in the resource regarding this screening tool would be valuable to LTCH staff (i.e., RNs, LPNs) so that all staff have consistent awareness regarding the identification of UTI in older adults.

Resource Content

Identification and Prevention. It was identified during the consultation that new LTCH staff may need support for gaining mastery of identifying the clinical signs and symptoms of UTI and it was suggested that it be included in the educational resource. It was also discussed by RNs, LPNs, and PCAs that LTCH staff have learning needs with respect to prevention interventions such as hydration, incontinence care, and indwelling urinary catheters. The NCs also discussed the importance of providing cognitively well older adults education regarding the clinical signs and symptoms of UTI and information regarding indwelling urinary catheter care as this provides the older adult with autonomy over their care needs.

Monitoring and Documentation. Within the consultation interviews, the concept of monitoring was raised by the NCs as a potential learning need or reminder for LTCH staff. This included monitoring the older adults while on antibiotics for adverse effects, symptom management which can include clinical issues such as fever and back pain, and assessing older adult's quality of life. The NCs also felt that a section of the resource should be dedicated to discussing documentation and its importance with respect to a UTI diagnosis as documentation related to the clinical signs and symptoms of UTIs experienced by the older adults was often missing.

Family Education. The concept discussed by all consultants (n=15) included how families need help understanding UTIs, with a specific focus on a misunderstanding regarding the appropriateness of antibiotics. It was described how families often push for antibiotics even if the older adult is ill due to another cause. If the older adult is not immediately prescribed an antibiotic families would state that the LTCH staff was doing nothing to treat the older adult. The

consensus from consultants was that families require education regarding UTIs as there is currently learning needs that have been noted in family interactions.

Delivery Methods. There was a consensus among all consultants (n=15) that in person education was the most beneficial delivery method for the educational resource. Many consultants discussed that in person education that involved a 'staff huddle' (i.e., education during the workday that takes place on the unit) have had success in the past. It allowed for the greatest number of staff to receive the education while also allowing for a hands-on learning environment that engaged LTCH staff members.

Summary of Resource

The development of this resource was informed by findings from an integrative literature review, environmental scan, and consultations. The educational resource included the creation of infographics for both staff and family of older adults who experience or at risk of developing UTIs, as this was the recommendation made by key consultants during the consultation phase of the project and through discussion with my practicum project supervisor. The utilization of infographics has become more common within the medical community (Martin et al., 2019). Recent studies within the literature have found that infographics have helped participants meet their knowledge needs while providing the education in a way that is less mentally taxing in comparison to reading text abstracts (Martin et al., 2019; Provvidenza et al., 2019). The infographics contain evidenced informed information regarding the prevention and identification of UTIs in older adults living in LTCH. The first infographic is titled *UTI and Older Adults: Information for LTCH Staff* and can be utilized to increase the knowledge and confidence of both licenced (e.g., RNs; LPNs) and unlicensed personnel (e.g., PCAs) in the steps involved in identifying UTIs, along with the incorporation of prevention interventions in hopes to decrease

the incidence and severity of UTIs in older adults. A secondary component of this resource was to provide education to family members of older adults living in LTCH to help them better understand the complexity of UTIs. This infographic was named *Information for Families Regarding Bladder Infections (a.k.a. UTI) and Older Adults* and included non-medical jargon to help promote clarity on how UTIs are identified and prevented within the older adult population. Both infographics can be found in Appendix IV.

Knowles (1984) Adult Learning Theory was incorporated as a theoretical framework in the development of the infographics as Knowles argues that adults have unique learning needs. Knowles considers adults as being in control of their learning and are self-directed in their education (Knowles, 1989; Mitchell & Courtney, 2005). Adults also utilize previous experience to inform their learning, and they are problem focused meaning they want to learn solutions for real life issues (Knowles, 1989; Mitchell & Courtney, 2005). Infographics therefore allow for self-directed learning and can assist individuals understand topics in more detail which can help provide solutions to problems faced which are key aspects of Knowles (1989) Adult Learning Theory. In this case, the education will provide LTCH staff and families with the tools to understand the complexity of UTIs, along with ways to properly identify and prevent UTIs in older adults living in LTCH. Overall, both infographics focused on four key areas which included risk factors, prevention interventions, clinical signs and symptoms, and diagnostic testing.

The infographic for LTCH staff was structured in a way to include the clinical signs and symptoms of UTI first, then the risk factors, prevention interventions, consideration for diagnostic test, and lastly considerations for documentation. The inclusion of the clinical signs and symptoms of UTIs was based on reports in the literature that this was a potential learning

need for LTCH staff (Lee et al., 2018). Further, there is a section dedicated to diagnostic testing as it critical that only older adults experiencing the clinical signs and symptoms of UTIs have a urine culture completed as this helps prevent antibiotic resistance (Ashraf et al., 2020; Lee et al., 2018). Within the literature it was also reported that LTCH staff may have learning needs regarding UTI prevention interventions (Lean et al., 2019; Mody et al., 2017). Therefore, a section of the infographic provided a list of evidence informed strategies; however, there was a specific section for indwelling urinary catheter care as older adults with indwelling urinary catheters are 2.41 times more likely to develop a UTI (Adomi et al. 2019). There was also the inclusion of risk factors which was based off the findings of the environmental scan, as it helps provide LTCH staff context of UTIs in the older adult population. The final section of the infographic focused on documentation and was incorporated as there were concerns in the consultation interviews with the nurse educators and infection control nurse that documentation was often lacking or missing key details, and that a reminder regarding proper documentation would be an important component to include when providing education to LTCH staff.

The infographic for families first included a brief definition of UTI, followed by risk factors, the clinical signs and symptoms of infection, and ways to prevent UTIs. A box highlighted in red, to catch the reader's attention, was also included to educate families on the appropriateness of antibiotics. During the consultation phase it was discussed by various members of the health care team that families had learning needs when it came to UTI. Specifically, learning needs when it came to understanding the clinical signs and symptoms of UTIs and the appropriateness of antibiotic usage. Often times, families request antibiotics for their loved one when it was not clinically indicated. Therefore, the aim of the infographic was to

provide education in these specific areas, along with providing general information regarding UTIs to help provide families with the resources to understand this complex health problem.

Discussion of Advanced Nursing Practice Competencies

The Canadian Nurses Association has developed an advanced practice nursing framework to promote the role of the advanced practice nurse while providing clear definitions of the knowledge, skills, and attributes of the clinical nurse specialist and nurse practitioners (Canadian Nurses Association, 2019). Outlined in the framework are six advanced nursing practice competencies which include direct comprehensive care, optimizing health systems, education, research, leadership, and consultation and collaboration. During the completion of this practicum project elements from some of these competencies have been demonstrated and are discussed below.

Research Competency

Advanced practice nurses conduct, appraise and integrate research evidence into practice (Canadian Nurses Association, 2019). Within this project I identified, appraised, and applied research so that the creation of the resource was based on the best possible evidence. This research also assisted in the developed of semi structured interview questions for the consultation of key stakeholders to ensure a well-informed educational resource. I was able to take the data obtain from the literature review, environmental scan, and consultation and analyze for key findings in order to create a well-rounded resource based on evidence informed information and locally relevant data.

Leadership Competency

Advanced practice nurses are leaders who help facilitate change and improve practice within the health system (Canadian Nurses Association, 2019). The goal of this project was to

create a resource with an aim at facilitating changes in practice with the overall goal being quality improvement (i.e., reducing overall incidence of UTIs). Being a leader in nursing involves the identification of a health care issue and developing a solution to address the problem. I worked towards this goal by creating an educational resource that will address a geriatric health issue at present and in the future within the province of Newfoundland and Labrador. I have also developed my skills in time management and organization throughout the practicum courses.

Educational Competency

Advanced practice nurses focus on providing education to members of the interdisciplinary team, to the clients themselves, and to families (Canadian Nurses Association, 2019). Through consultation with the LTCH staff, various learning needs were highlighted and they were a major focus in the educational resources development. This educational resource will serve as an educational tool for LTCH staff on the identification and prevention of UTI in older adults. For myself personally I have gained immense knowledge regarding the topic of UTI and older adults. I also gained skills in completing consultation interviews along with developing knowledge regarding accessibility and readability needs when creating an infographic for dissemination of education.

Optimizing Health Systems Competency

Advanced practice nurses make positive change to the health care system by advocating for clients through a holistic lens (Canadian Nurses Association, 2019). Within this project there was the incorporation of the literature, along with grey literature, to develop a new resource which can be utilized by LTCH staff to increase their knowledge surrounding UTIs. This new

knowledge can then be incorporated in practice with a focus on quality improvement (i.e., better health outcomes for older adults; decreases in hospital admissions).

Next Steps

The hope is that a future Master of Science in Nursing student will take on the implementation and evaluation of this project, as part of their requirements to complete their degree, so that the infographics can be incorporated in practice within LTCHs in St. John's, NL. This process will include the learning resource undergoing an examination by key stakeholders in a focus group setting prior to the learning resource being implemented in practice. After implementation, an evaluation will take place to determine the effectiveness of the learning resource within the LTCH setting.

Focus Groups

The proposal for the utilization of small focus groups is to examine the learning resource to determine if the infographics meet the potential learning needs of LTCH staff such as RNs, LPNs, and PCAs. Other key consultants to examine the infographics will include nurse educators, infection control nurses, nurse managers, and family members of older adult residents. The aim would be that three to four individuals from each unique group be involved in the small focus groups. These focus groups would be led by the potential Master of Science in Nursing student, as discussed above, and utilize a semi structured interview format. The goal being to determine if the information provided in the infographics is sufficient to meet the potential learning needs related to the proper identification and prevention of UTIs in older adults living in LTCH. It will also be critical to examine various accessibility and readability needs related to the infographics within the focus group sessions. It is critically important that the information provided is appropriately written for the target audience, while also taking into account

accessibility needs such as vision impairment. For example, the family infographics intended audience will include older individuals; therefore, individuals may have expected age related vision changes which can cause impairments when reading the infographics.

Implementation Plan

With respect to a potential implementation plan, the infographic will be delivered to NL Health Services communication department to seek approval for the utilization of the NL Health Services logo on the two infographics. Then, the infographics will be delivered to the Regional Program Coordinator for Long Term Care Programs by the potential Master of Science in Nursing Student to create a plan to disseminate the infographic to the LTCH staff in unit huddles as it allows for the materials in the infographic to be quickly disseminated to a large number of LTCH staff without an excessive time burden. The goal would be that the education surrounding the two infographics would be provided in 15 minutes, with 5 additional minutes for questions. The resource for LTCH staff would then be placed at the nursing station in a clearly visible area to serve as a reference for the LTCH staff. Copies of the family infographic would be provided to the unit to help educate families on UTI and the older adult when needed. The implementation plan would take into account the necessary time to provide education the various LTCH units that agree to take part in this quality improvement project.

Evaluation Plan

The proposed evaluation plan will focus on the LTCH staff in direct care of the older adult residents. This will include RNs, LPNs, and PCAs. The proposed evaluation will involve a mixed methods approach that will be executed by the potential Master of Science in Nursing student. The quantitative component will involve survey questions for RNs, LPNs, PCAs to evaluate their knowledge of UTIs and the older adult prior to the implementation of the

infographic and after the education delivery. Other outcomes of interest will be a comparison of UTI rates and antibiotic prescription prior to and after education delivery. The quantitative data will then inform the qualitative component as the aim will be to examine any potential concerns discovered during the quantitative component. This could include potential knowledge deficits of the LTCH staff or investigating why UTI rates and antibiotics prescriptions remained unchanged after education delivery. To accomplish this, focus groups with RNs, LPNs, and PCAs would take place with semi structured interview questions being informed by the potential areas of concerns. The interview questions will be developed in consideration of the unique scope of each profession. The goal being to ensure the educational resource that has been developed is well rounded and meets all learning needs of LTCH staff to help reduce rates of UTIs in older adults by increasing LTCH staff's knowledge of evidence informed interventions based on identification and prevention of UTIs.

Conclusion

UTIs have been noted to have negative outcomes for older adults which included increased risk for hospitalization and mortality (Gharbi et al., 2019; Palacios-Cena et al., 2021). They are the most frequently diagnosed infections in older adult resident's living in LTCHs (Ashraf et al., 2020; Latour et al., 2020). Within the literature it has been reported that LTCH staff may have potential learning needs when it comes to the identification and prevention of UTIs in older adults (Lee et al., 2018; Mody et al., 2017). The purpose of this practicum project was to develop a learning resource for licenced (i.e., RNs; LPNs) and unlicensed staff (i.e., PCAs) working in the LTCH setting that focused on the identification and prevention of UTIs in older adults. The goal was to address any potential knowledge deficits and improve older adults health outcomes.

Methods for the project included an integrative literature review, environmental scan, and consultations with key informants. The findings from these methods clarified the topic of UTIs and older adults, along with provided key information regarding potential learning needs of LTCH staff. The completion of this project allowed for the demonstration of advanced nurse competencies specifically research, leadership, education, and optimizing health systems.

A plan has been developed with regards to implementing and evaluating the educational resource. The implementation plan currently includes receiving feedback from key stakeholders to ensure their learning needs were met, and then consultation with the Regional Program Coordinator of Long Term Care Programs will take place to develop a plan for dissemination of the educational resource. The evaluation plan involves a mixed methods approach which will focus on key areas such as LTCH staff's knowledge deficits, UTI rates, and antibiotic prescriptions before and after education dissemination. The goal is that the educational resource developed in this practicum project will increase LTCH staff's abilities and confidence in identifying and preventing UTIs in older adults living in LTCHs.

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Appendices

Appendix I: Literature Review

Literature Review: Development of an Educational Resource for Nursing Staff and Unlicensed Personnel on the Identification and Prevention of Urinary Tract Infections within Residents Living in Long Term Care

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Introduction

Urinary tract infections (UTIs) are among the most frequently diagnosed infections in older adults living within Long Term Care Homes (LTCH) (Ashraf et al., 2020; Latour et al., 2020). UTIs are infections that occur within the genitourinary system which can lead to hospitalization and death (Cortes-Penfield et al., 2017; Gharbi et al., 2019; Palacios-Cena et al., 2021). The burden of UTIs can lead to a financial strain on the health care system with reports that UTI admissions cost 2.8 billion within the United States in 2011 (Simmering et al., 2017). Older adults (e.g., over 65 years of age) are particularly susceptible to UTIs due to decreases in immunity and increased rates of bladder and bowel incontinence (Genao & Buhr, 2012). Specific individual changes such as decreases in estrogen production in older woman (i.e., decreases ability to supress growth of bacteria) and increases in prostate sizes in older men (i.e., the inflammation of the prostate can form urinary stones which can trap bacteria) have also been linked to UTI development (Genao & Buhr, 2012). There can be additional risks for UTIs in LTCH residents who medically require an indwelling urinary catheter as it increases the risk for bacteria in the urine by 3-10% per day after catheter insertion (Niël-Weise et al., 2012).

To date there has been no standardized tool used as the 'gold standard' for the diagnosing of UTI in resident's living in LTCH, and currently there is an overreliance on laboratory data rather than clinical symptoms which can lead to a misdiagnosis of UTI (i.e., false positive; Mylotte, 2021; Cortes-Penfield et al., 2017). Within the literature there has been a demonstrated lack of knowledge among nursing staff of what constitutes the clinical symptoms of UTI or there has been a complete lack of regard with respect to the importance of the clinical signs and symptoms for the corroboration of a UTI diagnosis (Ashraf et al., 2020; Lee et al., 2018; Philips et al., 2012). When factoring in the lack knowledge among nursing staff regarding preventative

measures (Lean et al., 2019; Mody et al., 2017), older adult residents are at an increased risk of UTI development and missed diagnosis. Due to the complexity surrounding UTI a review of the literature is required to provide rationale for the proposed resource, as well as guide the content and delivery methods. Reviewing current literature revealed that there is moderate evidence supporting in-person or online education for LTCH staff which will decrease rates of UTI's and improve accurate diagnosis in older adults living in LTCH.

Search Methods

A literature search was conducted in the CINAHL, PubMed, Scopus, Cochrane library, and Google Scholar databases for articles from scholarly, peer-reviewed journals that examined the identification and prevention of UTI. Reference lists of relevant articles were also searched to find additional appropriate studies. The research question that guided the search was: "What is known about identification and prevention interventions with respect to UTIs in older adults living in LTCH?" Search terms included various combinations of the following terms: [older adults or elderly or geriatric or geriatrics or aging or senior or seniors or older people or aged 65 or 65+] and [long-term care or nursing home or residential care or assisted living] and [urinary tract infection or UTI or tract infection or urinary infection] and "catheter associated urinary tract infections" and "non-catheter associated urinary tract infections". Other key terms included "identification", "prevention", "education", "intervention", and "impacts".

Articles were included in the review if they were English-language and peer-reviewed research from the allied health profession; however, the focus was nursing research as the aim of the resource is to assist nurses and personal care attendants in the prevention and identification of UTI. Research was considered if it was published within the last ten years (i.e., 2013-2023) so that the most recently conducted research was utilized to inform the development of the

practicum project. Older studies were considered if the outcomes measured were deemed appropriate and clinically relevant for this topic, and there were no recent publications. Although the focus of the review was based on older adults living in LTCH, some medium and high-quality studies examining UTI within older adults based in the community or all adults ≥18 years of age living in the community were considered so that a fulsome understanding of the impact and contributing factors of UTI was obtained. Articles were excluded if the population of interest were individuals <18 years of age, as this may not be clinically relevant to older adult populations and the results may not be generalizable.

