

Growing Green:

Developing an Institutional Garden for The Ottawa Hospital

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Executive Summary

Background

Hospitals and other healthcare institutions recognize the benefits of gardens and have sought to incorporate more natural environments into their facilities. These institutional gardens serve various purposes including relaxation and leisure, use as a social space, and landscape beautification. Many healthcare institutions are also looking to develop gardens for both therapeutic and food production purposes.

The Ottawa Hospital (TOH) is interested in developing institutional gardens for therapeutic purposes in the short term and for food production in the long term. Institutional gardens would provide TOH with opportunities to meet the therapeutic needs of patients, improve health outcomes for both patients and staff, and enrich the overall experience of visitors to the hospital, all of which are aligned with TOH's mission and core values. Institutional gardens will also offer invaluable opportunities to strengthen community engagement, foster a range of research opportunities, develop partnerships, and strengthen TOH's position as a leader in promoting and improving health in the Ottawa community. The aim of this study was to create a model to support these short- and long-term goals by examining opportunities and potential challenges associated with developing gardens and engaging with potential community partners.

General Approach

To develop this model, the research team explored the specific needs of TOH, interviewed representatives from other healthcare institutions with existing gardens to learn from their practical experiences, and examined ways to develop sustainable partnerships with potential stakeholders. Participants completed 30-60 minute semi-structured interviews. The participants were categorized into one of three groups: TOH staff, representatives from gardens at healthcare institutions, and potential stakeholders.

Group 1 participants ($n=9$) comprised TOH staff in the Facilities, Food Services, Occupational Health & Wellness, Patient Advocacy, Finance, Security & Safety departments. Representatives from these departments provided critical insights into hospital operations including organizational policies, program development and utilization, finances, patients' experiences, and operational logistics.

Group 2 participants ($n=5$) comprised representatives from hospitals and university health networks with institutional gardens. These participants provided important insights into the day-to-day running of a garden program, risk management, finances and funding opportunities, and community partnerships and engagement

Group 3 participants ($n=5$) comprised representatives from local organizations and businesses who may have interest in becoming potential partners in the development of the garden.

Findings

Group 1 participants strongly voiced their enthusiasm regarding the potential development of a therapeutic garden. The longer-term goal of using the garden for food production was met with mixed reviews. Despite the majority of staff advocating for the inclusion of fresh local produce in hospital meals, many wanted to better understand the feasibility and sustainability of on-site food production. Key considerations highlighted by TOH staff were costs, food preparation methods, patient safety, and space constraints. A number of design considerations were identified, some of which included locating the garden in an easily visible and safe location, ensuring accessibility (e.g. tailoring design to user groups), and collaborating with the Facilities Department to ensure adherence to building codes and regulations. TOH staff suggested that the effectiveness of the garden could be measured by relying on patient feedback, patient outcomes, and incorporation of produce into cafeteria meals. In order to ensure sustainability, TOH staff suggested securing external management for the garden, recruiting volunteers, and enlisting the help of project ‘champions’.

Group 2 participants provided useful insight and advice regarding the planning and development of an institutional garden. The participants identified several uses of the gardens including education, community outreach, food production for cafeteria and patient meals, farmers’ markets, and community supported agriculture. The main purposes of the gardens were outreach, public relations, food production, and an overall commitment to personal and community health improvement. Design considerations included accessibility, seasonality, and the use of organic practices. Finances to cover garden costs included donor funding, grants, and departmental financial support. Community partnerships and collaborations were common and included partnerships with recreation centers, libraries, schools, universities, non-profit agricultural organizations, local food pantries, and other local community groups. Challenges with the gardens included selecting an appropriate location for the garden, finding a meaningful use for the produce, and securing sufficient funding.

Group 3 participants showed more interest in collaborating on the therapeutic garden than on the food production aspect. Potential stakeholders can contribute to the gardens by providing design expertise, equipment, volunteer services, and connections to local farmers for food production. Suggested design considerations included using raised garden beds, wheelchair accessible pathways, and selecting a location near the hospital. Potential stakeholders agreed that a food garden would heighten patients’ interests in meals and advised on challenges such as food policies, seasonality, and volume of food that can be produced.

Key Recommendations

Short-Term Recommendations for Therapeutic Garden

- Create an interdisciplinary planning and design team that includes TOH staff (administrators, management, Facilities Department, healthcare professionals, and rehabilitation therapists) and community partners (farmers and local organizations) to ensure an effective and efficient design process.
- Select a location for the therapeutic garden that meets the needs of patient, staff, and visitor user groups by ensuring proximity to the hospital and visibility from the hospital interior.
- Design of the therapeutic garden should be tailored to meet the needs of user groups by including sufficient seating, unrestricted access for individuals with walking aids, raised garden beds accessible from wheelchair height, a designated area for staff, and plants that stimulate the senses.

Long-Term Recommendations for Food Production Garden

- Consider a partnership with a farmer who can take on responsibility for managing the food garden.
- Use produce from the garden in cafeteria meals or for an occasional on-site farmers' market.
- Establish communication between kitchen and food garden staff to balance supply and demand and to coordinate seasonal menus.

General Recommendations

- Begin with a therapeutic garden and use this therapeutic phase to build capacity and proficiency with gardening operations before expanding into food production.
- Decide on funding strategies, sources, and timelines during the planning and design process.
- Seek staff champions to advocate for the gardens (particularly clinical front-line workers). Champions will be familiar with the internal functions of the hospital and can help navigate administrative complexities.
- Use organic practices.