Initial searches of the databases resulted in over 1,300 articles which were examined via their abstracts to determine relevance. A total of 26 articles were determined to be applicable as per the criteria outlined above and were then critically appraised for this literature review and were analyzed using the Public Health Agency of Canada (PHAC) critical appraisal tool kit (PHAC, 2014). Literature summary tables were completed for studies that implemented UTI education, identification, and prevention interventions (**Arnold et al., 2021**; **Freeman-Jobson et al., 2016**; **Lee et al. 2018**; and **Pasay et al., 2019**) The names of these authors will appear in bold the first time they are referenced in each subsequent section of this literature review.

Only medium and high-quality systematic reviews and quantitative studies (e.g., randomized control trials, cohort, population based, cross sectional, and uncontrolled before and after [UCBA] studies) were considered. From the 26 selected articles, 20 were utilized to determine the significance of the problem. This included one systematic review of medium quality and strong design (Krinitski et al., 2021), three cohort studies of high quality and moderate design (Hu et al., 2019; Gharbi et al., 2019; Palacios-Cena et al., 2021), three cohort studies of medium quality and moderate design (Cherubini et al., 2012; Magny et al., 2018;

Simmering et al., 2017), four population-based studies of medium quality and moderate design (Adomi et al., 2019; Ahmed et al., 2018; Caljouw et al., 2011; Vallejo-Torres et al., 2018), one high quality cross sectional study of weak design (Pinnell et al., 2021), two high quality UCBA study of weak design (Mody et al., 2017; Renard et al., 2014), four medium quality cross sectional studies of weak design (Cotter et al., 2012; Philips et al., 2012; Silva et al., 2021; Wagenlehner et al., 2018), and two medium quality UCBA designs of weak design (Lee et al., 2018; Lean et al., 2019). The remaining six articles focused on interventions to address UTI and included two medium quality systematic reviews of strong design (Meddings et al., 2017; Wu et al., 2020), while the four remaining articles were of various quantitative designs. Two of the quantitative studies were of weak design including two medium quality UCBA designs (Freeman-Jobson et al., 2018; Viner & Gautam, 2020), while the remaining two studies were strong design with one high quality randomized control trial (Arnold et al., 2021) and one medium quality randomized control trial (Pasay et al., 2019).

Significance of the Problem

UTI have been reported to have negative impacts on both the physical and mental health of older adults (Gharbi et al., 2019; Kriniski et al., 2021; Wagenlehner et al., 2018). Contributing factors include knowledge deficits by LTCH staff related to the clinical signs and symptoms of UTI and preventative measures, along with indwelling urinary catherization utilization within the LTCH population.

Incidence

Within the literature, the examination of UTI incidence within the older adult population has not specifically focused on LTCH residents. Two observational population-based studies examined the general incidence rates of UTIs within older adults regardless of where they reside

(Ahmed et al., 2018; Caljouw et al., 2011). A medium quality retrospective population-based study, of moderate design, conducted by Ahmed et al. (2018) examined 931,945 individuals ≥ 65 years of age who had been admitted to a hospital within the United Kingdom; whereas, a medium quality prospective population based study, of moderate design, carried out by Caljouw et al. (2011) had an inclusion criteria which involved all older adults ≥ 85 years of age within a city in the Netherlands (n=479). Both study authors found a similar risk for UTI infection in men ≥85 years of age with Ahmed et al. (2018) reporting that there were 10.54 UTI infection per 100 person-years at risk (95% CI, 8.61-12.48) while Caljouw et al., (2011) discovered the rate to be 7.8 UTI per 100 person-years at risk (95% CI 5.1, 10.6). However, both authors reported that woman may have an increased risk for developing a UTI as Ahmed et al. (2018) described that the incident rate for woman ≥ 85 years of age was 19.80 per 100 person-years at risk (95% CI, 17.86-21.73) while Caljouw et al. (2011) found that the rate was slightly lower at 12.8 UTI per 100 person years at risk (95% CI, 10.4-15.2). Ahmed et al. (2018) reported that over the study period there was a statistically significant increase in UTI incidence for both men and woman between 2004-2014 ($p<0.05$); however, Caljouw et al. (2011) determined that woman had a 1.7-fold increased risk of developing a UTI in comparison to men (Hazard Ratio 1.7, 95% CI 1.1-2.5; $p=0.012$).

Prevalence

Two cross sectional studies with weak designs were found that examined the prevalence of UTI in older adults of various ages. A high-quality cross-sectional study was conducted by Pinnell et al. (2021) and included older adults (n=499) presenting to two emergency departments in Canada, while a medium quality cross-sectional study conducted in Brazil examined the prevalence rate within LTCH residents ≥60 years of age (n=116; Silva et al., 2021). Silva et al.

(2021) reported that of the 116 participants who had a urine sample conducted a total (n=39; 33.62%) were determined to be symptomatic (i.e., met the criteria for UTI diagnosis). This was drastically higher than the results reported by Pinnell et al. (2021) who stated that 57 of the total participant (n=499; 11.4%) participants were diagnosed with a UTI in the emergency department. However, a limitation in both studies was the fact that both authors failed to incorporate a standardized procedure to diagnosis UTI which meant that there was the risk that the overall prevalence rate was lower than initially reported.

Impact

UTIs can have direct impacts on the overall health of older adults and can include increased risk of mortality (Gharbi et al., 2019; Hu et al., 2019) and delirium (Krinski et al., 2021; Magny et al., 2018), as well as declines in mental health (Wagenlehner et al., 2018; Renard et al., 2014) These effects on the older adult can directly impact the health care system through potentially unnecessary hospitalizations which have an inherent cost associated with them (Palacios-Cena et al., 2021; Simmering et al., 2017). These impacts will be examined in the following sections.

LTCH Resident

Mortality. In a high-quality retrospective cohort study, of moderate design, completed in England the study authors were able to examine the impact of no antibiotics, immediate antibiotics, and deferred antibiotics with respect to community based older adults who were diagnosed with a UTI (n= 157,264; Gharbi et al., 2019); whereas, a high quality retrospective cohort study, of moderate design, conducted in China examined predictors of 28-day mortality of older adults with nosocomial UTI (n=1,112; Hu et al., 2019). Gharbi et al. (2019) reported that individuals diagnosed with a UTI who did not receive an antibiotic for treatment, or who had

treatment delayed by 7 days, had significantly higher rates of bloodstream infections (p=0.001). When Gharbi et al. (2019) completed a multivariable cox regression examining 60 day all-cause mortality, participants with no antibiotics had significantly higher risk of death in comparison to individuals started on antibiotics immediately after UTI diagnosis (adjusted Odds Ratio 2.18, 95% CI 2.04-2.33; p<0.001). Hu et al. (2019) described the rate of mortality for participants with nosocomial UTI to be 1.43%, and that factors such as high Carlson Comorbidity Index scores (odds ratio 1.205, 95% confidence interval 1.088–1.334) and lower level of serum prealbumin (odds ration 0.995, 95% confidence interval 0.990–0.999) were risk factors for 28 day in hospital mortality after the completion of multivariate analysis. The studies highlight the concern that UTI can increase older adults' risk for mortality especially when prompt treatment is not initiated, as well as for those older adults who have higher rates of commodities. Both studies accounted for potential confounding variables by performing appropriate statistical analysis which strengthen each study's findings.

Delirium. With respect to delirium, Kriniski et al. (2021) conducted a medium quality systematic review and meta-analysis, of strong design, which examined the association between delirium and UTI in older adults ≥65 years of age (n=16,618), while Magny et al. (2018) completed a medium quality prospective cohort study, of moderate design, investigating the predisposing and precipitating factors of delirium within the same population (n=2,563). Overall, Krinski et al. (2021) reported that delirium was found to be associated with UTI infection even in the presence of potential confounders (OR 2.67, 95% CI 2.12-3.36; p<0.001). Magny et al. (2018) found similar results in their investigation of patients admitted with delirium (n = 208), as infection was the primary factor for presenting with delirium (p<0.001). UTIs were noted as accounting for 15.4% of these infections (Magny et al., 2018). Neither study focused strictly on

LTCH residents, but both utilized the target population of older adults. There was a risk of information bias in the study completed by Magny et al. (2018) as the diagnosis of UTI was based solely on a physician diagnosis and it was not clear the diagnostic criteria utilized to lead to a UTI diagnosis. This meant there was a risk of UTI misdiagnosis (i.e., false positive) meaning the delirium diagnosis had other underlying causes. This was not the case in the study by Krinski et al. (2021) as they had strict inclusion criteria for UTI diagnosis (i.e., positive urine culture and clinical UTI symptoms) which provides support to the claim that older adults experiencing a UTI are at an increased risk of developing delirium.

Mental Health. The effect of UTI on the mental health of individuals (n=575) were investigated in a high quality UCBA study, of weak design, conducted within seven countries: Egypt, Germany, Lebanon, Peru, Poland, Portugal, and Switzerland (Renard et al., 2014), while Wagenlehner et al. (2018) completed a medium quality cross-sectional study, of weak design, within five countries: Germany, Switzerland, Poland, Russia, and Italy. Renard et al. (2014) followed men and woman ≥18 years of age (n=575) over a period of six months, while Wagenleher et al. (2018) conducted a one-time web survey in woman ≥18 years of age (n=1,941) who have experienced recurrent UTI. Renard et al. (2014) reported that at baseline the mean Hospital Anxiety (cronbach alpha 0.83; Bjelland et al., 2002) and Depression (cronbach alpha 0.83; Bjelland et al., 2002) [HAD] score related to anxiety was 10.3 (SD=4.1, range 0-21), and the mean score for the depression subscale was 6.4 (SD=3.6, range 0-18) for participants who were monitored throughout the course of the study. After receiving an intervention to decrease the participants overall UTI episodes, there was a significant decrease in HAD scores in comparison to baseline ($p<0.0001$). Wagenlehner et al. (2018) reported on depression and described that four out of the five participating countries had over half of their participants score

below the national average of the general United States population with respect to risk for depression when completing the SF-12v2 questionnaire: Germany (57%), Italy (68%), Poland (58%), and Russia (71%). The SF-12v2 questionnaire is known to be valid within the general population (test-retest reliability 0.760; Coyne et al., 2009; Ware et al., 1996). The results of both Renard et al. (2014) and Wagenlehner et al. (2018) suggests that older adults who develop a UTI may be at risk for developing depression and anxiety which can negatively impact their mental health. Both authors utilized known tools to measures indicators of mental health, with Renard et al. (2014) incorporating the Hospital Anxiety and Depression (HAD) Scale, and Wagenleher et al. (2018) included the SF-12v2 questionnaire, but it should be noted that Wagenleher et al. (2018) failed to produce data on the significance of their finding with respect to risk for depression, rather only providing descriptive statistics. The study by Wagenleher et al. (2018) was also at risk for selection bias as the study utilized a convivence sample to recruit participants (i.e., individuals required internet access in order to participate).

Health Care System

Due to the impacts related to UTIs within the older adult population such mortality due to bacteria being present in the blood (i.e., urosepsis; Gharbi et al., 2019) and delirium (Krinski et al., 2021), an overall direct impact is observed within the health care system in relation to hospital usage and the associated health care costs.

Hospitalizations. A prospective cohort study of medium quality and moderate design completed in Italy examined various predictors of hospitalization within residents residing in LTCH (Cherubini et al., 2012), while Palacios-Cena et al. (2021) examined the direct effect of UTI on risk for hospitalization in their retrospective cohort study of high quality and moderate design which took place in Spain. Through the completion of logistic regression, Cherubini et al.

(2012) were able to determine that UTIs were associated with a higher risk of hospitalization even after controlling for factors such as demographics and clinical variables within their participant sample (n=1466; p=0.0003). On the other hand, Palacios-Cena et al. (2021) examined all hospital admissions related to UTI from 2001 to 2018. Over this time period there was a statistically significant increase in hospital admissions for both men (n=252,418) and woman [n= 331,275] ($p<0.001$). There was an increase of 280.98 incidence of UTI infection in men, and 300.10 in woman per 100,000 individuals (Palacios-Cena et al., 2021). The results indicate that UTI have an impact on the utilization of hospital resources based on the increased risk of hospitalization for older adults, which in turn can increase overall health care costs.

Hospitalization Costs. With increases in hospitalization come the related costs of admission. A medium quality cohort study, of moderate design, conducted in the United States (Simmering et al., 2017), and a medium quality retrospective observational study, of moderate design completed across eight countries, (Vallejo-Torres et al., 2018) examined the overall costs associated with a UTI admission within hospitals. From 1998-2011 Simmering et al. (2017) reported that non-UTI patients (n=107,712197) had an average yearly increase of $577 per admission, in contrast to $317 for UTI patients (n=960 516) which was a significant difference of $259 per year ($p<0.0001$) even after controlling for inflation. Overall, the average cost of a UTI diagnosis in 2011 was estimated to be $6424, which was similar to overall costs reported by Vallejo-Torres et al. (2018). Vallejo-Torres et al. (2018) described that the cost of patients (n=637) first visit to hospital for UTI was 5065 euros ($5687.35 USD), and when factoring in the costs of antibiotics it increased to 5091 euros ($5717.68 USD). Simmering et al. (2017) included a control group to compare the related costs between UTI and non UTI hospital admissions, but this was lacking from the works of Vallejo-Torres et al. (2018). In both studies the focus was not

on LTCH residents decreasing the generatability of the results; however, the studies indicate the burden of UTI on the health care system. In 2011, it was estimated that the cost UTI in the United Sates was $2.8 billion (Simmering et al., 2017).

Contributing Factors

There are many contributing factors discussed within the literature that are associated with UTIs. These include several modifiable risk factors such as incontinence, dehydration, and catheter usage, along with non-modifiable risk factors such as female gender, cognitive impairment, and previous history of UTI (Adomi et al., 2019; Caljouw et al., 2011; Silva et al., 2021). Other contributing factors include nursing staff knowledge deficits which include lack of knowledge surrounding the clinical signs and symptoms of UTI (**Lee et al., 2018**) and preventative measures (Mody et al., 2017).

Risk Factors

A variety of modifiable and non-modifiable risk factors exist which influence older adults' risk of developing a UTI. A medium quality prospective population-based study, of moderate design, conducted in the Netherlands [n=479] (Caljouw et al., 2011), and a cross sectional study of medium quality and weak design conducted in Brazil [n=116] (Silva et al., 2021) found that there was an associated between modifiable risk factor such as incontinence, physical disability, dehydration. The study by Caljouw et al. (2011) was utilized as there were no more recent studies examining risk factors and UTI within the older adult population. The authors described that self-reported urinary incontinence was an independent predicator of UTI incidence (Hazard Ratio 1.5, 95% CI 1.0-2.1; Caljouw et al., 2011), with Silva et al. (2021) finding similar results in participants ≥ 60 years of age experiencing urinary incontinence with incontinence pad use ($p<0.05$). With respect to physical disability, Caljouw et al. (2011)

discussed how dysfunction of daily living with respect to activities were an independent predictor of UTI development (Hazard Ratio 1.7, 95% CI 1.1-2.5). Silva et al. (2021) also explored the connection between dehydration and UTI and found that dehydrated older adults were 40 times more likely to develop a UTI (Odds Ratio 40.0; $p<0.001$).

With respect to nonmodifiable risk factors, Caljouw et al. (2011) reported that history of UTI (Hazard Ratio 3.4, 95% CI 2.4-5.0) and cognitive impairment (Hazard Ratio 1.9, 95% CI 1.3- 2.9) were independent risk factors, while Silva et al. (2021) reported associations between being female ($p=0.015$) and having type I diabetes ($p=0.021$) with UTI development.

Urinary Catherization

A population based observational study of medium quality and moderate design was conducted in older adults living in the community within Japan (n= 32 617) to determine the impact of catherization on UTI development (Adomi et al., 2019), while Cotter et al. (2012) conducted a medium quality study in Ireland to examine baseline data regarding health care associated infections in LTCH residents (n= 4170) in their cross-sectional study which has a weak design. The study by Cotter et al. (2012) was utilized as no other recent literature examined urinary catherization as a contributing factor of UTI within older adults. Adomi et al. (2019) reported that the incident rate of UTI was higher in individuals with indwelling catheters (33.8 per 100 person years, 95% CI, 22.3-51.3) versus those without (14.4 per 100 person-person years, 95% CI, 10.5-22.3). A similar finding was also reported by Cotter et al. (2012) as they discovered that the presence of an indwelling urinary catheter was found to be associated with UTI development ($p<0.0001$). Adomi et al. (2019) went on to also discuss that long term urinary catheter (i.e., for two consecutive months) was independently associated with an increased risk of UTI development (rate ratio: 2.41, 95% CI, 1.45 to 4.00, $p=0.001$). Since Adomi et al. (2019)

examined older adults in the community it decreased the generalizability of the findings, while Cotter et al. (2012) did not include a standardised definition to determine a UTI diagnosis which may have influenced the results. However, these results are important as estimates within Canada indicate that 5-10% of residents in LTCH are living with an indwelling catheter in place (Niël-Weise et al., 2012).

Health Care Staff Lack of Knowledge

Health care staff have demonstrated knowledge deficits with respect to accurate identification of the clinical signs and symptoms of UTI **(Lee et al., 2018)**, along with various prevention interventions (Mody et al., 2017). Due to these knowledge deficits, there can be direct or indirect effects on UTI identification and prevention.

Clinical Signs and Symptoms. A cross sectional study of medium quality and weak design completed in the United States examined the utilization of signs and symptoms in UTI diagnosis in LTCH (n=4; Philips et al., 2012), while a medium quality UCBA study, of weak design, examined how UTI education could make an impact on Registered Nurses, Licenced Practical Nurses, and unlicensed personal understanding of the clinical signs and symptoms of UTI in (n=7) LTCH in Canada (Lee et al., 2018). The study by Philips et al. (2012) was included in the literature review as no other recent literature examined nursing staffs understanding of the clinical signs and symptoms of infection. The authors conducted a retrospective chart review and reported that 46.5% of the antibiotic prescriptions for suspected UTI for non-catharized individuals and 82.6% of the antibiotic prescriptions for individuals living with an indwelling urinary catheter occurred without documented UTI signs and symptoms (i.e., these residents may not have been experiencing an UTI). This was similar to the results discussed by Lee et al. (2018) as the number of inappropriate treatments of UTI decreased from 90% to 62.9%

(p=0.003) after Registered Nurses, Licenced Practical Nurses, and unlicensed personal received 15 minutes of in person education regarding the diagnostic criteria related to a UTI diagnosis in older adults (i.e., clinical signs and symptoms; interpretation of urine culture results). There were baseline differences in the characteristic of the LTCH in the study by Philips et al. (2012), while Lee et al. (2018) did not account for confounding variables which limits the study's results. Nevertheless, the authors describe that there is either a knowledge deficit regarding what constitutes the clinical signs and symptoms of UTI or the complete disregard for the importance of these signs and symptoms. The results indicate that older adults are often treated for UTI in the absence of the clinical signs and symptoms that indicate infection such as dysuria, new or worsening urgency, frequency, incontinence, along with fever, suprapubic pain, and flank pain (Ashraf et al., 2020). The clinical signs and symptoms of infection appear to be an area of educational need for health care staff working in LTCH.

Prevention Interventions. Other areas of concern include unlicensed and licenced personnel knowledge deficits surrounding UTI prevention methods. A high quality UCBA study, of weak design, completed in the United States examined indwelling catheters (Mody et al., 2017); whereas, a medium quality UCBA study, of weak design, completed in United Kingdom focused on dehydration (Lean et al., 2019). With respect to the works by Mody et al. (2017), in person and virtual education was provided to frontline staff (n=404) working in LTCH which included a technical bundle focusing on information involving clinical skills, along with the promotion of teamwork and a culture of safety. Specifics regarding this education involved basic infection prevention and control (e.g., hand hygiene) along with catheter specific knowledge (e.g., proper cleaning techniques). On the other hand, Lean et al. (2019) reported the successful implementation of a hydration management intervention within (n=4) LTCH. The intervention

provided LTCH staff a 2 hour in person education session which involved the importance of hydration for older adults, information on a structured drink round which would occur daily, along with strategies to ensure sustainability of care delivery. After the implementation of the education intervention by Mody et al. (2017) the catheter-associated UTI rate decreased from 6.42 infections per 1000 catheter-days at baseline, to 3.33 infections per 1000 catheter-days twelve months later (incidence rate ratio, 0.46, 95% CI 0.36-0.58; $p<0.001$; Mody et al., 2017). This indicated that there was either a fundamental lack of knowledge regarding catheter care, or the staff required a refresher on prevention interventions. Lean et al. (2019) also reported reduction in UTI development after intervention implementation. The authors described that the days between UTI development in LTCH residents increased from 9 days during the preintervention period, to 121 days twelve months post intervention (Lean et al., 2019). This was accompanied by a 36% reduction in hospital admissions although this was not a statistically significant finding ($p=0.09$). Lean et al. (2019) did not account for confounding variables through statistical analysis which is a study limitation. However, the results indicate that the prevention interventions can be successful in decreasing incidence of catheter associated UTI and UTI.

Summary

From the evidence provided in this literature review, it has been determined that UTI infections are a health care issue within the population of older adults. There have been reports of high incidence (10.54 per 100 person-years at risk for men; 19.80 per 100 person-years at risk for woman; Ahmed et al. 2018) and prevalence rates (11.4%; Pinnell et al., 2021) of UTI in older adults. Newfoundland and Labrador has the oldest population in Canada with 23.6% of its population aged 65 years and older (Statistics Canada, 2022). The older adult population will

continue to grow in the coming years within the province and with the need for LTCH beds expected to double by the year 2035 the health care concern of UTI cannot be overlooked (Canadian Institute for Health Information, 2021; Provincial Advisory Council on Aging and Seniors, 2018). UTI has negative health outcomes for older adults, including increased risk of mortality and delirium, as well as decline in mental health. These impacts can directly affect the health care system by increasing overall health care spending. Factors such as long term catherization's and knowledge deficits related to the clinical signs and symptoms of UTI and preventative measures, within health care staff practicing in LTCH, can exacerbate the rates of infection. The development of UTIs for older adults in LTCH is clinically problematic in Newfoundland and Labrador and necessitates the development of a resource to support frontline staff practicing in LTCH caring for this population.

Intervention

Six articles were selected to inform the literature review regarding interventions related to UTI. These included two medium quality systematic reviews (Meddings et al., 2017; Wu et al., 2020), and 4 quantitative studies. The majority of the quantitative studies were of weak design including two medium quality UCBA designs (**Freeman-Jobson et al., 2018;** Viner & Gautam, 2020), while the remaining two studies were strong design with one high quality randomized control trial (**Arnold et al., 2021**) and one medium quality randomized control trial (**Pasay et al., 2019**). Each of the studies were analyzed using the PHAC (2014) tool kit.

Education Interventions

Education for Nursing Staff

Lack of knowledge among nursing staff and unlicensed personnel was determined to be a contributing factor in relation to UTI occurrence in older adults (Lee et al., 2018; Philips et al.

2012). Two medium quality UCBA studies of weak design (**Freeman-Jobson et al., 2018;** Viner & Gautam, 2020) provided nursing staff with foundational knowledge with respect to UTI, while one high quality (Arnold et al., 2021) and one medium quality (Pasay et al., 2019) randomized control trial of strong design provided nursing staff with education in determining the clinical signs and symptoms of UTI.

General UTI Knowledge. Two UCBA studies of medium quality and weak design conducted in the United States examined the effectiveness of an education intervention on nursing staff's knowledge of UTIs with respect to awareness, management, and prevention of UTIs (**Freeman-Jobson et al., 2016;** Viner & Gautam 2020). Freeman-Jobson et al. (2016) sample was comprised of 42 participants with backgrounds that included Registered Nurses (n=10), Licenced Practical Nurses (n=14), Personal Care Attendants (n=14), and Medical Technicians (n=4); whereas, Vincer and Gautam (2020) had a smaller sample of 21 participants which included only Registered Nurses (n=18) and Licenced Practical Nurses (n=3). Although the locations of both studies were LTCH, the study by Viner and Gautam (2020) also included beds dedicated to post-acute short term care rehabilitation.

Participants in both studies completed a pre-intervention questionnaire along with a questionnaire immediately after the education intervention took place. The questionnaire in the study by Freeman-Jobson et al. (2016) included 10 multiple choice questions. Viner and Gautam (2020) also included multiple choice questions, nine in total, but also had two dichotomous items. The aim of the questionnaires was to assess nursing staff's knowledge related to awareness, management, and prevention of UTIs and was based on the content provided in the education session. The education provided by Viner and Gautam (2020) occurred in person via

power point presentations and in person discussion; however, the delivery methods of the education provided by Freeman-Jobson et al. (2016) was not clearly defined.

The overall knowledge score was one outcome of interest reported by the study authors. Freeman-Jobson et al. (2016) reported that participants overall scores had significant increases from pre-education (mean (M) test score=6.5, standard deviation (SD)=2.69) in comparison to post-education (M=8.21, SD=1.42; p=0.00; r=0.75). On the contrary, Viner and Gautam (2020) found no statistical differences between the pre-education and post-education scores (pre-education: M=9.0, SD= 1.06; post-education: M=9.47, SD=0.87; p=0.088). When examining specific topics, Viner and Gautam (2020) reported that there was as significant increase in knowledge for UTI prevention (p=0.003). Freeman-Jobson et al. (2016) were more specific and discussed how there was a significant increase in the participants understanding of the importance of routine toileting for the prevention of UTIs (p=0.001), along with a significant knowledge improvement in relation to what constitutes a UTI diagnosis (p=0.003; Freeman-Jobson et al., 2016).

Both studies were of medium quality and weak design (Freeman-Jobson et al. 2016; Viner & Gautam, 2020). The study by Freeman-Jobson et al. (2016) included unlicensed personnel to take part in the education which limits the comparability of the results to those reported by Viner and Gautam (2020) who had an inclusion criteria of only licenced health care workers as the licenced health care workers likely have a better knowledge of UTI due to their formal education. There was also a risk of selection bias as only 52.5% of nursing staff agreed to participate in the study conducted by Viner and Gautam (2020); whereas, there was no data available on response rates in the study completed by Freeman-Jobson et al. (2016) due to the anonymity of attending the educational session. Viner and Gautam (2020) also did not find significant results between pre

and post education test scores, but the authors described that nursing staff may have already been proficient in the education that was provided to them. This indicates the need to tailor the education to the needs of the nursing staff.

Since the studies had weak design and were medium quality, the findings indicate weak evidence that in person education may have a positive effect on nursing staffs overall UTI knowledge. In the future, high quality studies of strong design, which include intervention and control groups, would be ideal to gain a better insight on the impact of educational interventions and nursing staffs foundational UTI knowledge.

Clinical Signs and Symptoms of UTI. In the search of the literature no study specifically examined an intervention aimed at increasing LTCH staff knowledge of the clinical signs and symptoms of UTI. However, two randomized control trials were found within literature that examined antimicrobial stewardship which involved understanding what constitutes a diagnosis of a UTI (i.e., the clinical signs and symptoms of infection). One randomized control trial of high quality and strong design conducted in Denmark (**Arnold et al., 2021**) along with a medium-quality randomized control trail study of strong design completed in Canada (**Pasay et al., 2019**) examined the impact of education for health care staff with respect to the prescribing of antibiotics to residents living in LTCH, the goal being that only patients with a UTI received antibiotic treatment. Arnold et al. (2021) included a total of 22 LTCH with a total of (n=1470) residents, while Pasay et al. (2019) incorporated 42 LTCH and a total of (n=1248) residents. Both studies examined the effect of the intervention within the older adult population; however, Pasay et al. (2019) also included individuals living in LTCH who were younger than 65 years of age. In each study the intervention groups received the education, while the control groups continued with usual care which involved the routine practices of the unit.

In both studies the education was delivered by the study authors and was aimed at antimicrobial stewardship which incorporated the defining of what constitutes a UTI (i.e., clinical signs and symptoms). Arnold et al. (2021) and Pasay et al. (2019) both provided in person education sessions, with the education provided by Arnold et al. (2021) taking place over 75 minutes while no length of time was discussed by Pasay et al. (2019). Arnold et al. (2021) and Pasay et al. (2019) focused defining the signs and symptoms of UTI, along with the minimum criteria required for the collection of a urine culture. Furthermore, Arnold et al. (2021) included education on the evaluation of non-specific symptoms for UTI and use the dialogue tool (i.e., improve communication with physicians regarding patient's signs and symptoms) which is critical for ensuring that the appropriate clinical information is delivered to the physician. In each study the education was based off previous research or experts in the field of geriatrics, and was delivered to nursing staff, with the notable exceptions that Pasay et al. (2019) also included physicians to receive the education.

The primary outcome of interest in both studies was the focus on the total amount of antibiotic prescriptions in relation to UTI diagnosis [i.e., how many LTCH residents were accurately identified with a diagnosis of a UTI] (Arnold et al., 2021; Pasay et al., 2019). Pasay et al. (2019) also included the number of urine cultures performed as a primary outcome which is key as only those with the clinical signs and symptoms of UTI should have a urine culture test performed. Arnold et al. (2021) and Pasay et al. (2019) both described that there was a lower number of antibiotics prescribed after the delivery of the education, with Arnold et al. (2021) reporting that the intervention group has 134 prescriptions per 84035 days at risk, versus 228 prescriptions per 77817 days at risk in the control group, and Pasay et al. (2019) stating that the control group had 3.3 antibiotic prescriptions per 1000 resident days while the intervention group

had 2.5 prescription per 1000 resident days ($p<0.0001$). Arnold et al. (2021) further explained that their adjusted model indicated that the rate ratio of receiving an antibiotic in the intervention group was 0.42 (95% CI 0.31-0.57) post educational intervention, and that there was an overall lower amount of inappropriate antibiotic treatments in the intervention group in comparison to control based on the education provided (adjusted model rate ratio 0.33; 95% CI 0.23-0.49). These results indicate that more patients were being treated inappropriately with antibiotics prior to the education intervention, meaning that patients were being treated for UTI when they did not actually have the infection. Antibiotics should only be administered if the patient has clinical signs and symptoms of infection, and the same rationale is involved in the ordering of urine cultures. Pasay et al. (2019) reported significant decreases in urine cultures post education within the intervention group in comparison to the controls ($p<0.001$). There were 2.1 less urine cultures per 1000 resident days within the intervention group ($p<0.001$; Pasay et al., 2019). Overall, these results indicate that nursing staff had either knowledge deficits regarding signs and symptoms of UTI in older adults living in LTCH or did not understand the importance of the clinical signs in symptoms of UTI in relation to the completion of urine cultures and antibiotic treatment. Although the results do not directly examine nursing staff's knowledge of the clinical signs and symptoms of UTI, the results do demonstrate an indirect increase in the awareness of these clinical signs and symptoms due to decreases in antibiotic prescriptions and urine culture rates.

Both studies were of strong design and were of high quality (Arnold et al., 2021) and medium quality (Pasay et al., 2019). Strengths of both studies included a large sample size across a substantial number of LTCH which increased the generatability of the findings. The limitation of the works by Pasay et al. (2019) included the inclusion of physicians in the education as it

may have had an impact on the overall results by influencing their practice decisions. Since the studies were of high quality (Arnold et al., 2021) and medium quality (Pasay et al., 2019) respectively, the findings indicate that there is strong evidence that the education interventions demonstrated an ability to decrease overall antibiotic prescribing and urine culture testing without increasing risks for mortality (Arnold et al., 2021; Pasay et al. 2019). Meaning that nurses were better able determine when a LTCH resident was experiencing a UTI. Therefore, education that involves the clinical signs and symptoms of UTI should be examined in any education interventions provided to health care staff working in LTCH as many UTI are diagnosed without an investigation of the clinical signs and symptoms of infection (Philips et al., 2012).

Prevention Interventions

There are modifiable risk factors for UTIs that the literature reviewed demonstrates as an area to focus for preventions interventions such as treatment for dehydration and incontinence (Caljouw et al., 2011; Silva et al., 2021). It is also understood that catheters are associated with UTI and are the strongest predictor of infection even when controlling for confounding variables (Cotter et al., 2012). Catheters could be considered modifiable if they are being used inappropriately (e.g., for incontinence) or non-modifiable if there are issues relating to the genitourinary system. By implementing interventions focusing on modifiable and nonmodifiable risk factors, the hope is to decrease the overall incidence rates of UTI in older adults living in LTCH.

Two medium quality systematic reviews examined prevention interventions that could be implemented to reduce UTI in LTCH residents (Meddings et al., 2017; Wu et al., 2020). Wu et al. (2020) focused specifically on nurse-led interventions; whereas, it was not clear in the

systematic review by Meddings et al. (2017) if all the interventions were led by nurses or if there was the incorporation of other members of the interdisciplinary team. Wu et al. (2020) exclusively focused on nurse led interventions within LTCH; however, Meddings et al. (2017) took a more expanded approach by including not only LTCH, but also short-stay centres and rehabilitation units. In both studies there were LTCH residents included in analysis who we <65 years, along with those >65 years of age (Meddings et al., 2017; Wu et al., 2020).

Meddings et al. (2017) included 8 randomized control trials and 11 were nonrandomized control trials, while Wu et al. (2020) examined 1 cluster randomized control trial, one nonrandomized control trial, and two UCBA. Shared outcomes of interest included rates of UTI, catheter associated UTI, while Meddings et al. (2017) also included indwelling urinary catheter utilization as a primary outcome. Interventions in the works by Meddings et al. (2017) included (n=13) that focused on urinary catheter use and care: appropriateness of urinary catheter use (n=4), improving urinary catheter maintenance (n=4), securement (n=4), removal of unnecessary urinary catheters (n=4), improving incontinence care (n=4), catheter changes (n=2), and comparing different types of catheters (n=2). Both Meddings et al. (2017) (n=3) and Wu et al. (2020) (n=2) examined interventions that focused on hydration management, while Wu et al. (2020) included studies that incorporated advanced practice nurses to provide education and support to LTCH staff (i.e., Nurse Practitioner [n=1] and infection control nurse [n=1]), along with (n=1) study which involved direct patient involvement.

Meddings et al. (2017) and Wu et al. (2020) had a total of (n=11) studies which demonstrated reductions in UTI (n=9, n=1; respectively). Meddings et al. (2017) also described that (n=5) studies reported decreases in catheter associated UTI and (n=2) studies described bacteriuria reduction, with Wu et al. (2020) describing (n=2) studies increasing fluid intake, and

(n=1) study increases toileting frequency. Only (n=1) study included in the review by Meddings et al. (2017) that demonstrated significant results, while Wu et al. (2020) described (n=2). Meddings et al. (2017) and Wu et al. (2020) reported a statistically significant decreases in catheter associated UTI (n=1) and fluid intake (n=2), respectively. Meddings et al. (2017) described that when a multimodal intervention was incorporated that focused on the promotion of hand hygiene, improve antimicrobial use, incorporation of a standardized definition of catheter associated UTI, and multi drug resistant organism surveillance, a significant decrease in catheter associated UTI was reported. On the other hand, Wu et al. (2020) discussed (n=2) studies that demonstrated significant increases of fluid intake with the incorporation of a nurse practitioner providing supportive management to LTCH staff, while the other encouraged LTCH residents to drink 1500mL per day. Meddings et al. (2017) also made recommendations of fluid intake as a supportive strategy to decrease overall incidence of UTI even with no significant increases of fluid intake in the (n=3) studies examining the outcome. Finally, Meddings et al. (2017) also described the importance of reducing indwelling urinary catheter utilization although this study did not report statistically significant results.