Introduction

Gardens are common in homes, workplaces, and neighbourhood spaces, and have long provided an easy way to introduce nature into the built environment. Beyond their aesthetic value, gardens provide a range of benefits that may not be as obvious. Gardens provide space for social gatherings, therapeutic and educational activity, and food production; all of which contribute to more frequent social interactions, skill-building activities, improved nutrition, and overall benefits to health and well-being. To take advantage of these benefits, gardens are used at healthcare institutions to provide calming scenery and respite from the sterile institutional environment. More recent applications of institutional gardens include food production to reduce reliance on prepackaged foods and create a healthier environment for patients, staff, and visitors.¹

Research gap

When healthcare institutions incorporate gardens for therapeutic and food production purposes, they are often faced with various challenges related to accessibility, financial costs, lack of infrastructure and labour to support the garden, food safety policies, and operational liabilities (Mount & Knezevic, 2015). While there is significant interest in developing gardens at healthcare institutions, there are few guidelines, little support, and a scarcity of information on successful programs for interested institutions to emulate (Perline, 2014).

There is also limited research on the challenges and opportunities in creating single or dual-purpose gardens for therapeutic purposes and/or food production. These limitations call for

¹ For the purpose of our paper, gardens found at healthcare facilities are referred to as institutional gardens which encompass both therapeutic gardens and food production sites/gardens.

an in-depth exploration into the day-to-day functioning of institutions with existing programs to serve as a guide for those interested.

Study aim and context

The Ottawa Hospital (TOH) plans to implement an institutional garden for therapeutic purposes (short-term goal) and for food production (long-term goal). The aim of this study was to create a model to support these short- and long-term goals by examining opportunities and challenges associated with developing gardens in hospitals. This study identified the needs of TOH by drawing from the perspectives of representatives from relevant departments, interviewing representatives from hospitals with existing gardens for practical information and advice on garden operations, and exploring potential future partnerships with stakeholders.

Study significance

Institutional gardens would provide TOH with opportunities to improve health outcomes for both patients and staff, meet the therapeutic needs of patients, and enrich the overall experience of visitors to the hospital, all of which align with TOH's mission and core values.² Institutional gardens will also offer invaluable opportunities to strengthen community engagement, foster a range of research opportunities, and strengthen TOH's position as a leader

² Mission: The Ottawa Hospital is a compassionate provider of patient-centred care with an emphasis on tertiary-level and specialty care, primarily for residents of Eastern Ontario. The Ottawa Hospital educates future health-care professionals in partnership with the University of Ottawa and other affiliated universities, community colleges and training organizations. The Ottawa Hospital develops, shares and applies new knowledge and technology in the delivery of patient care through world-leading research programs in partnership with the Ottawa Hospital Research Institute (OHRI). The Ottawa Hospital also plays an active role in promoting and improving health within our community. The Ottawa Hospital collaborates with a wide range of partners to address the needs of the community and to build a strong, integrated system for regional health-care delivery. The Ottawa Hospital functions in English and French while striving to meet the needs of the culturally diverse community we serve (The Ottawa Hospital [TOH], 2017).
Core Values: Compassion, A Commitment to Quality, Working Together, Respect for the Individual (The Ottawa Hospital, 2017).

in promoting and improving health in the Ottawa community (Mount & Knezevic, 2015; TOH, 2017).

Like most institutions in Canada, TOH relies heavily on pre-produced foods from suppliers to serve meals to patients, staff, and visitors. While this use of packaged meals is common in healthcare institutions (Perline, 2014), a food production garden can enhance the capacity of TOH to integrate fresh, wholesome, and nutritious produce into its meals. The insights on garden development from the diverse departments consulted for this study will also help ensure optimal use and impact of the institutional garden at TOH. Finally, this study will contribute to the body of work on the opportunities and barriers surrounding the creation of institutional gardens at hospitals for therapeutic and/or food production purposes.

Literature Review

History of institutional gardens

Historically, the interaction between nature and humans has been commonly viewed as beneficial for health and well-being (Van Den Berg, 2005; Keniger, Gaston, Irvine, & Fuller, 2013). The first documented use of therapeutic gardens, which are gardens “designed to address physical, psychological, and spiritual needs of designated users” can be traced back to ancient Egyptian times when court physicians prescribed walks in the palace gardens for members of the royal family with mental illness (October, De Villiers, & Dolley, 2004; Curl & Wilson, 2015). In 500 BC, Persians created gardens that calmed the senses by combining beauty, fragrances, and the music of flowing water (Detweiler et al., 2012). Crowded Greek and Roman urban

environments also used elements of nature such as trees and grass to buffer out noise and create peaceful and nonthreatening atmospheres (Thacker, 1985).

In 1798, Dr. Benjamin Rush, one of the signatories of the United States Declaration of Independence, found that field labour in a farm setting had curative effects on people with mental illness (Rush, 1812; Davis 1998). His findings were widely accepted in North America and Europe (Davis, 1998; Detweiler et al., 2012).³ This research led to the establishment of horticultural activities for those suffering from mental illness in Spain and England (Davis, 1998; Detweiler et al., 2012). Due to the well-documented benefits of horticulture in mental health facilities, these therapeutic techniques were implemented in physical disability rehabilitation programs (Detweiler et al., 2010). These programs were developed for the numerous World War I veterans who were returning with physical injuries and disabilities (Detweiler et al., 2010). More recent applications of therapeutic gardens include use in long-term care homes, hospices, educational facilities, corporate offices, and healthcare institutions (Cooper-Marcus & Barnes, 1995; Cooper-Marcus & Sachs, 2014).

Health benefits of gardening

Several studies have highlighted the benefits of engaging in gardening activities on physical, nutritional, and psychological health (Grahn & Stigsdotter, 2003; Hollick, 2005). Less recognized are the benefits of gardening to social well-being through providing and strengthening opportunities for social interactions and community cohesion (Armstrong, 2000; Wakefield, Yeudall, Taron, Reynolds, & Skinner, 2007).