Both studies were rated as medium quality and shared some similar concerns. One such concern involves the lack of a meta-analysis which was due to the heterogeneity of the included studies (Meddings et al., 2017; Wu et al., 2020). Secondly, the two systematic reviews included only studies published in English and did not examine grey literature which means that some studies may have been excluded from the review. Specifically concerning the review conducted by Wu et al. (2020), there was limited studies discovered which met the inclusion criteria, with the predominant study designs found being pilot and feasibility in nature. Whereas, an issue discussed by Meddings et al. (2017) was the fact many of the studies were underpowered which

led to the inability to find statistically significant results. In the future, it would be ideal for studies examining UTI preventions to have strong designs (e.g., randomized control trial) which have sufficient power, provide adequate information regarding the interventions, and include interventions that are nurse-led with a focus on leadership and change (Meddings et al., 2017; Wu et al., 2020). However, there is moderate evidence to suggest that individual or multimodal interventions focusing on prevention methods (e.g., infection control, hydration, catheter removal protocols) and the incorporation of advanced care nurses (i.e., Nurse Practitioner) can have positive effects on reducing overall UTI incidence in older adults living in LTCH.

Summary of the Literature

The literature revealed many studies within the discipline or nursing and allied health which provided education to nurses and unlicensed personnel regarding UTI within the older adult population, as well as educating LTCH staff members in strategies to identify and prevent UTI. These studies were primarily strong designs and included systematic review (n=2) and randomized control trials (n=2); however, two additional studies were of weak design which included UCBA (n=2).

It has been noted in the literature that LTCH staff have demonstrated knowledge deficits with respect to accurate identification of UTI signs and symptoms which can lead to direct or indirect effects on UTI identification (**Lee et al., 2018**; Philips et al., 2012). Based on the findings of the two-medium quality UCBA studies conducted by **Freeman-Jobson et al. (2016)** and Viner & Gautam (2020), there is weak evidence to support the incorporation of education surrounding assessment and management of UTI in older adults. The authors incorporated in person education with Vinver and Gautam (2020) providing the education via powerpoint, but it was unclear what delivery methods were utilized by Freeman-Jobson et al. (2016). Overall, the

education demonstrated improvement in foundational knowledge of UTI involving assessment and management (e.g., UTI diagnosis criteria). With respect to education involving the clinical signs and symptoms of UTI, two randomized control trials of high quality **(Arnold et al. 2021)** and medium quality **(Pasay et al. 2019)** were determined to have strong evidence in relation to UTI identification. The goal of the authors educational interventions was focused on antimicrobial stewardship, specifically that only patients with a UTI received treatment. Arnold et al. (2021) and Pasay et al. (2019) both provided in person education sessions and they had a focus on defining the clinical signs and symptoms of UTI. Arnold et al. (2021) also included education on the evaluation of non-specific symptoms for UTI. The authors determined that the educational interventions were able to successfully decrease antibiotic prescriptions for suspected UTI. This was an important finding as it indicates that more patients were being treated inappropriately with antibiotics prior to the education intervention, meaning that patients were being treated for UTI when they did not actually have the infection. Pasay et al. (2019) also found that the total number of urine culture decreased, indicating a better understanding of the diagnostic tool, as urine cultures should only be collected if the older adult has clinical signs and symptoms of a UTI.

In terms of prevention of UTI, it is key that a focus is placed on modifiable risk factors such as dehydration, incontinence, and in appropriate use of indwelling urinary catheters (Adomi et al., 2019; Caljouw et al., 2011; Silva et al., 2021). Based on the finding of two systematic reviews of medium quality (Meddings et al., 2017; Wu et al., 2020) it was determined that there was moderate evidence that individual or multimodal interventions focusing on prevention methods (e.g., infection control, hydration, catheter removal protocols) and the incorporation of advanced care nurses (i.e., Nurse Practitioner, infection control nurse) can have positive effects

on reducing overall UTI incidence in older adults living in LTCH. Meddings et al. (2017) described that a multimodal intervention that focused on hand hygiene, improve antimicrobial use, incorporation of a standardized definition of catheter associated UTI, and multi drug resistant organism surveillance had success in decreasing catheter associated UTI. While Wu et al. (2020) described the incorporation of a nurse practitioner providing supportive management to LTCH staff as an influencing factor in increasing hydration, while another study described by Wu et al. (2020) demonstrated increases in fluid intake in LTCH residents by encouraging them to drink 1500mL per day. Meddings et al. (2017) made recommendations of increased fluid intake as a supportive strategy to decrease overall incidence of UTI.

The literature discussed within this section was utilized to help answer the research question and will be incorporated in informing the development of the educational resource. The educational interventions discussed were completed either in person or online; therefore, these methods would be ideal for delivering the educational resource. However, throughout the consultation process with key stakeholders the preferred delivery method will be chosen. Education should focus on the assessment and management of UTI (Freeman-Jobson et al., 2016; Viner & Gautam, 2020), identification of the clinical signs and symptoms of UTI (Arnold et al., 2021; Pasay et al., 2019), and prevention methods such as hand hygiene, improved antimicrobial use, incorporation of a standardized definition of catheter associated UTI, multi drug resistant organism surveillance, and hydration management (Meddings et al., 2017; Wu et al., 2020). Overall, according to Table 4 of the PHAC Tool Kit (PHAC, 2014), it was determined that there was moderate evidence that suggests that education provided to LTCH staff will decrease rates of UTI development and increase the accuracy of identifying the infection within the older adult population.

Theoretical Framework

The development of the learning resource will be influenced by Knowles (1984) Adult Learning Theory. It is critical that the learning resource be guided by a well-informed learning theory as it will serve as a theoretical framework for how individuals will increase their knowledge and skills in order achieve positive change in behaviour and performance (Mukhalalati & Taylor, 2019). The theory is based on the concept of andragogy which implies that adults have different learning needs in comparison to children (Knowles, 1989). The adult learning theory implies that it is the adult who is in control of their learning (Mitchell et al., 2005). Adults need to understand the importance of a topic prior to learning it, they take pride in their ability to perform self-directed learning, they utilized previous experience to inform their learning, and they are problem focused meaning they want to learn solutions for real life issues (Knowles, 1989; Mitchell & Courtney 2005).

It is critical that the learning resource focus on the areas of concern of the learner which in this case are the licenced (e.g., Registered Nurses, Licenced Practical Nurses) and unlicensed (e.g., Personal Care Attendants) staff working within LTCH (Gravani, 2012). These key stakeholders will be invaluable in determining how the education is delivered (e.g., individual versus group activities) and what strategies should be incorporated (e.g., experiential learning; Gravani, 2012). These key questions will be explored during the consultation phase. However, with respect to the current literature it was determined that in person education were successful in increasing the knowledge of licenced and unlicensed personal with respect to key concepts of UTI (**Freeman-Jobson et al., 2016**), the clinical signs and symptoms of UTI (**Arnold et al., 2021; Pasay et al., 2019**), and the incorporation of UTI prevention methods (Medding et al., 2017; Wu et al., 2020). Mody et al. (2017) also described that online education was also a viable

option for providing education to frontline LTCH staff providing care to older adult residents as the interventions related to improving nurses clinical skills decreased catheter associated UTI.

Conclusion

The findings of this literature review demonstrate that UTIs are a health concern that have negative impacts on LTCH residents and the health care system. Licenced (e.g., Registered Nurses and Licenced Practical Nurses) and unlicensed staff (e.g., personal care attendants) work directly with residents residing in LTCH; therefore, they are in ideal position to combat this health care challenge. To be successful in implementing this change, these members of the LTCH staff need to have knowledge of evidence informed interventions based on the identification and prevention of UTI. Findings from this literature review provide strong evidence for the development of an educational resource that focuses on the identification of the clinical signs and symptoms UTI, moderate evidence for the inclusion of prevention interventions, and weak evidence for the inclusion of education related to UTI awareness and management. The goal of the resource is to increase the knowledge of LTCH staff to decrease the incidence of UTI while simultaneously assisting in early detection of UTI so that proper management strategies can be implemented. Overall, according to Table 4 of the PHAC Tool Kit (PHAC, 2014), it was determined that there was moderate evidence that suggests that education provided to LTCH staff will decrease rates of UTI development and increase the accuracy of identifying the infection within the older adult population.

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Appendix A: Literature Summary Table

Key Question: "What is known about identification and prevention interventions with respect to UTIs in older adults living in LTCH?"

Legend: ASB: Asymptomatic Bacteremia; LPN: Licenced Practical Nurse; LTCH: Long Term Care Homes; Mins: minutes; OR: Odds Ratio; R: effect size; RR: Rate Ratio; RN: Registered Nurse; Rx: prescription; SD: Standard Deviation; S/S: Signs and Symptoms; Tx: Treatment; UTI: Urinary Tract Infection; V&R: valid and reliable; Y/o: Years Old

Study/Design/Purpose	Sample and Methods	Key Results	Comments

Authors:
 	
Freeman-Jobson et al. (2016)
 	
Design:
 	
Uncontrolled Before and After
 	
Purpose:
 	
To determine if an evidence-based education intervention would increase knowledge of health care providers working within LTCH
	N: 42 participants from 3 LTCH
	Nurse Aid: n=14
	LPN: n=14
	Medical Technician: n=4
	RN: n=10
	
	Country: United States
	
	Intervention:
	• In person education
	• Delivery methods unclear
	
	Data Collection:
	• 10 item multiple choice questionnaire
	  • Good V&R (reviewed by expert panel)
	• Maximum Score 10
	
	Outcomes:
	• Awareness related to UTI
	  • UTI S/S, prevention methods, and diagnostic criteria
		Overall Knowledge Scores
		
		Pre-Intervention
		M test score=6.5 (SD=2.69)
		
		Post Intervention
		M test score= 8.21 (SD=1.42)
		
		• p<0.001
		• r=0.75
			Strength of Design: **Weak**
			
			Quality: **Medium**
			
			Key Threat to internal validity:
			
			-No control group therefore no ability to make a comparison
			
			-Authors did not control for confounding via statistical analysis
			
			-Risk for selection bias since no data on

Study/Design/Purpose	Sample and Methods	Key Results	Comments
	Analysis: • No use of regression analysis		overall participation rates

Study/Design/Purpose	Sample and Methods	Key Results	Comments

Authors:
 	
Arnold et al. (2021)
 	
Design:
 	
Randomized Control Trial
 	
Purpose:
 	
To determine if increases in UTI knowledge and communication skills influence antibiotic prescriptions for UTIs. A main component of the study is teaching LTCH staff the clinical signs and symptoms of UTI in older adults.
	N: 22 LTCH; older adults ≥65 y/o (n=1470)
	
	Country: Denmark
	
	Intervention Group (n=11):
	• In person education (75 mins in length)
	  • Distinguish between UTI and ASB
	  • Evaluate Non-Specific UTI S/S
	  • Diagnostic Tool
	
	Control Group (n=11): Usual Care
	
	Data Collection:
	• Total antibiotic Rx (V&R good)
	• Documentation of UTI S/S (V&R good)
	
	Outcomes:
	• Antibiotic Rx for acute UTI
	• Appropriateness of Tx
	
	Analysis:
	• Poison Regression Model to adjust for clustering
		Antibiotic Prescriptions
		
		Post Education
		
		Intervention Group:
		• 134 prescriptions per 84035 days at risk
		
		Control Group:
		• 228 prescriptions per 77817 days at risk
		
		Adjusted RR
		• 0.42 (95% CI 0.31-0.57)
		
		Inappropriate Tx
		
		Post Education
		
		Intervention Group:
		• 32 events per 84035 days at risk
		
		Control Group:
		• 62 events per 77817 days at risk
		
		Adjusted RR
		• 0.33 (95% CI 0.23-0.49)
			Strength of Design: **Strong**
			
			Quality: **High**
			
			Strength of Design:
			
			Limited loss to follow up (0.4%)
			
			Conducted the interventions in multiple LTCH(n=65)
			
			Utilized older adults ≥65 years of age as study participants (i.e., target population)
			
			Regression Analysis was conducted on primary and secondary outcomes
			
			Conducted in 22 LTCH increasing generalizability of the findings

Study/Design/Purpose	Sample and Methods	Key Results	Comments

Authors:
 	
Pasay et al. (2019)
 	
Design:
 	
Randomized Control Trial
 	
Purpose:
 	
To measure the impact of antimicrobial stewardship initiative on the rate of urine culture testing and antimicrobial prescribing for UTIs. A main component of the study is teaching LTCH staff the clinical signs and symptoms of UTI in older adults.
	N: 33 LTCH; older adults 25-106 y/o (n=1,248)
	
	Country: Canada
	
	Intervention Group (n=12)
	• Face to face education for LTCH staff and physicians
	  • Awareness of antibiotic stewardship
	  • Best practices for UTI and ASB
	  • Diagnostic Tool
	
	• Education for families
	  • Pamphlet examining antibiotics
	
	Control Groups (n=21)
	• Matched by +/- 10% of amount of beds
	• Usual Care
	
	Data Collection:
	• Urine Cultures (V&R good)
	  • 95% specificity; 85% sensitivity
	• Antibiotic Rx (V&R good)
	
	Analysis:
	• Logistic Regression used to measure variables over time
		Urine Cultures
		
		Post education
		
		Intervention group:
		
		• 3.0 urine cultures per 1000 resident days
		
		Control Group:
		
		• 4.2 urine cultures per 1000 resident days
		
		• $p<0.0001$
		
		Antibiotic Prescriptions
		
		Post Education
		
		Intervention Group:
		
		• 2.5 prescriptions per 1000 resident days
		
		Control Group:
		
		• 3.3 prescriptions per 1000 resident days
		
		• $p<0.0001$
			Strength of Design: **Strong**
			
			Quality: **Medium**
			
			Key Threat to internal validity:
			
			Physicians included in educations sessions; therefore, possible factor influencing study results
			
			No age restrictions on participants which may have affected results since target population ≥65 years of age
			• ASB more prevalent in older adults (Rowe & Juthani-Mehta, 2013)
			
			Strength of Study
			-large study population across 33 LTCH

Study/Design/Purpose	Sample and Methods	Key Results	Comments

Authors:
 	
Lee et al. (2018)
 	
Design:
 	
Uncontrolled Before and After Design
 	
Purpose:
 	
To determine if an educational intervention can decrease inappropriate antibiotic usage in LTCH residents with ASB. A main component of the study is teaching LTCH staff the clinical signs and symptoms of UTI in older adults.
	N: Nursing staff (n=212)
	• 7 LTCH
	• LTCH participants (n=112)
	  • Inclusion criteria→ >18 y/o; positive urine culture
	
	Intervention:
	• 15 minute in person education
	  • ASB Tx guidelines
	  • Diagnostic criteria for UTI
	  • Pocket cards with UTI diagnostic criteria
	
	Data Collection:
	• Chart Audits
	  • Conducted by study authors (V&R good)
	
	Outcomes:
	• Inappropriate antibiotic Tx of ASB
	• Appropriateness of urine culture tests
	• Urine Culture Requests
	
	Analysis: No use of regression analysis
	Chi Square Tests→categorical data
		Inappropriate Antibiotic Prescription for ASB
		
		Pre-education: 90% rate
		
		Post-education: 62.9% rate
		
		• p=0.003
		
		• OR: 5.32 (95% CI, 1.68-16.81)
		
		Appropriateness of Urine Cultures
		
		33.8% preintervention vs 44.0% postintervention
		
		• p>0.05
		
		Urine Culture Requests
		
		Preintervention:
		• 13.2 urine cultures per 100 beds
		
		Post intervention
		• 11.6 urine cultures per 100 beds
		
		• p>0.05
			Strength of Design: **Weak**
			
			Quality: **Medium**
			
			Key Threat to internal validity:
			
			Small sample size may have affected the results
			
			No control group for compression
			
			Risk for selection bias→14.6% of eligible nurses completed the education
			
			The authors did not control for confounding via statistical analysis

Appendix II: Environmental Scan

Environmental Scan Report: Development of an Educational Resource for Nursing Staff and Unlicensed Personnel on the Identification and Prevention of Urinary Tract Infections within Residents Living in Long Term Care

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Urinary tract infections (UTIs) are among the most frequently diagnosed infections in older adults living within Long Term Care Homes (LTCH) (Ashraf et al., 2020; Latour et al., 2020). The concern is that UTIs can increase the risk of mortality due to decreases in immunity in older adults with those greater than 84 years of age having the highest risk of death (Palacios-Cena et al., 2021). This practicum project is focused on the development of a resource on the identification and prevention of UTI for health care staff practicing in Long-Term Care Homes (LTCH). This decision was informed by findings from a recent literature review in which there was evidence to suggest that educational interventions for licenced (i.e., Registered Nurses [RNs], Licenced Practical Nurses [LPNs]) and unlicensed staff (i.e., personal care attendants [PCAs]) may be effective for accurately identifying and preventing UTI in LTCH residents. The purpose of this environmental scan is to determine if there are existing educational materials, policies, and protocols currently incorporated in health authorities within Atlantic Canada, as well as within the remaining Canadian provinces or international organizations. This is critical as these materials may help to inform the development of a learning resource on UTI for health care staff practicing within LTCH that services older adult residents in St John's, NL.

Brief Overview of the Project

The goal of this practicum project is to enhance the health of residents residing in LTCH by increasing the identification and prevention of UTI. This information will be integrated into the development of a resource to provide nursing staff and unlicensed staff working in LTCH with the knowledge required to understand the complexity of UTIs, along with providing them with the tools to guide their practice decisions.

It may be possible that already established interventions exists within grey literature; therefore, an extensive search of health care organization websites and other reputable

organizations took place to examine if already established interventions aimed at identifying and preventing UTIs in residents residing in LTCH can be adapted for implementation into practice. This adaptation would depend on the local context, such as current practices, the target population, and the current allocation of resources (e.g., funding, staffing ratios, and technology).

Along with interventions, it is also critically important to consider levels of knowledge. There has been a demonstrated lack of knowledge with respect to the signs and symptoms of UTIs within this population by both nursing staff and unlicensed personnel (Jones et al., 2020; Lee et al., 2018). Confusion also exists among nursing staff in differentiating asymptomatic bacteremia from a UTI which can lead to inappropriate utilization of antibiotics which can contribute to antimicrobial resistance (Lee et al., 2018). Finally, nursing staff have knowledge deficits with respect to preventative measures which could decrease rates of urinary tract infections (Meddings et al., 2017; Wu et al., 2020). Therefore, the grey literature, including health care organization websites and online resources of other reputable organizations, were examined for already established education material (e.g., power point presentations, self-directed learning modules, pamphlets etc…), along with policies and protocols that could be utilized or adapted within the resource manual to mitigate these potential knowledge deficits.

Overall, the completion of this environmental scan will provide a better understanding of possible interventions and education materials that are currently utilized for nurses practicing in LTCHs. The results of the environmental scan will also help inform the development of the consultation plan and inform the development of the practicum project.

Specific Objectives for the Environmental Scan

1. To identify current intervention(s), protocols, and education utilized within LTCHs within the Atlantic Canada region aimed at increasing the recognition and decreasing the development of

urinary tract infections within residents of LTCHs.

2. To identify current interventions(s), protocols, and education from reputable Canadian or International organizations that focus on older adults and urinary tract infections.

3. To determine the appropriateness of available materials within the various health authorities with respect to the development of the resource.

Methods

The completion of this environmental scan included the examination of sources on reputable websites. A google search was conducted to obtain the most pertinent and accurate information regarding this project's key objectives via credible webpages. Search terms such as "urinary tract infections" and "long term care" and "resources or interventions or protocols" were utilized to obtain information related to the prevention and identification of UTI.

Information was obtained by examining the websites created by health organizations within the Maritime Provinces (i.e., Nova Scotia, New Brunswick, and Prince Edward Island) and are outlined in Table 1. The inclusion of the aforementioned provinces provides the ability to compare current nursing practices within these various health organizations, to that of the Eastern Regional Health Authority in Newfoundland, as these geographical areas are cultural similar and have comparable demographics, which may better inform the development of the resource. Within the search, two webpages within Nova Scotia focused on identification of UTI in all individuals; whereas, two webpages in New Brunswick focused on the pharmacist role to treating patients in the community aged 18-64 years experiencing a UTI. Only one webpage within Prince Edward Island revealed relevant content with respect to the project's overall goals, and this included a Care Pathway which specifically focused on LTCH residents experiencing a potential UTI without an indwelling urinary catheter (Health PEI, 2015).

A more global search of the internet also took place, with the exact same search criteria mentioned previously, to determine if any additional resources existed across Canada, as well as internationally. This search yielded a total fifteen webpages across Canada and the United States, but only five were deemed to be relevant to the identification and prevention of UTI in older adults living in LTCH and they can be found in Table 1. This included education materials from the Registered Nurses Association of Ontario (Cowie, 2011), Public Health Ontario [PHO] (2019), British Colombia [BC], (2015) California Department of Public Health [CDPH], (2019), along with a clinical practice guideline created by Alberta Health Services [AHS], (2015).

Additionally, resources were obtained from the Eastern Regional Health Authority in Newfoundland. A LTCH Nurse Educator and Regional Program Coordinator of Long-Term Care Services within the Eastern Regional Health Authority were contacted via email, which can be found in Appendix A, to determine if any existing resources have been developed and implemented within the region. Both individuals responded and the resources provided are depicted in Table 1 which included education for health care staff, residents, and families (Eastern Health [EH], n.d a; EH, n.d. b), as well as a policy (EH, 2023a) and medical directive (EH, 2023b).

Together, the information obtained from these modes of inquiry will be synthesized based on concepts (i.e., education, identification, prevention, and residents/families) and will inform the practicum project.

Data Collection, Management, and Analysis

Data were collected by reviewing the concepts covered within all the resources obtained in the environmental scan. This included the various webpages and resources obtained in the interviews with the Nurse Educator and Regional Program Coordinator. The analysis of the data

was conducted via a manifest content analysis which examines data that is easily observable without having to determine underlying meaning (Kleinheksel et al., 2020). Codes were predetermined prior to the completion of the environmental scan based on a recent literature review and included *education, identification, prevention, and residents/families.* From these codes key themes related to UTI were created with respect to the materials analysed in the environmental scan and can be found in Table 2. All relevant materials were examined to ensure that they were from reputable sources (e.g., registered health organizations and/ or peer reviewed scholarly articles) and that the information was recently published to allow for the retrieval of information that is relevant to current nursing practices in LTCH.

Ethical Considerations

To determine if the practicum project required ethical review by the Health Research Ethics Authority (HREA), the HREA screening tool was completed. As the project is focused on quality improvement, it was determined that an HREA review was not required. A completed copy of this screening tool can be found in Appendix B.

Privacy and confidentiality were upheld since all information obtained in the environmental scan, including email correspondence with the Nurse Educator and Regional Program Coordinator, was kept confidential and only shared with the practicum supervisor. This information was kept on an encrypted, password protected laptop and will be permanently deleted upon the completion of this project. Although some aspects of the concepts that were reviewed may help inform the topics covered in the learning resource, no information reviewed was directly related to meet the needs of the practicum project. Therefore, it was unnecessary to pursue obtaining written permission for the use of the resources reviewed in the environmental scan.

Results

The material included in the environmental scan had a primary focus on educating health care staff on the identification and prevention of UTI; however, one resource's aim was educating residents living in LTCH, as well as their families, with respect to identification and prevention which will enhance their ability to understand the complexity of UTI within the target population (Eastern Health, n.d.b). The seven webpages previously discussed (AHS, 2015; BC, 2015; CDPH, 2019; Cowie, 2011; Health PEI, 2015; PHO, 2019), along with the materials obtained in the discussions with the LTCH Nurse Educator and LTCH Regional Program Director (EH, n.d. a; EH, n.d. b; EH, 2023a; EH, 2023b) were reviewed and analyzed in the environmental scan.

The resources are broken into key components in Table 1 (i.e., type of resource) and Table 2 (i.e., similarities between resources). Key themes included the specific and nonspecific signs and symptoms of UTI, along with screening tools that can be utilized to diagnosis a UTI in an older adult. The resources also focused on preventative interventions such as appropriateness of urinary catheters, as well as the importance of catheter care, hydration, and hygiene.

Table 1

UTI Resources

Resource	**Organization Type**	**Format**	**Topic**
Alberta Health Services (2015)	Health Organization	PDF: Clinical Practice Guidelines	UTI & CAUTI
British Colombia (2015)	Health Organization	PDF: Pamphlet for health care staff	UTI
California Department of Public Health (2019)	Health Organization	PDF: Slide Show	UTI & CAUTI
Cowie, 2011	Registered Nurses Association	PDF: Slide Show	UTI
Eastern Health (n.d a)	Health Care Organization	Webpage: Self-directed learning	UTI

Eastern Health (n.d b)	Health Care Organization	PDF: Pamphlet for families and residents	UTI
Eastern Health (2023a)	Health Care Organization	PDF: Policy	UTI and CAUTI
Eastern Health (2023b)	Health Care Organization	PDF: Medical Directive	UTI and CAUTI
Health PEI, 2015	Health Care Organization	PDF: Care Pathway	UTI
Public Health Ontario (n.d.)	Health Care Organization	PDF: Slide Show	CAUTI

Legend: Catheter Associated Urinary Tract Infection (CAUTI), Portable Document Format (PDF)

Table 2

Synthesis of Resource Content Available on UTI in the context of LTCH

	AHS (2015)	**BC (2015)**	**CDPH (2019)**	**Cowie, (2011)**	**EH (n.d a)**	**EH (n.d b)**	**EH (2023a)**	**EH (2023b)**	**Health PEI (2015)**	**PHO (2019)**
Education										
Etiology	•		•							
Pathophysiology		•								
Risk Factors	•		•	•						
Signs and Symptoms	•	•		•	•		•	•	•	•
Nonspecific Signs and Symptoms	•	•			•					•
Asymptomatic Bacteremia	•			•	•					•
Complications of UTI (e.g., mortality, functional decline, decreased mobility)			•							
Identification										
Validated Screening Tool				•						
Screening Tool	•				•		•	•	•	•
Appropriateness of Urine Culture	•			•	•		•		•	•

Inappropriateness of Urine Dipstick	•			•	•		•			•
Prevention										
Hydration		•	•	•	•					
Hygiene		•		•	•					
Nutrition			•							
Toileting					•					
Physical Activity (i.e., functional status)				•						
Appropriateness of Urinary Catheter	•		•	•	•		•			
Catheter Removal	•		•				•			
Infection Control Practices (e.g., hand washing)	•	•	•				•			
Aseptic Technique (e.g., catheter insertion)	•		•				•			
Catheter Care	•		•	•			•			
Families & Residents										
Signs and Symptoms						•				
Prevention Interventions						•				
Asymptomatic Bacteremia						•				

Legend: • content included in resource

Resource Content

The resources in this environmental scan included education materials from the Registered Nurses Association of Ontario (Cowie, 2011), EH (n.d a), and PHO (2019) aimed at increasing knowledge of health care staff with respect to UTI and older adults, education materials for prevention of catheter associated UTI (California Department of Public Health (CDPH), 2019), a pamphlet to better inform health care staff of the strategy of antimicrobial

stewardship (BC, 2015), and a pamphlet aimed at educating family members and residents of LTCH with respect to UTI (EH, n.d b). Other resources included: clinical practice guideline for treatment of UTI (AHS, 2015), a care pathway for individuals without a catheter suspected to have a UTI (Health PEI, 2015), and a policy and medical directive focusing on protocols with respect to suspected UTI (EH, 2023a; EH, 2023b). Although many reputable sources existed within the grey literature, there was no single resource that covered all the components (e.g., themes) listed in Table 2.

The manifest content analysis revealed that there were many similarities between the resources obtained in the environmental scan; however, no resource examined included all the following themes: UTI education for health care staff, UTI education for families and residents, UTI prevention, and UTI identification. Therefore, the development of a resource is warranted that includes all the relevant themes in order to optimize the chances of UTI identification and prevention in residents residing in LTCH.

Education

The education resources were unclear with their target audience; however, the education could be tailored to licenced (i.e., RNs and LPNs) and unlicensed personnel (i.e., Personal Care Attendants) based on each professional's scope of practice within the institution. One area highlighted by AHS (2015) Cowie (2011) CDPH (2019) included modifiable and nonmodifiable risk factors. Risk factors for UTI discussed within the resources included: age related changes to genitourinary tract, post-menopausal changes, prostatic hypertrophy, history of UTI for woman, dementia, limitations to mobility, neurogenic bladder, diabetes, incontinence for woman, immunological changes, urological surgeries in men and woman, and gynecological procedures (AHS, 2015; Cowie, 2011; CDPH, 2019). CDPH (2019) also discuss the risk of catherization,

whether it be an indwelling catheter or straight catherization. The resource states that 7-10% of LTCH residents have an indwelling urinary catheter and that it is the most common cause of bacteremia (CDPH, 2019). This agrees with the literature as it has been reported that 5-10% of LTCH residents in Canada have an indwelling catheter (Niël-Weise et al., 2012), and studies such as Adomi et al. (2019) has reported that UTI has been independently associated with long term catheter utilization.

All identified resources except one (CDPH, 2019) included the signs and symptoms of urinary tract infections with respect to older adults living in LTCH. Although there were some differences noted without each resource, there were many similarities with respect to the pertinent signs and symptoms of UTI's. For each of the EH resources, the signs and symptoms were broken into separate categories: residents with and without a urinary catheter. For residents in LTCH who do not require catheterization, the signs and symptoms of UTI included: acute dysuria, acute pain in the testes, fever, leukocytosis, new or increased urgency, frequency, incontinence, as well as gross hematuria, suprapubic pain (i.e., generalized symptoms of pain that is regionalized in the genitourinary area), and costovertebral angle pain (i.e., generalized symptoms of pain that is regionalized between the curve of the twelfth rib and spine; EH, n.d a; EH, 2023a; EH, 2023b). Signs and symptoms for residents living with an indwelling urinary catheterization included: fever, rigors, hypotension, leukocytosis with acute mental status change or acute functional decline; however, in each case there must be no alternative site for the infection such as an indwelling intravenous catheterization (EH, n.d a; EH, 2023a; EH, 2023b). The resources also included new onset suprapubic, costovertebral or testicular pain as signs and symptoms (EH, n.d a; EH, 2023a; EH, 2023b), with EH (2023a) and EH (2023b) adding purulent discharge from the urethra as another possible sign of infection. Other resources such as AHS

(2015) also categorized the signs and symptoms of UTIs but did not include leukocytosis or testicular pain for non-catharized residents, acute mental status and functional decline with leukocytosis, or the inclusion of hypotension and testicular pain in those living with catheters. This may have been due to a change in knowledge regarding UTI over time.

Many resources also covered non-specific signs and symptoms which is key for differentiating between UTI and asymptomatic bacteremia. Resources such as EH (n.d. a), AHS (2015), and PHO (2019) define asymptomatic bacteremia as a phenomenon when bacteria is present in the urine but there is an absence in the clinical signs and symptoms of infection. This is key as non-specific signs as symptoms are sometimes utilized by members of healthcare teams in LTCHs to diagnose a UTI as noted in the qualitative study conducted by Jones et al. (2020). Non-specific signs and symptoms of UTI include confusion, falls, lethargy, and responsive behaviours (AHS, 2015; BC, 2015, EH n.d. a; PHO, 2019). EH (n.d a) describe how many non-specific signs and symptoms such as changes in functional status, mental status, and decrease in falls is due to dehydration; whereas AHS (2015) provide a more detailed report including hyponatremia, hypoglycemia, worsening dementia, new medication side effects, unmanaged pain, among others.

Although considered a non-specific symptom, changes in acute mental status are included as an indicator of UTI in those with a urinary catheter which adds a layer of complexity to the diagnosis. For example, an acute change in mental status is associated with a UTI when combined with leucocytosis and no alternative diagnosis (EH, n.d a; EH, 2023a; EH, 2023b) or no alternative diagnosis for UTI with a new onset of delirium (AHS, 2015). However, the resource created in Prince Edward Island promoted the utilization of a urine culture for those residents without a urinary catheter experiencing a delirium, inherently increasing the risk of

false positive UTI diagnosis due to factors such as asymptomatic bacteremia (i.e., bacteria in the urine without specific signs of a UTI; Health PEI, 2015). An acute change in mental status can be indicative of a UTI in older adults with a urinary catheter, but not in those without a urinary catheter (Ashraf et al., 2020). As described by ASH (2015), the diagnosis of UTI in catheterized older adults is one of exclusion, it can only be made after ruling out alternative causes. This illuminates the complexity of UTI in older adults living in LTCH, along with the confusion surrounding the true UTI signs and symptoms versus the non-specific signs and symptoms (Ashraf et al., 2020).

Only one resource examines the complications of UTI (CDPH, 2019). CDPH (2019) described possible complications of infection include: functional decline, decreased mobility, increased hospital admission, and death. Hospital admission and mortality are impacts which have been examined within the literature (Palacios-Cena et al., 2021; Gharbi et al. 2019).

Identification

Within the resources tools for the identification of UTI were separated into two components; screening tools and the appropriateness of urine cultures based on screening tools. Firstly, five resources included screening tools. Four examined the differences in diagnosis a UTI in a catharized and non-catharized LTCH resident (ASH, 2015; EH, n.d a; EH, 2023a; EH, 2023b), while the other resource examined only non-catheterized LTCH residents (Health PEI, 2015). The EH and Health PEI resources were created by the health organizations themselves; therefore, this makes validation of the tools challenging. However, it should be noted that the EH screening tool was based on the Infection Prevention and Control Canada Long Term Surveillance Toolkit, so it could be assumed that the tool contains content validity. This was not the case for the Health PEI (2015) screening tool, as it is unclear how the toolkit was developed,

making content validity challenging to ascertain. On the other hand, AHS (2015) discussed the utilization of a validated screening tool which have been discussed within the literature. This screening tool is the Loeb criteria, and it has been suggested by the Society for Post-Acute and Long-Term Care Medicine, a workgroup comprised of experts in geriatrics and infectious diseases, as tool to be adopted by LTCH facilities to diagnosis UTI (Ashraf et al., 2020).

The EH screening tool provides guidance on when a urine culture and antibiotics are appropriate; whereas, the Loeb Criteria described by ASH (2015) only provides the signs and symptoms of a potential UTI in an older adult. Health PEI (2015) takes it a step further by providing guidance via a care pathway where they split older adults into two categories: systematically well and unwell. An issue is present within the systematically unwell section as the tool guides the practitioner to obtain a urine culture if the older adult is presenting with nonspecific signs and symptoms of UTI. This is problematic as it can lead to false positive results, meaning that the older adult is diagnosed with a UTI and treated with antibiotics when there was another underlying cause of disease present. The literature suggests that urine cultures should only be ordered when a LTCH resident presents with clinical signs and symptom of infections which excludes nonspecific signs and symptoms (Ashraf et al., 2020).