³ The history of institutional gardens does not come without controversy, as this has also been used as an excuse for forced farm labour in prisons (Waliczeh & Zajicek, 2016), mental health facilities (Trowbridge, 2015), and residential schools (Legacy of Hope Foundation, n.d.).

Physical health benefits

Gardening has been linked to better physical health, likely as a result of increased movement and exercise. Zick, Smith, Kowaleski-Jones, Uno, and Merrill (2013) identified a correlation between lower Body Mass Index (BMI) and the regularity with which people engaged in community gardening. Gardening activities such as raking, digging, and compost mixing are a few examples of physical activities that require upper and lower body movement (Park & Mattson, 2008). Davies, Devereaux, Lennartsson, Schmutz, and Williams (2014) reported that depending on the activity level, working in the garden can burn between 250 and 500 calories per hour.

In a Welsh study, Hawkins, Mercer, and Clayton (2013) compared elderly gardeners at a community garden with others of the same age group who were on the community garden waiting list. Their findings revealed that 68% of the participants who gardened met the daily physical activity recommendations compared to only 25% of those on the waiting list. These findings demonstrate that much like other types of planned and structured exercises (e.g. lifting weights, sports), gardening can be considered an important form of physical activity. However, unlike these exercises, gardening can also directly improve nutrition.

Nutritional health benefits

Research on the effects of gardening on nutrient intake largely focus on micronutrients, particularly vitamins A and D. Gardening activities are beneficial in increasing the intake of these micronutrients through increased consumption of nutrient-rich foods and exposure to sunlight. Hollick (2005) and Kampman, Wilsgaard, and Mellgren (2007) showed that participation in outdoor gardening exposed people to sunlight which enhanced their natural

vitamin D production. De Rui et al.'s (2014) cohort study showed that amongst a cohort of elderly Caucasians in northeast Italy, those who participated in gardening or cycling had higher vitamin D levels compared to those who solely engaged in indoor activities or other outdoor activities such as brisk walking or fishing. Gardening may also be beneficial in the increased consumption of micronutrient-laden foods such as carrots and leafy green vegetables. Studies show that home gardening can help increase the availability, ease of access, and consumption of vitamin A-rich vegetables, particularly amongst the nutritionally insecure (De Pee, Talukder, & Bloem, 2008; Faber & Laurie, 2011).

Studies from low and middle-income countries also support the benefits of gardening on micronutrient intake. A South African home garden project that aimed to enhance vegetable intake in children aged two to five reported increased consumption of vitamin A-rich green leafy vegetables in the target group (communities with gardens) compared to the control group (Faber & Laurie, 2011). The Helen Keller International homestead program, a gardening program implemented in rural Bangladesh to address nutritional deficiency, saw a marked improvement amongst mothers and children in their consumption of provitamin A carotenoid largely due to increased produce accessibility, vegetable crop diversification, and consumption of leafy greens (Taher et al., 2004). Evidently, besides improving the intake of micronutrients, gardening can also increase people's consumption of fresh vegetables.

Psychological health benefits

Use of green spaces and engagement with nature has been well-documented to improve mental health and cognition. These psychological benefits include relieving stress, reducing anxiety, improving concentration and attention, and decreasing feelings of depression (Erickson,

2012; Cooper-Marcus & Sachs, 2014). Grahn and Stigsdotter (2003) conducted a study in nine Swedish cities and towns with 953 participants that evaluated the relationships between health and the use of different urban green spaces. These researchers found that regardless of age, sex, and socioeconomic status, participants who visited urban green spaces reported fewer stress-related illnesses (Grahn & Stigsdotter, 2003).

An exploratory study conducted by Thompson and colleagues (2012) found that people dwelling in communities closer to green spaces reported lower stress and anxiety levels. Furthermore, this study also determined that people living in closer proximity to green space had lower levels of stress-related biological markers, such as cortisol, in comparison to those living farther away from green spaces (Thompson et al., 2012).

Therapeutic gardens have also shown to reduce the severity of depression (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2010). Gonzalez and his research team assessed changes in depression severity and perceived attentional capacity in a population with clinical depression treated with therapeutic horticulture programs. The study used clinical questionnaires including the Beck Depression Inventory. Results indicated that there was a 50% decline in clinical depression levels among participants in the horticultural programs and at the three month follow-up, participants maintained their improvements (Gonzalez et al., 2010). These findings show that interacting with nature can nurture a state of mental wellness and psychological well-being.

Social health benefits

Gardening can foster social cohesion—the strong feeling of connection that people who belong to a community feel towards each other—and social support (Kingsley & Townsend, 2006). These elements are considered the pillars of *social capital*. The Center for Disease

Control and Prevention (2013) defines social capital as the personal and communal commitment towards “community improvement, social networking, civic engagement, personal recreation,” and other activities that create social bonds between people.

Armstrong (2000) studied 63 community gardens in upstate New York to identify characteristics beneficial to neighbourhood development and health promotion, and found that in addition to “staple” benefits such as increased vegetable consumption, community gardens served as physical meeting locations for residents. This meeting space allowed for social networking opportunities and increased residents’ involvement in community improvement projects and similar events (Armstrong, 2000). This salient finding is of value to health promotion policies and programs that aim to build, foster, and sustain capacity and empowerment at the community level. Such initiatives are a welcome deviation from—but can also complement—the individually-targeted health promotion programs that often ignore the confluence of factors affecting health (Armstrong, 2000).

Wakefield et al. (2007) describe similar findings in a study on community gardens in Southeast Toronto. The researchers found that gardening inspired social connections among residents, increased community pride, and encouraged community mobilization. Gardeners also reported feeling satisfied in sharing their harvest with others. Wakefield et al. (2007) supported Armstrong’s (2000) finding of gardens as points for communal meetings which ignite positive social interactions. This function of gardens as social spaces can greatly benefit the elderly, low income persons, and other communities where isolation, social exclusion, and marginalization are common.

Gardening and occupational therapy

Benefits of gardening as an occupational therapy intervention

Given the various health benefits of gardens, the practice of gardening has extended into the realm of healthcare. Following the examination of numerous case studies, Cooper-Marcus and Barnes (1995) found that the availability of outdoor gardens in healthcare settings prompted both therapeutic and emotional healing for the patients and staff. Stress reduction, emotional recovery, and improved morale all contribute to an optimal healing environment for patients. The study also found that employees used these gardens for rejuvenation, which is essential for a productive, efficient and content workforce (Cooper-Marcus & Barnes, 1995).

In subsequent research, Cooper-Marcus and Barnes (1999) suggest that therapeutic gardens in medical settings improve recovery from physical symptoms and illness, decrease stress, and improve comfort for those engaged in physically and/or emotionally tiring experiences, and improve one's overall sense of well-being. These findings are supported by Dwyer, Flores-Pajot, Lawlor, McGivern, and Pagotto (2016), Franklin (2012), Jiang (2014), and Ulrich (1984), all of whom identified a variety of benefits of gardens in healthcare settings.

Evidence supporting the therapeutic benefits of nature to healing has prompted its use in various forms of therapy, including occupational therapy, physical therapy, and recreational therapy (Detweiler et al., 2012). Haering (2016) conducted a mixed methods study (using surveys and interviews) to determine the extent to which occupational and physical therapists value using an outdoor environment for patient treatment. Haering found that the majority of practitioners (90%) perceived the outdoor environment as a valuable resource for patient treatment. The reasons for such findings are due, in part, to the outdoor features that support

treatment goals, the psychosocial benefits (e.g. providing a sense of normalcy, reducing stress), the opportunities for meaningful participation, and patient satisfaction. Of particular importance to the therapists were the opportunities provided by the outdoor environment, as they allowed for the provision of real life situations and novel circumstances. Furthermore, the therapists felt that they were able to address various goals in a different context. The specific therapy goals of functional mobility, dynamic balance (balance in motion)/functional balance (combination of static and dynamic balance), upper extremity skills, and cognitive skills were all frequently cited as being supported by the outdoor environment. Participant comments included, “some of our patients have never gardened before, so I can assess how they perform in a novel situation,” and “it gives me another tool in my toolbox of treatment options” (Hearing, 2016).

Similarly to Haering (2016), Wagenfeld and Atchison (2014) found that therapists generally valued gardening as an occupational therapy intervention and described the activity as meaningful/purposeful (93.66%), motivating (80%), fun (61.6%), and client-centred (31.67%). Additionally, gardens and horticulture activities have proven to engage the physical, psychological, and social aspects of wellbeing (Davies et al., 2014). The abundance of evidence supporting the use of gardens for therapeutic purposes has since helped to inform occupational therapy practice (Jonasson, Marklund, & Hildingh, 2007; Wang & MacMillan, 2013; Wiseman & Sadlo, 2015; York & Wiseman, 2012). Importantly, the literature suggests that the design of the garden itself plays a vital role in the success of the intervention (Davis, 2011).

Design features

Gardens can function as a useful adjunctive intervention for occupational, physical, and recreational therapy. They can facilitate the attainment of certain therapy goals, instigate novel circumstances/differing contexts, and stimulate various senses. However, in order for the garden to operate at maximal efficiency, numerous design considerations should be taken into account. With the exception of design features that support treatment goals, many of these concepts can and should be applied when developing an institutional garden for more general purposes (e.g. therapeutic viewing gardens).

Site analysis

Site analysis is a critical step in the design process of therapeutic gardens (Kamp, 1996; October et al., 2013). Site analysis should include site history (past use or conditions), information on use of the surrounding areas, the climate of the site (garden microclimates, breezes), orientation and viewing accessibility from other parts of the hospital/garden, and site pollutants that may affect the participants or activities, for example, smells and noise (October et al., 2013).

Interdisciplinary collaboration in design

In order to create a garden optimized for therapeutic use, diverse input will be needed (Haering, 2016). Davis (2011) conducted a post-occupancy evaluation of a hospital rooftop garden, with the aim of identifying the successes and failures of garden design, specifically those used for physical rehabilitation. Based on this evaluation, Davis emphasized the importance of interdisciplinary collaboration between landscape architects and horticultural therapists to develop and maintain the garden. Along with the physical/occupational therapists and patients,

this collaboration can be used to align the garden with the original therapeutic goals. Should the therapeutic garden also function for food production, consultation with local farmers or gardening organizations may also be necessary (Ottawa Food Policy Council, 2011). These findings are consistent with those of Colorado State University (2005) and Haering (2016), who suggest that the design process is optimized when an interdisciplinary process with feedback from all user groups is employed. Through interdisciplinary collaboration, diversity in design can be achieved.

Diversity in site design offers functional variety and interest, as well as varied aesthetic and sensorial stimulation (Cooper-Marcus & Barnes, 1999). In healthcare settings, therapeutic gardens generally have three primary user groups: patients, staff, and visitors (Erickson, 2012). According to Erickson (2012), the unique needs of each user group must be considered when planning a therapeutic garden. Erickson (2012) highlights the value of the garden designer consulting with the therapists who will be using that space for patients as well as consulting with patients themselves. The garden site should allow for privacy of patients undergoing therapy (Kamp, 1996; October et al., 2013). Eckerling (1996) outlines a range of guidelines for designing therapeutic gardens and suggests creating a layering effect with different trees and plants to allow for patient and staff privacy (Cooper-Marcus & Sachs, 2014). The garden should not only have the capacity to facilitate relaxation and rest for hospital patients, visitors, and staff, but it should also have the capacity to accommodate therapy activities (Kamp, 1996; October et al., 2013).