Prevention and Health Promotion

Prevention and health promotion of UTIs were described as important aspects of nursing practice for caring for older adults in LTCH. This included interventions that focused on hydration (BC, 2015; CDPH, 2019; Cowie, 2011; EH, n.d a), appropriateness of catheter (AHS, 2015; CDPH, 2019; Cowie, 2011; EH, n.d. a; EH, 2023a), catheter removal (ASH, 2015; CDPH, 2019; EH, 2023a), aseptic insertion (AHS, 2015; CDPH, 2019; EH, 2023a), catheter care (AHS, 2015; CDPH, 2019; Cowie, 2011; EH, 2023a), and hand hygiene (AHS, 2015; BC, 2015; CDPH,

2019; EH, 2023a). Other interventions discussed in the resources but not included as recommendation in the two systematic reviews conducted in a separate literature review included interventions related to hygiene (BC, 2015; Cowie, 2011., EH, n.d. a), nutrition (CDPH, 2019), routine toileting (EH, n.d. a). and physical activity (Cowie, 2011). ASH (2015), CDPH (2019), Cowie (2011), and EH (2023a) provided concrete details on how to accomplish the goals set by the various suggested intervention(s); however, BC (2015) and EH (n.d. a) simply provided the intervention with no accompanying strategies.

Families and Residents

There was little focus on education involving families for the resources reviewed as part of the environmental scan. Studies such as the works of Pasay et al. (2019) included pamphlets to distribute to families of residents in LTCH to attempt to increase their knowledge on UTI in the hopes this would decrease unnecessary UTI testing and decrease inappropriate antibiotic usage which may have been contributing to antibiotic resistance. EH (n.d. b) created a pamphlet for families and residents entitled 'What Residents and Families In Long Term Care Need To Know About Urinary Tract Infections and Antibiotics'. This resource included appropriate signs and symptoms of a UTI in a suitable language for the intended audience, along with alluding to the harms that asymptomatic bacteremia and untreated UTIs can cause (EH, n.d. b). The resource also included a variety of prevention interventions such as hydration, voiding schedules, proper hygiene, and the risk associated with catheters (EH, n.d. b).

Conclusion

The information retrieved in the environmental scan was determined to be relevant to the identification and prevention of UTI in older adults living in LTCH. The information obtained in the environmental scan, e.g., topics covered will be helpful with the conceptual development of

the learning resource as well as inform the consultation plan. Information gained as a result of this environmental scan highlighted the saliency for the need for LTCH staff to have the ability to differentiate between specific versus non-specific signs and symptoms of UTI; asymptomatic bacteremia; and provide direction when a urine culture is necessary, as well as incorporate evidence informed prevention strategies. The use of a UTI screening tool may support LTCH staff to accurate prevent, identify, and treat UTI's in older adult residents. Finally, this environmental scan highlighted the importance of providing education on UTIs by LTCH staff to families and residents of LTCH and will be included as topics to be covered in the learning resource.

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Appendix A: Email Inquiry for Nurse Educator and Program Coordinator

[Insert Nurse Educator/Regional Program Coordinator Name],

My name is Zachary Thorne, and I am a Master of Science in Nursing student from Memorial University who is currently completing my Practicum Project on urinary tract infections within residents residing in Long Term Care. The aim of the project is to develop a resource that can be utilized by nursing staff, along with other care staff (i.e., personal care attendants), to increase their knowledge with respect to the complexity of the infection, along with providing them with the tools to help prevent the occurrence of the disease in the future.

I am inquiring today to determine if any current protocols, intervention(s), or educational strategies have been developed and implemented with the aim of increasing the knowledge of nurses and personal care attendants with respect to urinary tract infections? Specifically, has any resources focused on the identification and prevention of the infection in residents residing in Long Term Care? If possible, I would be interested in meeting with you in person or online to discuss any potential materials which could inform my project.

I appreciate your time and I look forward to your response at your earliest convenience.

Sincerely,

Zachary Thorne BNRN-Master of Science in Nursing Student

Appendix B: Health Research Ethics Authority (HREA) Screening Tool

Student Name: Zachary Thorne

Title of Practicum Project: Developing a Resource for Nursing Staff and Unlicensed Personnel on the Identification and Prevention of Urinary Tract Infections within Residents Living in Long Term Care

Date Checklist Completed: May 31st, 2023

This project is exempt from Health Research Ethics Board approval because it matches item number _3_ from the list below.

1. Research that relies exclusively on publicly available information when the information is legally accessible to the public and appropriately protected by law; or the information is publicly accessible and there is no reasonable expectation of privacy.
2. Research involving naturalistic observation in public places (where it does not involve any intervention staged by the researcher, or direct interaction with the individual or groups; individuals or groups targeted for observation have no reasonable expectation of privacy; and any dissemination of research results does not allow identification of specific individuals).
3. **Quality assurance and quality improvement studies, program evaluation activities, performance reviews, and testing within normal educational requirements if there is no research question involved (used exclusively for assessment, management or improvement purposes).**
4. Research based on review of published/publicly reported literature.
5. Research exclusively involving secondary use of anonymous information or anonymous human biological materials, so long as the process of data linkage or recording or dissemination of results does not generate identifiable information.
6. Research based solely on the researcher's personal reflections and self-observation (e.g. auto-ethnography).
7. Case reports.
8. Creative practice activities (where an artist makes or interprets a work or works of art).

For more information please visit the Health Research Ethics Authority (HREA) at

https://rpresources.mun.ca/triage/is-your-project-exempt-from-review/

Appendix III: Consultation Report

Consultation Report: Development of an Educational Resource for Nursing Staff and Unlicensed Personnel on the Identification and Prevention of Urinary Tract Infections within Residents Living in Long Term Care

Zachary Thorne

Memorial University of Newfoundland

Urinary tract infections (UTIs) are among the most frequently diagnosed infections in older adults living within Long Term Care Homes (LTCH) (Ashraf et al., 2020; Latour et al., 2020). UTIs are infections that occur within the genitourinary system which can lead to decreases in mental and physical health and increases hospitalization and death for older adults (Cortes-Penfield et al., 2017; Gharbi et al., 2019; Palacios-Cena et al., 2021; Wagenlehner et al., 2018). The burden of UTIs within the general population can lead to a financial strain on the healthcare system with Simmering et al. (2017) reporting that the total cost of hospital admissions within the United States in 2011 was 2.8 billion. In the year 2021 older adults in Newfoundland and Labrador (NL) accounted for 23.1% of the population, an increase from 16.3% in 2012 (Statistics Canada, 2023). There has been a steady rise in the older adult population within NL and with the estimation that "Canada will need an additional 199,000 long term care beds by 2035" (Conference Board of Canada, 2017, p. 5) the health care concern of UTIs cannot be overlooked. Proper early identification and prevention of UTI can help decrease the risk of mortality and hospitalization in older adults. A review of the literature conducted for this practicum project suggests that a contributing factor to this problem may be that LTCH staff (i.e., nursing and unlicensed personnel) may experience knowledge deficits regarding the clinical signs and symptoms of UTI (Gharbi et al. 2019; Lee et al., 2018).

The purpose of this practicum project is to develop an educational resource which focuses on the prevention and identification of UTI in older adults living in LTCH. The need for this educational resource was supported through a recent literature review which found that there was strong evidence suggesting that education provided to LTCH staff will increase the identification of UTI, as Pasay et al. (2019) reported in their study that there was a significant difference in antibiotic prescriptions in an intervention group (i.e., LTCH staff provided

education on the clinical signs and symptoms of UTI) in comparison to a control group who received standard care (2.5 antibiotic prescriptions per 1000 resident days versus 3.3 prescriptions per 1000 resident days, $p<0.0001$). This indicated that nursing staff had knowledge deficits regarding the clinical signs and symptoms of UTI which in turn caused misdiagnosis. The literature review also demonstrated moderate evidence that education provided to LTCH staff will decrease rates of UTI development as discussed in the systematic review by Meddings et al. (2017) where catheter associated UTI (CAUTI) decreased to 5.2 CAUTI per 1000 catheter days in an intervention group in comparison to 10.0 CAUTI per 1000 catheter days in a control group receiving usual care. These results occurred after the delivery of education to LTCH staff within the intervention group (i.e., hand hygiene, appropriate use of antibiotics, standardized CAUTI definition). An environmental scan was also conducted to review available educational resources for identifying UTIs in older adults and which determined there was not a sufficient educational resource which could be implemented into practice. The aim of the consultation report is to establish key stakeholders learning needs and preferred educational strategies to inform the development of the educational resource. This process will assist with the creation of a resource (e.g., topics to be covered) that will be both comprehensive and beneficial for LTCH staff who care for older adult residents.

Brief Overview of the Project

The goal of this practicum project is to explore UTIs in older adult residents residing in LTCH, along with the development of a learning resource as informed by the review of the literature and environmental scan, and consultations for nursing staff (i.e., Registered Nurses [RNs], Licensed Practical Nurses [LPNs]) and unlicensed personnel (i.e., Personal Care Attendants [PCAs]). The literature reviewed to inform this practicum project revealed that

nursing staff and unlicensed personnel may lack consistent knowledge when it comes to the clinical signs and symptoms of UTI and interventions that can be implemented to prevent infection such as adequate hydration and proper in-dwelling catheter care (Lean et al. 2019; Lee et al., 2018; Mody et al. 2017; Philips et al., 2012). Due to this possible knowledge deficit, there may be inconsistent practices when caring for residents in LTCHs who may experience UTIs. The consultation interview was developed in conjunction with findings from the literature review and environmental scan. The purpose of this consultation report is to determine the current learning needs of nursing and unlicensed staff working within a LTCH in St. John's, NL, and who are providing care to older adult residents experiencing UTIs. The findings from the consultation report will then be utilized to inform the educational resource. Certain topics and concepts to be explored with the consultation plan include the possible mode of delivery for the resource and to explore the learning needs of LTCH staff to create an informed resource that will benefit its intended recipients.

Specific Objectives for the Consultations

The overall goal of the consultation is to determine the needs and preferred education delivery methods of both nursing staff (i.e., RNs and LPNs) and unlicensed personnel (i.e., PCAs), practicing in LTCH, with respect to UTIs in older adult residents.

1. To identify the learning needs of LTCH staff related to UTIs in older adult residents.
2. To identify LTCH staff's preferred delivery method for the educational resource.
3. To obtain information from experts practicing in LTCHs (e.g., infection control practitioners, clinical educators, and nurse managers) regarding best practices or gaps in current observed practices which may inform the content of the learning resource.

Methods

Setting and Sample

The consultations took place within various units in a LTCH within Newfoundland and Labrador's Eastern Regional Health Authority which provides service to residents with high levels of acuity. Within LTCHs RNs, LPNs and PCAs practice collaboratively to provide high quality care to residents residing in the facility, many of whom require care for UTIs. To have a broad understanding of the learning needs and challenges faced by these care team members the goal was to include three to five participants from each category of LTCH staff (i.e., three to five: RNs, LPNs, PCAs). Due to communication challenges experienced during the consultation phase the email developed for potential consultants was unable to be distributed by the nursing managers of the facility. Therefore, permission was obtained by the authors practicum project supervisor and the Associate Dean of Graduate Studies to reach out to individuals directly by contacting potential consultants via email, as well as by visiting the facility. The email request (Appendix A) was shared with potential consultants which included information pertaining to the practicum project. As this is a quality improvement initiative rather than a research project, no written consent was required from potential consultants (Appendix B). A total of 4 RNs, 3 LPNs, 5 PCAs were interviewed to examine their experiences and learning needs with respect to caring for older adult residents experiencing a UTI.

To seek further expertise from leadership within the LTCH, to support the development of a learning resource for LTCH staff, two nurse educators, one infection control nurse, and one nurse manager were invited to be potential consultants. The two nurse educators and one infection control nurse were interviewed, as having these unique perspectives and expertise may provide vital information on issues pertaining to UTI in LTCH. To maintain confidentiality of

the Nurse Educators and Infection Control Nurse, they will be referred to as nurse consultants (NC) throughout the report. This will also allow for their positions to be clearly distinguished from the staff nurses (i.e., RNs, LPNs). Appendix C includes the email request for these members of the interdisciplinary team.

Data Collection

The consultations were conducted via semi structured interviews which were informed from insights gained from the literature review and environmental scan examining UTI and older adults living in LTCH. The interview questions (Appendices D-F) were tailored to the unique scope of practice for each category of consultant and included the following: RNs and LPNs (Appendix D); PCAs (Appendix E); and Infection Control Nurse, Clinical Educator, and Nurse Manager (Appendix F). The interviews were originally scheduled to be completed one on one; however, some interviews were conducted in group settings as per the request of consultants within two units of the facility. Prior to completing the interviews, the principles of reflexivity were employed which involved reflecting on my own nursing practice in caring for older adults experiencing UTIs and accounting for these experiences ensuring that they did not contaminate the data collection process (Polit & Beck, 2021). This was critical so that I could fully understand the consultants' experiences which involved the utilization of a technique known bracketing (Polit & Beck, 2021). To achieve objective data collection, the interviewer must set aside personal opinions or assumptions to avoid personal bias (Polit & Beck, 2021).

To accommodate each consultant's schedule and preference, the semi structed interviews took place in person within the facility (RN, n=3; LPN, n=2; PCA, n=5), in an online forum (NCs, n=2), or via a phone call (LPN, n=1; NCs, n=1). Interviews lasted approximately 25 minutes in length. Consultants were informed that participation within the consultation process

was confidential and voluntary. During group sessions participants were reminded that all aspects of the interview were confidential, and they agreed verbally to honour principals of confidentiality for colleagues who attended the group session (RN, n=3; LPN, n=2; PCA, n=5). All consultants were reminded at the beginning of the interviews that they may decide to not answer question(s) or withdraw from participating prior to the point that their information is synthesized into the consultation report. Privacy and confidentiality were maintained by assigning a random number to each participant to ensure anonymity and to correspond to the information obtained from the participant in the interview. This information was only accessed by myself, and the participants name will never be utilized within the consultation report.

Data Management and Analysis

Data collected from the consultation interviews were appropriately managed and analyzed to help inform the development of the educational resource. The answers provided by the participants were handwritten in jot note form during the interview and expanded upon after the completion of the interview. After all interviews were conducted, a content analysis was performed whereby information was extracted, organized, and synthesized from the interviews into key concepts (e.g., identification) and themes (e.g., resource contents) (Polit & Beck, 2021). The findings from this consultation report were then compared with those from the literature review and the environmental scan to examine for similarities and differences.

With respect to privacy and confidentiality, to mitigate the risks all information obtained in the consultation process was only shared with my practicum project supervisor. All information was kept on an encrypted, password protected laptop only accessed by myself and will be permanently deleted upon completion of the practicum project. Handwritten notes pertaining to the consultations were kept in a secured locked unit only accessible by myself and

will be shredded and permanently destroyed upon completion of the practicum project.

Ethical Considerations

To determine if the practicum project required ethical review the Health Research Ethics Board screening tool was completed. Since this project has a focus on quality improvement no approval from a Health Research Ethics Board was required (see Appendix B for details). Agreement to participate was obtained through emails sent to potential consultees, as well as through in person conversations, and was further confirmed prior to the commencement of the interview. The email sent or hand delivered to LTCH staff clearly articulated that a potential participant may deny participation in the consultation process with no negative implications. It was also explicitly stated in the emails, and reiterated prior to the consultation, that participation is voluntary and that all answers provided by the participants will remain confidential. To ensure anonymity numeric codes were assigned to all participants. For clarity within the report, individuals will be referred to their position held in the LTCH throughout this paper which will continue to ensure confidentiality.

Results

A total of 15 consultants were interviewed for this report from various units within the facility. This included 4 RNs, 3 LPNs, 5 PCAs, 3 NCs. Nurse Managers were contacted to participate but were unable to be reached during the time consultations were scheduled to be completed. The years of experience for RNs, LPNs, and PCAs can be found in Table 1.

The content analysis revealed three recurring themes and concepts which included barriers to practice, resource content, and delivery methods. Concepts such as limited education, barriers to providing care, along with communication and organizational issues were associated with the overall theme of barriers to practice. The theme of resource content included the

concepts of identification, prevention, monitoring, documentation, and family education. Lastly, the delivery method theme examined the consultant's personal preference for education delivery.

Table 1

Demographic Data of LTCH Staff Consultants

Position	Total Years of Experience	Years of Experience working with Older Adults
RN[1]	25 years	3 years
RN[2]	26 years	16.5 years
RN[3]	37 years	13 years
RN[4]	8 years	1 year
LPN[1]	28 years	28 years
LPN[2]	5 years	5 years
LPN[3]	8 years	6 years
PCA[1]	13 years	13 years
PCA[2]	2 years	2 years
PCA[3]	17 years	17 years
PCA[4]	15 years	15 years
PCA[5]	9 years	9 years

Legend: RN (Registered Nurse); LPN (Licenced Practical Nurse); PCA (Personal Care Attendant)

Emergent Themes

Barriers to Practice

The RNs, LPNs, and PCAs were asked questions regarding their experience providing care to older adult residents within LTCH. While NCs were asked if there were any additional information or support that could be of benefit for LTCH staff. Limited education, barriers to providing care, along with communication and organizational issues were concepts identified

throughout the interviews which relate to UTI and older adults and can be found in Table 2.

Table 2

Barriers to Practice

Concepts Related to the Theme of Barriers to Practice
• Limited education • Barriers to providing care • Communication Issues • Organizational Issues

Limited Education. Through discussion with RNs and LPNs there appeared to be some lack of consistency regarding awareness of a new screening tool (i.e., policy and medical directive) that was recently released by the facility in May of 2023. This new screening tool was discussed by the NCs during their respective consultation interviews and was examined within a recent environmental scan (Eastern Health [EH], 2023a, EH 2023b). RN[2] described that there has been ample education surrounding the screening tool recently; however, there were other staff RNs and LPNs who described that they had no awareness of any screening tools being implemented within the facility. RN[1] stated that there was no specific policy and that current practices have been beneficial in ensuring that UTIs are being properly treated and antibiotics are not being overprescribed. However, RN[3] discussed how such a screening tool would be beneficial to practice due to the importance of evidence-based practice. LPN[4] shared a similar thought as they have noticed that there is current inconsistency in practice. They stated that "everyone is not on the same page" and they felt as though a standardized protocol would be beneficial. Since this standardized protocol already exists (i.e., facility policy and medical directive), further education in the resource regarding this screening tool would be valuable to

LTCH staff (i.e., RNs, LPNs) so that all staff have consistent awareness regarding the identification of UTI in older adults.