Design features that support treatment goals

The current literature recommends that the design of gardens be driven by the therapeutic goals of the specific patient population in order to adequately meet the desired health outcomes (Winterbottom & Wagenfeld, 2015). A recent study by Haering (2016) identified key design features deemed critical for patient treatment. These features included railings and level terrain (for developing basic mobility skills), level terrain of varied textures (for developing moderate mobility skills), and steeper inclines and hills (for developing advanced mobility skills). Haering (2016) also found that therapists valued the specific gardening activity of planting as it afforded opportunities to address vocational goals, avocational goals, range of motion, coordination, and cognition. Consequently, raised garden beds, pots/planters, beds just above ground level, and ground level plantings were all mentioned as important features of a therapeutic garden.

Accessibility and ease of use

Therapeutic gardens must be easy to enter and exit, as well as move through (October et al., 2013). They must be barrier-free and have surfaces that enable safe and free movement (Kamp, 1996; October et al., 2013). According to Eckerling's (1996) guidelines, less mobile patients should be placed closer to the garden entrances/exits in order to provide physical access for patients in wheelchairs and other walking aids through wide, non-slip pathways with handrails. The availability of seating and shaded areas were also cited as vital design features (Davis, 2011; Haering, 2016).

Garden composition and maintenance

The plants selected for the therapeutic garden should provide shade and shelter, and define spaces and displays (Kamp, 1996; October et al., 2013; Cooper-Marcus & Sachs, 2014).

The designer(s) of the garden must take into consideration the seasonal influence on each plant as well as the therapeutic benefit of the plant (October et al., 2013). Selection of plants that cause allergies, produce messy or slippery droppings such as sap, pods, leaves, etc. need to be carefully considered (October et al., 2013). Moreover, provisions for maintenance of therapeutic gardens must be incorporated from the start of the design process (Kamp, 1996; October et al., 2013; Cooper-Marcus & Sachs, 2014). For example, a budget for maintenance requirements includes training, supplies, equipment, plant replacement, and general ‘wear and tear’ damage (October et al., 2013).

Active and passive environment

Restorative experiences are not only achieved through active participation in gardening activities, but also through passive experiences in the environment (Relf, 1992). Active use of the garden refers to purposeful activity such as therapeutic gardening activities while passive use refers to engaging in various forms of sensory stimulation (e.g. fresh air, scents, etc.), which is conducive to relaxation for patients, staff, and visitors (Gonzalez & Kirkevold, 2014).

According to Gay (2012), “optimal function for a person is developed through exposure to rich sensory environments and interactive experiences” (p.1). The brain processes sensory information and responds through thought, behaviour, feeling, and movement (Gay, 2012). A garden that stimulates the senses allows occupational therapists to structure sensory experiences so that specific skills can be taught (Gay, 2012). Therefore, the garden should also be developed and adjusted to maximize sensory engagement (Colorado State University, 2005; Kamp, 1996; Wiseman & Sadlo, 2015). The sensory aspects of touch, smell, taste, visual, and auditory appreciation should be considered (Kamp, 1996; Wiseman & Sadlo, 2015). Sensory engagement

can be achieved by including colourful plantings and smells (e.g. lavender, roses), incorporating auditory sounds (e.g. water fountains, wind chimes), supporting wildlife (birds, bird feeders), and utilizing a variety of textures within the garden (Barnes, 1999).

Building the business case

Illness is costly in terms of human suffering and financial expenditures (Jo, 2014). Conventional healthcare settings are rarely therapeutic (Van Den Berg, 2005). Healthcare administrators are in a conundrum where they are under constant pressure to reduce and control costs, but also increase the quality of care (Ulrich, 2002). Administrators are faced with many demands, such as paying for costly new medical technology, and may often see therapeutic gardens as desirable but non-essential (Ulrich, 2002). Moreover, the medical community, specifically physicians, may not see the need to assign any financial resources to therapeutic gardens (Franklin, 2012). Frequently, cost-cutting discussions overlook the structural elements of the hospital (Sadler et al., 2011).

The scientific evidence detailed in the sections above indicates that the physical environments in which medical care is provided have an impact on patients, visitors, and staff. Return on investment (ROI) from therapeutic gardens can be quantified based on a) the improved health and wellbeing of patients, b) stress reduction for patients, visitors, and staff, and c) improved patient and visitor satisfaction (Ulrich, 2002; Sadler et al., 2011; Cooper-Marcus & Sachs, 2014).

Improved patient health and well-being

A US-based study conducted in 1984 by Ulrich compared patients recovering from surgery who viewed nature to patients who viewed a brick wall. Ulrich (1984) found that patients who viewed nature, specifically views with vegetation and water, were released on average after 7.96 days, while those who viewed brick walls were released on average after 8.71 days noting a decrease of 8.5% in average length of stay. A study by Terrapin Bright Green (2014) estimated that if all post-surgery patients had views of nature, the average hospital stay would be reduced by approximately half a day and would result in savings of greater than \$93 million per year in the American context. In addition to these indirect restorative benefits, there are also direct positive benefits associated with patients using therapeutic gardens.

In the late 1990s, it was noted that gardening and gardening-related activities played a role in patient healing, socialization and leisure needs (Ulrich, 1999; Cross Chater, 2015). Directly partaking in horticultural activities has been shown to increase emotional, cognitive and sensorimotor function, greater social participation and overall increase in life satisfaction (Söderback, Söderström, & Schäländer, 2009). Verra, Angst, Beck, and Aeschlimann (2012) found that horticultural therapy used in occupational and physical rehabilitation ameliorates coordination, balance, and strength. Therefore, the indirect and direct benefits of therapeutic gardens offer a positive ROI (Cooper-Marcus & Sachs, 2014).

Stress reduction

Stress at healthcare facilities affects three populations: patients, staff, and visitors. A reduction in stress levels among the three populations can lead to better health outcomes and higher satisfaction (Cooper-Marcus & Sachs, 2014). Studies have concluded that exposure to

therapeutic gardens can result in a positive change in mood (Terrapin Bright Green, 2014; Cooper-Marcus & Sachs, 2014). For example, garden users/visitors in four San Francisco area hospitals were asked how they felt after spending time in the garden. The results indicated that 95% of users/visitors felt more relaxed, less stressed, better able to cope, and experienced an overall positive change in mood (Cooper-Marcus & Barnes, 1995).

The implementation of therapeutic gardens may improve staff well-being, satisfaction, retention, and possibly reduce medical errors (Cooper-Marcus & Sachs, 2014). Pati and colleagues (2008) determined that nurses who have work areas with views of nature sustain or improve their levels of alertness before and after a twelve-hour shift. In contrast, nurses who did not have access to views of nature from workstations experienced reduced alertness (Pati, Harvey, & Barach, 2008). According to other studies, a brief exposure between three and five minutes to actual or simulated nature can lead to a significant reduction in stress (Ulrich, 1999; Parson & Haertig, 2000).

Cooper-Marcus and Sachs (2014) have hypothesized a scenario-based calculation for stress reduction of nurses via therapeutic gardens (the numbers have been adjusted for the Canadian context). If a \$500,000 therapeutic garden that is easily accessible by nurses was installed, and an estimated 10% of the 500 nurses use the garden regularly (assume that this garden alleviates some work-related stress), nurses would be less likely to quit their job due to burnout. Replacing a nurse in Canadian hospitals costs approximately \$25,000 due to hiring a temporary replacement, recruitment, orientation and training (O'Brien-Pallas, Murphy, Shamian, Li, & Hayes, 2010). Therefore, the savings of not having to replace 50 nurses could potentially be as high as $50 \times \$25,000 = \1.25 million. Although this is a hypothetical calculation, and many

other factors influence staff retention, it provides some insight regarding the possible economic benefits of investing in gardens.

Improved patient and visitor satisfaction

Therapeutic gardens have the potential to influence patient and visitor satisfaction in the hospital, which may result in positive perceptions and recommendations of the hospital (Cooper-Marcus & Sachs, 2014). Satisfying the patient base may be an important consideration for administrators responsible for growing market share and revenue. San Diego-based Rady Children's Hospital used this technique of growing market share and revenue in 1993 when they initiated a healing garden program (Rybkowski, 2009). A follow-up study on Rady Hospital's healing garden program two years later, found that 50% of user's overall satisfaction increased (Rybkowski, 2009; Cooper-Marcus & Sachs, 2014). Seventy-two percent reported that they would recommend other visitors and hospital employees to visit the garden, 48% said that the garden influenced their opinion on whether they would recommend the hospital or not, and 90% of garden users and non-garden users stated that it was important for the hospital to have gardens (Whitehouse et al., 2001; Cooper-Marcus & Sachs, 2014). In addition to the benefits for patients and visitors, the ability to access therapeutic gardens may make the hospital a more attractive employer for prospective employees as well as current employees due to the demonstration of the hospital's commitment to a high level of care (Cooper-Marcus & Sachs, 2014). Although Canadian hospitals do not operate in the type of competitive market seen in the United States, patient satisfaction is still an important consideration for assessing the value of public investment into hospital operations and could influence the success of hospital fundraising efforts.

Overall, these considerations are the stepping stones to creating a successful therapeutic garden. In the short-term, the garden itself may not produce a large ROI, but garden returns may be seen through reduced costs incurred by the hospital due to shorter stays for certain patient categories, fewer doses of strong pain medication administered, higher satisfaction rates among staff and patients, which may lead to higher hospital rankings and growth in donations, and better staff retention. Another source of potential savings for the hospital may be through expansion into food production.

Use of gardens for hospital food production

Various healthcare institutions have articulated a desire to integrate fresh produce into their food services, in an attempt to not only improve health outcomes, but also staff and patient experiences (George, Rovniak, Kraschnewski, Hanson, & Sciamanna, 2015; Mount & Knezevic, 2015). On-site farmers' markets, CSAs, and institutional gardens are just a few of the ways that hospitals are achieving these goals (Health Care Without Harm, 2007; Rouchotas, 2014). Although the basis of this literature review explores institutional gardens, this section will also touch on the utility of farmers' markets and CSA as approaches to promoting health and wellness within hospital food service departments.

Advantages of institutional gardens in hospitals

Project SOIL (Shared Opportunities on Institutional Lands) was a three-year feasibility study led by Mount and Knezevic (2015), which explored opportunities for on-site food production at various institutions in Ontario (social service, health, and educational institutions) through arrangements with local producers. Following numerous pilot projects, a survey, and

interviews, the authors articulated a number of recommendations for program development and maintenance. Mount and Knezevic (2015) suggest that hospitals looking to grow fresh food on-site should connect with local farmers. As institutional gardens require space, resources, and management, the integration of a local farmer can help to alleviate some of the burden associated with planning, planting, maintaining, and harvesting (Mount & Knezevic, 2015). Farmers trained to use small plot intensive farming techniques are particularly valuable, since these techniques use economically sustainable practices with consistently high returns per square metre (Mount & Knezevic, 2015). Although institutional gardens are generally more costly to operate than farmers' markets and CSAs, the establishment of community partnerships and the development of informal connections can help with the project's start-up and maintenance, decreasing some of the associated costs (Mount & Knezevic, 2015). Another major finding of Project SOIL was the value of strong institutional support. The support of participating institutions is deemed essential for fostering interdepartmental collaboration, navigating administrative details, and garnering the interest of champions, all of which contribute to the sustainability of the on-site food production program. This finding was confirmed in a 2016 study by Dwyer et al.