With respect to specific interventions RN[1] and RN[3] discussed limited education regarding the new directive to no longer irrigate indwelling urinary catheters. They described that it has not been made clear to them why the change in practice was initiated and that this was a learning need. Both RNs described how education surrounding this topic would be beneficial for LTCH staff.

Barriers to Providing Care. Many LTCH staff members cited similar concerns with providing care to residents. This involved UTI prevention methods, specifically hydration. One barrier that emerged from the interviews involved cognitive impairment. Since many of the residents within the facility are living with dementia, LTCH staff have noted it to be challenging to provide adequate hydration. RN[1] described that older adults on their unit often forget how to properly grasp cups; therefore, the residents require assistance to drink fluids. Even with assistance and reminders, PCA[4] described that they often encounter older adults who do not want to drink fluids. PCA[1] discussed how responsive behaviours (i.e., behavioural and psychological symptom of dementia) can compound the issue significantly as even with encouragement to drink the older adult may refuse due to an underlying issue causing the responsive behaviours.

Another barrier focused on how the hydration intervention is delivered. RN[3] and LPN[1] talked about the incorporation of a hydration schedule on their unit; however, fluids are often administered at 6am, 2pm, and in the late evening. They both discussed how 6am was not an appropriate time to be encouraging fluids as many older adults would be asleep at that time. They questioned whether the older adults were actually receiving fluids at this time and suggested that the hydration schedule be modified to meet the needs of the older adults. LPN[4]

also considered their units hydration schedule and felt as though it was made more a priority in the hot summer months in comparison to the colder winter months. LPN[4] and the NCs alluded to a concern, that until recent changes, fluid was provided to older adults in very small drinking cups which was a noted barrier to providing adequate hydration. LPN[4] explained that an older adult would need to drink thirty-two of these cups to receive adequate hydration.

Lastly, older adults requiring a thicken fluid was seen as a barrier as various staff members noted these individuals often have poor oral intake. RN[3] stated that they believed that the thicken fluids may not quench the thirst of the older adult because it was like "drinking a pudding".

Communication Issues. During the PCAs interviews it was consistently discussed by these staff members that there were concerns with communicating older adult health issues with other members of the interdisciplinary team. PCA[3] discussed that if you had experience working with other members of the interdisciplinary team they were more likely to take you concerns regarding the older adult seriously in comparison if they had limited experience working together. They stated "They [members of the interdisciplinary team] don't think we know things"-PCA[3]. PCA[5] described that they can recognize when the patient may be experiencing a UTI, but they are often not taken seriously by the interdisciplinary team. They described that they understood that the patient may not be experiencing a UTI in each case, but they were being dismissed when describing that the older adult had a change from their baseline status. When asked what could help facilitate these conversations with the interdisciplinary team there were no actionable suggestions provided by the PCAs. PCA[5] stated "I give my opinion and see what happens".

Organizational Issues. Many of the RNs, LPNs, and PCAs cited staffing issues as a

barrier to being able to successfully complete UTI prevention interventions such as hydration. According to LPN[4] the lack of staff led to a decrease in the time required to complete all duties to the quality of care that they expected themselves to provide. Due to the lack of staff, PCA[3] described that they often were being pulled away to complete other duties that took time away from providing care to the older adult. This often led to hydration rounds being delayed.

Resource Content

The questions posed to the RNs, LPNs, and PCAs, centered around the identification and prevention of UTIs in older adults. They were also asked questions regarding their experiences in communicating with the interdisciplinary team and families. The NCs were also asked similar questions pertaining to their respective roles. After analyzing the information obtained through the interviews there were recurring ideas mentioned by the consultants as possible learning needs for LTCH staff or suggested topics for the resource. These ideas will be incorporated within the educational resource and will guide the content during its development. An overview of these ideas can be found below in Table 3.

Table 3

Resource Content

Learning Needs and Suggested Topics
• Risk factors for UTI • Identification of UTI Signs and Symptoms • Screening Tool (i.e., UTI identification and diagnosis) • Prevention Interventions (e.g., hydration, incontinence care) • Caring for Indwelling Urinary Catheters • Monitoring (e.g., symptom management, adverse effects of antibiotic, older adult quality of life) • Family Education • Older Adult Education (i.e., cognitively well individuals)

- Documentation (e.g., signs and symptoms experienced by the older adult)

Identification. All of the RNs, LPNs, and PCAs interviewed during the consultation process described how they currently do not have learning needs when it comes to the identification of the clinical signs and symptoms of UTI. PCA[1] however felt as though new staff may need support for gaining mastery of identifying the clinical signs and symptoms of UTI and suggested that it be included in the educational resource. This coincides with findings within the recent literature review as it has been noted that there can be confusion among LTCH staff with respect to the clinical signs and symptoms of UTI in older adults (Lee et al., 2018). When discussing with the NCs, a new medical directive and policy has been developed within the facility which was discussed in a recent environmental scan (EH 2023a, EH 2023b). This policy and medical directive provide direction to LTCH staff on the clinical signs and symptoms of UTI in older adults with and without an indwelling urinary catheter, and the NCs discussed its importance in regard to LTCH staff's education.

Prevention. Prevention interventions and issues surrounding prevention were the most frequently discussed topic in the interviews with consultants. A variety of RNs, LPNs, and PCAs shared their concerns that there are learning needs that exist among staff regarding hydration, incontinence care, and urinary catheters.

With respect to hydration, RN[1] described that reminding LTCH staff of the significance of hydration would be an important component of the educational resource. This was also articulated by the NCs as a suggested section to be covered within the resource. It was acknowledged by many consultants, that up until a recent change, water was provided in very small cups. LPN[3] stated that they were told that an older adult resident would need to drink thirty two of these cups to receive adequate hydration. The change now includes cups that will contain

more water with the hope that it will help increase older adults hydration status. Nevertheless, RN[1] and the NCs still felt that the importance of hydration should be included within the educational resource. This information would be critical as a recent literature review determined that dehydrated older adults are more 40 times likely to develop a UTI in comparison to older adults not experiencing dehydration (Silva et al., 2021).

Incontinence care was also a suggestion made by consultants as a topic which should be covered within the educational resource. PCA[5] described that a more frequent toileting schedule may help solve some of this issues; however, the consensus was that information regarding incontinence care should be outlined within the educational resource which is in agreement with a recent literature review as it has been determined that incontinence is an independent predictor of UTI in older adults (Caljouw et al., 2011).

Many consultants also described learning needs for LTCH staff members with respect to caring for older adults living with an indwelling urinary catheter. This finding was consistent within a recent literature review which described LTCH staff as having learning needs regarding the care of indwelling urinary catheters (Mody et al., 2017). In the interview with the NCs they reiterated the importance of staff education regarding indwelling urinary catheters for the prevention of catheter associated UTI. The NCs discussed the policy created by the facility (EH 2023a) as it contained information regarding the importance of an enclosed system, catheter insertion site cleaning, and aseptic technique with respect to insertion. The NCs felt that this information should be included within the educational resource.

Lastly, the NCs described the importance of providing cognitively well older adults with education regarding the clinical signs and symptoms of UTI and information regarding indwelling urinary catheter care. This is key in providing the older adult autonomy over their

care, and it allows the older adult to be well informed regarding potential health issues.

Monitoring. During the interview with the NCs the concept of monitoring the older adult after a UTI diagnosis was discussed. This topic was raised by the NCs as an area in which LTCH staff may have learning needs or may require reminders. This included monitoring the older adult while on antibiotics. The NCs described that it is important for the LTCH staff to recognize that antibiotics can have harmful adverse effects for the older adult (e.g., diarrhea which can lead to dehydration). The NCs discussed the importance of LTCH staff connecting with the prescriber in a timely fashion when adverse effects occur so that it limits harm to the older adult.

Besides monitoring medications being administered, the NCs also discussed the importance of symptoms management. They stressed that although the antibiotic is being used to treat the UTI, LTCH staff must be vigilant of symptoms such as fever and back pain and treat the symptoms accordingly (i.e., antipyretic or analgesic medication). The NCs also discussed the importance of older adult quality of life when ill. They felt this was a topic that should be stressed to LTCH staff as the older adult is often isolated when they are ill and this can lead to negative effects on mental health which was also a finding of a recent literature review. The works of Renard et al. (2014) and Wagenlehner et al. (2018) suggests that older adults who develop a UTI may be at risk for developing depression and anxiety which can negatively impact their mental health.

Documentation. During the interview with the NCs a concern was brought forth that documentation related to the clinical signs and symptoms of UTI experienced by the older adults was often missing. A similar finding was discovered in a recent literature review as it was determined that 46.5% of the antibiotic prescriptions for suspected UTI for non-catharized individuals and 82.6% of the antibiotic prescriptions for individuals living with an indwelling

urinary catheter occurred without documented UTI signs and symptoms (Philips et al., 2012). The NCs felt that a section of the educational resource should be dedicated to discussing documentation and its importance with respect to a UTI diagnosis.

Family Education. All consultants during the interviews described how families need help understanding UTI, with a specific focus on a misunderstanding regarding the appropriateness of antibiotics. RN[2] explained that from their experience families do not fully understand the disease process (i.e., signs and symptoms, treatment options). The NCs described that there is often a push from families to provide antibiotics to the older adult. Often families believe the older adult is experiencing a UTI when in fact there is another underlying cause to the older adults illness. RN[1] stated that the first step in treating an older adult with a change in status (e.g. more fatigued) is to provide increased hydration for 24 hours. However, they described that families have concerns with this approach as they state "mom has a UTI, what are you going to do about it". RN[1] provided additional information stating that sometimes families "think we are doing nothing". From the data collected from the consultants there seems to be learning needs among families regarding the diagnosis process of a UTI. NCs described that it is important for staff to educate families in the moment when a UTI may be suspected. Providing families with the specific clinical signs and symptoms of UTI may help ease their concerns. LPN[3] explained that "it is important to listen to the families concerns" and to address these concerns (i.e., explain that the symptoms that the older adult is presenting with is consistent with a potential UTI or potentially another underlying cause). NCs described that a pamphlet was recently created for families which address the clinical signs and symptoms of infection, antibiotic stewardship, and UTI prevention methods. This pamphlet was previously discussed in a recent environmental scan (EH, n.d. a). The consensus from consultants is that families require

education regarding UTI as there is currently learning needs that have been noted in family interactions. These learning needs can be addressed in the development of the educational resource.

Delivery Methods

There was a consensus among all consultants (n=15) that in person education was the most beneficial delivery method for the educational resource. Many consultants discussed that in person education that involved a 'staff huddle' (i.e., education during the workday that takes place on the unit) have had success in the past. The NCs described that in the past, formal education sessions which required the staff to leave the unit have proven to be a challenge due to staffing issues within the facility. RN[1] discussed that the utilization of in person education 'staff huddles' helped spark discussion among individuals with various levels of experience and LPN[4] stated that the in-person 'staff huddles' allowed for hands on information. From their experience staff were more engaged in these types of education sessions. The NCs stated that a positive of in person 'staff huddles' was that more staff were captured in the education sessions, meaning that it was the easiest method to provide education to the most amount of LTCH staff at one period in time.

Concerns with online delivery of education included the fact that PCAs do not require competency hours to maintain their position. The NCs described that PCAs are less likely to complete online education since it is not mandatory. The NCs also described challenges such as limited access to computers for staff on the unit, and that RNs and LPNs would be less likely to complete this education independently at home. Many RNs, LPNs, and PCAs alluded to barriers to completing online education at work due to lack of staff on the floor. They described not having adequate time to complete online education during the workday.

It was also discussed by the NCs and several RNs, LPNs, and PCAs that a summary table (i.e., infographic) would be beneficial. Many LTCH staff discussed that education is often provided on the walls within the washroom on a singular piece of paper; therefore, a summary of key points could be incorporated into a single page document. This information could also be placed into a binder on unit for a quick reference which was a suggestion of the NCs and LPN[3].

Overall, the consultant's suggestion of in person education was consistent with a recent literature review findings which indicated that in-person education was noted as being an effective delivery method to support LTCH staff's learning needs (Arnold et al., 2021; Meddings et al., 2017).

Limitations

Communication difficulties experienced throughout the consultation process made it difficult for all RNs, LPNs, and PCAs of the facility to be contacted for their consideration to be a potential consultee. Due to circumstances outside of the control of the author of this report, the email was not distributed by the management team to their staff members. Due to this barrier, permission was obtained from the authors practicum project supervisor and the Associate Dean of Graduate Studies to contact these members of the interdisciplinary team directly via email and by visiting the facility. Through this process, individuals who I had a previous collegial and professional relationship with volunteered to become potential consultants.

It should be noted that two of a total of fifteen units within the facility also held a focus group session whereby various members of the interdisciplinary team could be interviewed at once. Although this helped increase participation in the consultation, it may have decreased the authenticity of the answers provided due to consultants concerns of providing information within a group setting (e.g., concerns of admitting a personal learning need in front of other staff).

Although this limitation exists, the information obtained throughout this consultation process will be beneficial for the development of an education resource which will be comprehensive and valuable for LTCH staff in the identification and prevention of UTI in older adults living in LTCH.

Conclusion

The data that was obtained throughout the consultation process will be critical in informing the development of the educational resource. It was noted that LTCH staff may have had limited education regarding a new screening tool developed by the facility. The LTCH staff also cited barriers which have led to challenges in providing older adults prevention interventions aimed at decreasing rates of UTI. The various consultants identified a variety of topics to include in the educational resource based on their suggestions and staff learning needs. Many topics discussed by the consultants to be included in the educational resource were also areas of concern found within a recent literature review. This included LTCH staff's learning needs regarding the sign and symptoms of UTI, older adults' risk of dehydration, importance of incontinence care, proper care of indwelling urinary catheters, and lack of documentation (Caljouw et al., 2011; Lee et al., 2018; Mody et al., 2017; Philips et al., 2012; Silva et al., 2021). Conversations with the consultants have determined the focus of the educational resource. These topics are outlined in Table 3 and will be incorporated during resource development.

Based on the consultation interviews, it was established that in person education that took place during 'staff huddles' on the unit would be the most effective delivery method. This was consistent with findings from a recent literature review as in person education was found to be an effective delivery method to support LTCH staff's learning needs (Arnold et al., 2021; Meddings et al., 2017). The educational resource will be developed in a way so that it involves the

engagement of the staff, and the creation of an infographic will allow the information of the educational resource to be summarized on a one-page document. The consultations have been beneficial as it has allowed in-depth conversations with key stakeholders on the topic of UTI and older adults. The data collected in the interview process has helped determine the learning needs of LTCH staff, as well as provided LTCH staff the ability to make suggestions on topics they feel should be covered in the educational resource. These findings will aid in the development of education resource which will be comprehensive and valuable for LTCH staff in the identification and prevention of UTI in older adults living in LTCH.

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Appendix A: Email Request for Participation for LTCH Staff

Hello

I am writing you today to request your participation in a consultation that will assist with the completion of my master's practicum project which is being completed through Memorial University of Newfoundland's Faculty of Nursing program. For my practicum project, I am **developing an educational resource for clinical staff working within Long Term Care Homes (LTCHs) that has a focus on urinary tract infections (UTIs) in older adult residents**. The goal is to address the needs of clinical staff to inform this resource with the aim of supporting LTCH staff in preventing, identifying, and treating UTIs in older adult residents. Currently, my objective is to consult with various members of the interdisciplinary team who have experience caring for residents living in LTCHs who have experienced UTIs. **I am requesting your participation in a short interview where you will be able to share your experiences working with LTCH residents affected by UTIs, as well as provide recommendations for how the educational resource should be developed.** This interview can take place in-person or by phone and would last approximately 20-30 minutes in length.

Your participation in this interview is voluntary and entirely confidential. The data will be stored on my personal laptop which is password protected and will only be viewed by myself and my practicum supervisor, Dr. Jennifer Collins. Once the practicum project is completed, data will be permanently deleted and destroyed. There are no consequences or negative implications if you chose not to participate in this interview or decide to withdraw at any point during the interview process. If you have any questions or would like to participate in this interview, please contact me via email at [insert email] by [December 4th, 2023]. I am looking to complete the interview by [December 8th, 2023]. Your experience would be valuable in guiding the

development of this learning resource and any assistance you can provide would be greatly appreciated.

Thank you for your consideration,

Zachary Thorne, BNRN, Master of Science in Nursing Student

Faculty of Nursing

Memorial University of Newfoundland

Appendix B: Health Research Ethics Authority (HREA) Screening Tool

Student Name: Zachary Thorne

Title of Practicum Project: Developing a Resource for Nursing Staff and Unlicensed Personnel on the Identification and Prevention of Urinary Tract Infections within Residents Living in Long-Term Care

Date Checklist Completed: July 2nd, 2023

This project is exempt from Health Research Ethics Board approval because it matches item number 3 from the list below.

1. Research that relies exclusively on publicly available information when the information is legally accessible to the public and appropriately protected by law; or the information is publicly accessible and there is no reasonable expectation of privacy.
2. Research involving naturalistic observation in public places (where it does not involve any intervention staged by the researcher, or direct interaction with the individual or groups; individuals or groups targeted for observation have no reasonable expectation of privacy; and any dissemination of research results does not allow identification of specific individuals).
3. **Quality assurance and quality improvement studies, program evaluation activities, performance reviews, and testing within normal educational requirements if there is no research question involved (used exclusively for assessment, management, or improvement purposes).**
4. Research based on review of published/publicly reported literature.
5. Research exclusively involving secondary use of anonymous information or anonymous human biological materials, so long as the process of data linkage or recording or dissemination of results does not generate identifiable information.
6. Research based solely on the researcher's personal reflections and self-observation (e.g. auto-ethnography).
7. Case reports.
8. Creative practice activities (where an artist makes or interprets a work or works of art).