On-site food production has the potential to enhance the transparency of food production and handling practices, increase nutrition education, generate revenue, foster resilience within the regional food system, and provide opportunities for community outreach (Ghosh & Wilkinson, 2016; Mount & Knezevic, 2015; Knezevic, Mount & Clement, 2016). In addition to food production, institutional gardens offer therapeutic benefits and skill development in a way that few activities do (Knezevic et al., 2016). The ability to offer a wide array of benefits sets institutional gardens apart from farmers' markets and CSAs.

Space may be perceived as a barrier for some healthcare institutions, however, there are innovative ways to bypass this limitation. Rooftop gardens have proven to be ideal in dense environments. Ghosh and Wilkinson (2016) suggest that urban food production in rooftop gardens improves sustainability, creates new ecologies within built environments, and improves biodiversity, while also acting as a catalyst for healing and knowledge transfer. In order for an institutional garden to function optimally for on-site food production, multiple considerations must be taken into account. Cost and liability issues when collaborating with outside contractors, food safety regulations, and overall operations, among others, need to be addressed (Knezevic et al., 2016).

Utility and benefits of farmers' markets on hospital grounds

A farmers' market is a food market where farmers have the opportunity to sell fresh produce directly to consumers (Farmers' Market Ontario, 2017). International healthcare coalition, Health Care Without Harm (2007) identifies three different types of hospital-based farmers' markets; internally focused, externally focused, and dual-purpose. Internally focused markets are generally located within the hospital and primarily serve staff, patients, and visitors; while an externally focused market will also serve the greater community. As its name suggests, a dual-purpose market will supply the Food Services Department of the hospital as well as individual customers (Health Care Without Harm, 2007). The concept of hospital-based farmers' markets is not entirely new, but has spread significantly over recent years (Park, 2009; George, Kraschnewski & Rovniak, 2011; Kraschnewski et al., 2014). To effectively alter dietary and lifestyle choices on a long-term basis, a setting with a steady supply of personnel and resources is needed. Hospital-based farmers' markets are considered to be a promising venue for

instigating such change for a variety of reasons (George et al., 2011; Health Care Without Harm, 2007). The mutual benefits for both the healthcare institutions (attending to the research goals of academic medical centres, focusing on prevention and treatment, positive publicity/distinction from other facilities, etc.) and local farmers (social and economic benefits, providing new outlets for selling produce, etc.) increases the sustainability and effectiveness of market-based health programs on hospital grounds (George et al., 2011).

There is widespread evidence suggesting that hospital-based farmers' markets improve employee health, increase patient satisfaction, improve community relations, and strengthen the local economy. Farmers' markets provide hospitals with various opportunities to set themselves apart from other institutions and improve their rankings (patient satisfaction, quality of care etc.), all the while generating another source of revenue that can be used to support program maintenance and/or sustainability. Hospital-based farmers' markets have the ability to achieve much more than simply selling produce (Kraschnewski et al., 2014).

Why incorporate CSA on hospital grounds?

Community supported agriculture is another method often used to offer community members access to locally-grown, fresh produce (Health Care Without Harm, 2007). Typically, interested community members will purchase a share of a farmer's harvest prior to planting. These customers will then receive regular boxes of farm fresh food (Local Food Research Centre, 2012). According to Local Food Research Centre (2012), two major challenges that farmers face when attempting to initiate CSA programs are securing a sufficient number of customers each season and navigating the logistics of delivering weekly boxes. Hospitals and colleges are considered to be optimal CSA host sites, since they typically possess a large

employee base and have internal systems strong enough to support the CSA program. Given the large target population in hospitals (employees, patients, visitors, etc.), farmers will have a core group of potential shareholders in one location, which increases the feasibility of delivery (Community Involved in Sustaining Agriculture, 2008). CSAs offer the advantage of fewer space and oversight requirements in comparison to farmers' markets, therefore, hospitals lacking the foot traffic and space to operate a farmers' market should consider developing a CSA program (Health Care Without Harm, 2007; Kansas Hospital Education & Research Foundation, n.d.).

Similar to hospital-based farmers' markets, CSAs have been shown to yield various benefits. Saltmarsh, Meldrum and Longhurst (2011) conducted a comprehensive study consisting of desk research, interviews, surveys, and case studies. The authors found that CSAs increase the provision of sustainable food, improve eating habits, and provide numerous opportunities for employment and volunteering. Furthermore, CSAs have shown to indirectly increase social cohesion, improve overall well-being, stimulate local economies, and reduce the environmental impact of food production by encouraging sustainable behaviour (Saltmarsh et al., 2011).

Although many of these aforementioned benefits are directed at the consumers and the community as a whole, it should be noted that farmers also benefit through the CSA model, as they receive a guaranteed investment in farm operations (Health Care Without Harm, 2007). Given these various benefits, hospitals should consider supporting the development of a CSA program to enhance the visibility of food production, improve patient/employee nutrition, and to generate revenue that can then be cycled back into the hospital.

Methods

Development of the project

In June 2016, the research team and a project advisor (Dr. Phil Mount from Project SOIL) met with administrators at TOH to understand how the hospital envisioned the development of an institutional garden project for its patients, staff, and the broader hospital community. The aim of developing gardens was both to enhance current operations of TOH and be a part of the future expansion of the hospital, with the potential to improve health outcomes for patients and staff, strengthen community connections, and increase opportunities for research.