For more information please visit the Health Research Ethics Authority (HREA) at https://rpresources.mun.ca/triage/is-your-project-exempt-from-review/

Appendix C: Email Request for Participation for Nurse Educator/ Infection Control Nurse/Nurse Manager

Hello [name of participant]

I am writing you today to request your participation in a consultation that will assist with the completion of my master's practicum project which is being completed through Memorial University of Newfoundland's Faculty of Nursing program. For my practicum project, I am **developing an educational resource for clinical staff working within Long Term Care Homes (LTCHs) that has a focus on urinary tract infections (UTIs) in older adult residents.** The goal is to address the needs of clinical staff to inform this resource with the aim of supporting LTCH staff in preventing, identifying, and treating UTIs in older adult residents. Currently, my objective is to consult with various members of the interdisciplinary team who have experience caring for residents living in LTCHs who have experienced a UTI. **I am requesting your participation in a short interview where you will be able to share your expertise and knowledge with respect to education and protocols related to UTI and LTCH residents, as well as provide recommendations for how the educational resource should be developed.** This interview can take place in-person or by phone and would last approximately 20-30 minutes in length.

Your participation in this interview is voluntary and entirely confidential. The data will be stored on my personal laptop which is password protected and will only be viewed by myself and my practicum supervisor, Dr. Jennifer Collins. Once the practicum project is completed, data will be permanently deleted and destroyed. There are no consequences or negative implications if you chose not to participate in this interview or decide to withdraw at any point up during the interview process. If you have any questions or would like to participate in this interview, please

contact me via email at [insert email] by [December 4th, 2023]. I am looking to complete the interview by [December 8th, 2023]. Your experience would be valuable in guiding the development of this learning resource and any assistance you can provide would be greatly appreciated.

Thank you for your consideration,

Zachary Thorne, BNRN, Master of Science in Nursing Student

Faculty of Nursing

Memorial University of Newfoundland

Appendix D: Interview Questions for Licensed Practical Nurses/Registered Nurses

1. How many years have you been working as RN/ LPN? How many years have you worked as a RN/LPN in a LTCH?

2. The literature suggests that there can be confusion surrounding the signs and symptoms of UTI in LTCH residents.

    a. Do you have any learning needs when it comes to identifying the specific clinical signs and symptoms of UTI or caring for residents with UTI? If so, can you please share these.

3. The literature suggests that urinary catheters are the strongest predictor of UTI in older adults.

    a. Do you have experience caring for residents with indwelling urinary catheters? Have you ever experienced any issues or barriers when performing care related to indwelling catheters? If so, can you please share these?

4. Within the literature it has been demonstrated that prevention measures for UTI such as hydration and incontinence care are effective at reducing UTIs in older adults.

    a. What have been your experience in providing these prevention measures?

    b. What are potential facilitators in providing such prevention measures? Or what would assist to facilitate these interventions?

    c. Is there anything that you feel could be covered in a learning resource to benefit your learning needs with respect to UTI prevention?

5. Studies have shown that there can be confusion surrounding the difference between a UTI and asymptomatic bacteremia.

    a. Does your facility utilize a screening tool to determine if a resident is experiencing a potential UTI (e.g., Loeb Minimum Criteria). If not, do you see this as being potentially

helpful for your nursing practice?

6. Evidence indicates that antibiotic stewardship, which is the effort to improve how antibiotics are prescribed by clinicians and used by patients, is imperative to promote appropriate antibiotic use and reduce the spread of infections and antimicrobial resistance.

a. When a patient presents with a potential UTI have you had conversations with Nurse Practitioners/Physicians regarding the appropriateness of the antibiotic order? What would you find helpful to facilitate these types of interdisciplinary discussions?

7. It has been noted that some educational resources retrieved from the grey literature have included materials dedicated to increasing the knowledge of older adult family members with respect to UTI.

a. From your conversations with resident's substitute decision makers, is there knowledge gaps that exist regarding their overall understanding of UTI?

b. Does your facility have resources for substitute decision makers regarding UTI, asymptomatic bacteremia, or basic knowledge regarding antibiotic stewardship?

8. After reviewing the literature, it was determined that in person education, online education, and simulations were noted as being effective delivery methods to support nursing staff's learning needs.

a. What would you consider to be the most effective educational strategy to provide information to LTCH staff regarding UTI and older adults living in LTCH?

b. Is there any information related to UTI that you feel should be included or any recommendations you would like to make for the development of this resource?

9. Is there anything else related to UTIs and your nursing practice in LTCH that you wish to discuss?

Appendix E: Interview Questions for Personal Care Attendants

1. How many years have you been working as a personal care attendant? How many years have you worked as a personal care attendant in a LTCH?

2. The literature suggests that there can be confusion surrounding the signs and symptoms of UTI in LTCH residents, this is necessary for PCA's as the scope of practice would involve reporting these signs and symptoms to the nurses on duty.

    a. Have you provided care to a resident experiencing a UTI?

    b. If so, do you have any learning needs when it comes to identifying the specific clinical signs and symptoms of UTI? If so, can you please share these?

    c. What helps you have discussions with your team, e.g., nursing staff for transitioning care of residents with UTI's? What could help you with this?

3. The literature suggests that urinary catheters are the strongest predictor of UTI in older adults.

    a. Do you feel like you have any learning needs with respect to individuals living with indwelling catheters for your scope of practice?

    b. Have you experienced any barriers when performing care (e.g., bathing, toileting/ emptying catheter bags) to residents who have indwelling catheters. If so, can you please share these with me?

4. Within the literature it has been demonstrated that prevention measures for UTI such as hydration and incontinence care are effective at reducing UTIs in older adults.

    a. What is your experience like with your role pertaining to this?

    b. What would potentially help you in providing such prevention measures? Or what could assist you with this?

    c. Is there anything that you feel could be covered in a learning resource to benefit your

learning needs with respect to prevention measures?

6. After reviewing the literature, it was determined that in person education, online education, and simulations were noted as being effective delivery methods to support LTCH staff's learning needs.

a. What would you consider to be the most effective educational strategy to provide information to LTCH staff regarding UTI.

b. Is there any information related to UTI that you feel should be included or any recommendations you would like to make for the development of this resource?

7. Is there anything else related to UTIs and your practice in LTCH that you wish to discuss?

Appendix F: Interview Questions for Infection Control Practitioner/Nurse Educator/Nurse Manager

1. What are the current best practices employed within this facility with respect to urinary tract infections (e.g., preventative measures, antibiotic stewardship, urine culture testing, screening tools)? What additional evidence or resources, for your staff to avail of, might you find beneficial for you in your role or for the LTCH staff that you support?
2. What has been your experience for residents in the LTCH experiencing UTIs? What type of information or support do you feel may benefit LTCH staff for this? What type of information or support do you think may benefit residents? What type of information do you feel may benefit family members of residents in the LTCH experiencing UTIs?
3. After reviewing the literature, it was determined that in-person education, online education, and simulations were noted as being effective delivery methods to support nursing staff, as well as other LTCH staff members, learning needs. What educational method do you feel would be most effective for delivering education to the LTCH staff (i.e., RNs, LPNs, PCAs)?
    a. What educational strategies have been successful in the past for the care staff at this LTCH?
    b. Can you describe any challenges or barriers you have experienced when providing education to nurses or unlicensed personnel in the past? If possible, how would you suggest overcoming these?
    c. Is there any information related to UTIs that you feel should be included or any recommendations you would like to make for the development of this resource?
4. Is there anything else related to UTIs and your LTCH staff that you wish to discuss?

Appendix IV: Learning Resource

Prevention and Identification of Urinary Tract Infections in Older Adults Living in Long Term Care: An Infographic for Long Term Care Home Staff and Families

Zachary Thorne

Memorial University of Newfoundland

Prevention and Identification of Urinary Tract Infections in Older Adult Residents

Source. From Microsoft Word Stock Images

An Infographic for Licenced and Unlicensed Staff Working in Long Term Care Homes and for Family Members

Introduction

This is an educational resource which has a primary focus on the prevention and identification of urinary tract infections (UTIs) in older adult residents residing in Long Term Care Homes (LTCH). This educational resource can be utilized to increase the knowledge and confidence of both licenced (e.g., Registered Nurse, Licenced Practical Nurse) and unlicensed personnel (e.g., Personal Care Attendants) in the steps involved in identifying UTIs, along with the incorporation of prevention interventions to decrease the incidence of UTIs in older adults. A secondary component of the resource was to provide education to family members of older adults living in LTCH to help them better understand the complexity of UTIs. This was done by using non-medical jargon to help promote clarity on how UTIs are identified and prevented within the older adult population. The development of this resource was informed by findings from an integrative literature review of recently published scholarly evidence; an environmental scan, which was a review of resources related to UTI's available online within Canada and internationally; and consultations, which consisted of interviews with key stakeholders.

During the consultation phase it was decided that an in-person education session would best meet the learning needs of the LTCH staff. Consultants discussed how providing the education during 'staff huddles' would be the best method for education delivery. Providing the staff with education regarding the identification and prevention of UTI would occur via an infographic as the information could be quickly disseminated to LTCH staff and could serve as a quick reference guide to inform healthcare practices to promote the health of residents. The utilization of infographics has become more common within the medical community (Martin et al., 2019). Infographics are defined as "visualizations of data and ideas that try to convey complex information to an audience in a manner that can be quickly consumed and easily

understood" (Smiciklas, 2012, p. 3). It provides a means for individuals to learn about medical evidence without the barrier of reading extensive literature which can take up remarkable amounts of time (Martin et al., 2019).

Two studies that were conducted in Canada examined the impact of infographics on learning. A high-quality cross-sectional study, of weak design, examined the use of infographics in providing education to youth (n=78) and adults (n=88) regarding concussions (Provvidenza et al., 2019), while a medium quality uncontrolled before and after study, of weak design, examined cognitive load and retention of education material in emergency room physicians (n=112) within the format of infographics and text only abstracts (Martin et al., 2019). Provvidenza et al. (2019) reported that participants indicated that the infographics met their knowledge needs (91%), provided them with new knowledge (87%), and participants identified that they intend to use the infographics to build their knowledge (89%). Martin et al. (2019) reported that emergency rooms physicians found it less mentally taxing to read material in an infographic format in comparison to text only abstracts ($p=.01$), and that they preferred medical information summarized in an infographic form rather than a text only abstract to inform their practice ($p<.01$). Study quality was determined utilizing the Public Health Agency of Canada (PHAC) critical appraisal tool kit (PHAC, 2014). Provvidenza et al. (2019) utilized individuals recruited from a variety of locations which help lead to a high-quality designation; whereas, the study conducted by Martin et al. (2019) was at risk for selection bias due to the utilization of a convivence sample which led to a rating of medium quality. Overall, the results of these two studies solidify the decision to utilize an infographic to provide LTCH staff and families information regarding UTI identification and prevention in older adults living in LTCH. This is due to individual preference of this dissemination option, along with a lower cognitive load

required to process the information. As described by Provvidenza et al. (2019), infographics are an emerging tool being utilized within a variety of target audiences, including nurses and unlicensed staff.

Learning objectives for the infographic aimed at LTCH staff and families can be found in Table 1 and Table 2 below. These learning objectives were created in conjunction with the findings from an integrative literature review of recently published scholarly evidence; along with an environmental scan and consultations previously discussed. The learning objectives were based on the learning needs of LTCH staff and family members surrounding the identification and prevention of UTI in older adults.

Table 1

Learning Objectives for LTCH Staff

Learning Objectives for LTCH Staff
After examining the infographic, LTCH staff will be able to: • Note risks factors associated with UTI and the older adult • Explain UTI prevention interventions which can be incorporated into clinical practice • Describe the clinical signs and symptoms of UTI • Describe when the use of a urine culture is appropriate • Explain the appropriateness of antibiotics • Understand how to monitor an older adult being treated for a UTI • Demonstrate proper documentation in relation to an older adult experiencing a UTI

Table 2

Learning Objectives for Families

Learning Objectives for Families
After examining the infographic, families will be able to: • Describe what a UTI is • Explain the signs and symptoms of UTI • Explain the nonspecific signs and symptoms of UTI • Describe the appropriateness of antibiotic use • Note ways UTIs can be prevented

In terms of educating LTCH staff and family members it is important to consider adult learning needs. Knowles (1984) Adult Learning Theory was incorporated as a theoretical framework in the development of the infographics as Knowles argues that adults have unique learning needs. Knowles considers adults as being in control of their learning and are self-directed in their education (Knowles, 1989; Mitchell & Courtney, 2005). Adults also utilize previous experience to inform their learning, and they are problem focused meaning they want to learn solutions for real life issues (Knowles, 1989; Mitchell & Courtney, 2005). Infographics therefore allow for self-directed learning and can assist individuals understand topics in more detail which can help provide solutions to problems faced which are key aspects of Knowles (1989) Adult Learning Theory. In this case, the education will provide LTCH staff and families with the tools to understand the complexity of UTI, along with ways to properly identify and prevent UTI in older adults living in LTCH. The infographics for LTCH staff and families can be found in the following section, including the request for copyright to utilize the Memorial University of Newfoundland Faculty of Nursing logo.

Infographic for LTCH Staff

Hyperlink/QR Code to be added in this section

UTI and Older Adults

Information for LTCH Staff

MEMORIAL UNIVERSITY
FACULTY OF NURSING

Created by: Zachary Thorne-MNRN Student

Clinical Signs and Symptoms of UTI

Without a urinary catheter

- Dysuria (Painful urination)
- Increased urination
- New or worsening incontinence or urgency
- Hematuria (Blood in urine)
- Lower abdomen pain (Suprapubic)
- Flank pain (kidney pain)
- Pain or swelling in testicular region
- Fever (>37.8)

Urinary catheter present

- Fever (>37.8)
- Chills
- Low Blood Pressure
- Flank Pain (kidney pain)
- Lower abdomen pain (Suprapubic)
- Change in mental status
- Purulent discharge from urinary catheter
- Pain or swelling in testicular region

Risk Factors

- Age
- Urinary Catheter
- Dehydration
- Incontinence
- Immobility
- Prior History of UTI
- Female Sex
- Diabetes
- Neurological Disease (e.g., stroke, Parkinson's disease, multiple sclerosis)

Prevention

- Hydration
- Incontinence Care
- Routine Toileting
- Adequate Nutrition
- Mobility Maintenance
- **Urinary Catheter Care**

Considerations for Urinary Catheter Care

- Infection Control (e.g., hand hygiene)
- Evidence Informed Catheter Care
  - Clean insertion site daily & after a bowel movement
  - Empty catheter bag into a clean urinal (i.e., resident specific)
  - Ensure catheter is secured to body
- Aseptic technique with insertion

Considerations for Diagnostic Tests

1) Urine Culture should **only** be ordered if clinical signs and symptoms of UTI present

2) Consult with a Physician or Nurse Practitioner if the **urine culture** is **positive**

Considerations for Documentation

- DAR Format: Data, Action, Response
- Resident Signs and Symptoms of UTI
- Vital Signs
- Symptom Management (e.g., interventions for pain, hydration, health promotion)
- Urine Culture Testing (e.g., date, collection methods, results)
- Current Antibiotic Usage

Documentation Should Occur Every Shift

Consult the UTI Protocol and Medical Directive on the Eastern Health Intranet

Infographic for Families

Information for Families Regarding Bladder Infection (a.k.a UTI) and Older Adults

Urinary Tract Infections (UTIs) are commonly known as bladder infections but can also occur in the kidneys. Older adults are at an increased risk for infection.

Risk Factors for UTIs

- Difficulty walking
- Dehydration
- Inability to control bladder
- Urinary Catheter
- Prior UTIs
- Female Sex
- Diabetes
- Neurological Disease (e.g., stroke, Parkinson's, multiple sclerosis)

People with UTIs may experience

- Painful urination
- Increased urination
- Feeling the need to urinate
- Sudden loss of bladder control
- Blood in urine
- Pain in lower stomach

Antibiotics should only be administered if the older adult has signs and symptoms of UTI and a positive urine culture. This helps prevent antibiotic resistance.

Ways to Prevent UTIs

- Drinking adequate fluids
- Regular trips to the washroom (don't hold it)
- Adequate nutrition
- Physical activity

Please consult a Physician or a member of the health care team if you have concerns about your loved one.

Created by: Zachary Thorne MNRN Student

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Student Contact Information

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Copyright Material Request

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Developing an Educational Resource for Nursing Staff and Unlicensed Personnel on the Identification and Prevention of Urinary Tract Infections within Residents.

to be submitted in partial fulfilment of the requirements for the degree of Master of Science in Nursing Pra at Memorial University of Newfoundland.

Description of the Material to be Included

For my Practicum Project I am developing an Infographic for both Long Term Care Staff and families of Long Term Care residents on the identification and prevention of urinary tract infections within older adults residents. I am requesting to utilize the MUNFON logo on the two infographics I have developed to signify that they were created by a Memorial Univeristy student within the Faculty of Nursing.

Permission of Copyright Holder

I, Stephanie Power (Name - type), ☑ do ☐ do not grant permission for the indicated use of the material described above.

Company/Organization: Memorial University Faculty of Nursing
Position Title: Communications Advisor
Address: 300 Prince Phillip Dr.
St. John's, NL

Signature: Stephanie Power **Date:** March 15, 2024

Note: Signature required on each additional attachment

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Updated September 2020

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