The meeting also provided an opportunity for the research team, in consultation with TOH stakeholders, to identify staff in various hospital departments to be recruited for the project. The consultation also yielded initial suggestions for organizations with which TOH could form partnerships for the long-term food production aspect of the project.

Study design

This study employed qualitative methods to explore issues pertaining to the creation and success of institutional gardens at hospitals. Data collection comprised interviews with three distinct groups of participants. This study was granted ethics approval by Carleton University Research Ethics Board on November 30th, 2016.

Participants

The participant groups included TOH staff, representatives from institutional models, and potential stakeholders.

Group 1 ($n = 9$) participants comprised TOH staff in the Facilities, Food Services, Occupational Health & Wellness, Patient Advocacy, Finance, Security & Safety departments. Participants possess knowledge important to the future of the garden program regarding organizational policies, program development and utilization, finances, patient experiences, and operational logistics.

Group 2 ($n = 5$) participants comprised representatives from US hospitals and university health networks with an active garden program for food production. Participants from this group were chosen to contribute insights on the day-to-day running of a garden program, risk management, business model, finances and funding opportunities, and community involvement and impact.

Group 3 ($n = 5$) participants comprised representatives from local organizations and businesses who may have interest in becoming potential partners in the development of the gardens. Appendix A provides details on participant information.

Recruitment was conducted via e-mail and over the phone. In cases where e-mail contact information was not available, participants were contacted using online web forms. Written and verbal consent was obtained from all participants. Group 1 participants were initially identified with the help of the TOH administrators. Some participants were also recommended by fellow staff members during interviews. Group 2 participants were determined through a Google search of hospitals with institutional gardens as well as referrals from the project supervisors and the publication *Farms and Health: A Guide to Farms and Gardens in Healthcare* (Dellorto-Blackwell & Stewart, 2016).⁴ Notably, in recruiting Group 2 participants, it was found that

⁴ This report was provided to us by one of its authors, whom we were put into contact with by another participant.

Google searches yielded better, more relevant results than academic database searches since information about hospital gardens is mainly published on the institutions' own websites.

Various combinations of the following search terms were used: "hospital," "garden," "institutional," "farm," "produce," "food," "food production," and "vegetables."

Group 3 participants were identified through a Google search for organizations involved with food production and sales, gardening, and garden supply stores in the Ottawa area. Some Group 3 organizations were suggested at the consultation with TOH with additional input from the project supervisors and Dr. Phil Mount, who served as an advisor to the project. Participants were not compensated for their involvement in the study.

Interviews

Nineteen semi-structured interviews were conducted in-person or using phone and video (Skype™) calls. In-person interviews were conducted at the workplaces of the participants or at a mutually agreed-upon location in the Ottawa area. Phone and video interviews took place at Carleton University, Ottawa. Interview questions were developed to reflect important aspects of institutional gardens pertaining to: garden operations and design, organizational and governmental policies, funding and finances, user experience, risk management, community involvement, and partnership opportunities (see Appendix C for the complete list of interview questions). Questions were open-ended to allow participants to provide answers in an unrestricted manner. Follow-up probes were prepared in advance—as well as on the spot—but were only used when further information was needed.

Interviews lasted 30-60 minutes. Participants were required to complete and return the written consent forms. Verbal consent to commence the interview and record audio was also

sought at the beginning of all interviews. All participants consented to be audio recorded. Audio recordings were transcribed by the research team and transcripts stored on a password-protected USB. Interviews were conducted by at least two team members, one serving as lead interviewer and the other as an assistant. All members of the team had the opportunity to serve in both roles.

Data analysis

Transcribed interview data was analyzed using inductive thematic analysis. This method of analysis can be visualized as a “funnel shape,” starting with diverse uncategorized answers from the interviews which are then summarized into specific overarching themes (Thomas, 2006). This required reviewing interview transcripts to understand the diverse responses for each participant group, discerning and establishing links or relationships between research objectives and the responses, and summarizing these relationships into general categories. This process occurred in two stages explained below.

Stage 1: Preliminary reading of interview transcripts

For this stage of analysis, team members undertook a thorough preliminary reading of the transcripts to gain an understanding of general themes that emerged for each group. Interviews were reviewed and emergent themes were discussed, checked for consistency, and analyzed accordingly, which strengthened the rigour and trustworthiness of our analysis (Thomas, 2006).

Stage 2: Software analysis

Stage 2 involved the use of *NVivo Pro 11* qualitative analysis software to further analyze and code the transcripts. Coding is the process of selecting key fragments such as words, phrases,

or sentences (referred to as codes) within interview transcripts (Thomas, 2006). The codes represented the underlying themes we had identified in the stage 1 preliminary readings.

Similar codes were grouped into categories in NVivo called ‘nodes.’ The coding process involved consultation with all team members. Due to the varying expertise of the participant groups, interview questions, and interview aims (as shown in Appendices A and C), analysis for each group was conducted independently. VH conducted the analysis for group 1, AM and DK for group 2, and CO and FM for group 3.

Results

This study had a total of nineteen participants (N = 19). Nine participants came from group 1 (47%), five participants came from group 2 (26%), and five participants came from group 3 (26%). All but one TOH staff member contacted took part in the study. Of the nine TOH participants interviewed (group 1), three were involved in food services, three were involved in health, safety, and wellness, and the remaining three were involved in facilities, patient advocacy, and finance. For group 2, invitations to participate in the study were sent to 13 institutions. Five institutions responded and agreed to participate in the study. Of these five institutional gardens, there were two rooftop gardens, one greenhouse, one institution with hoop houses in addition to outdoor production space, and one multi-acre farm. All models were located in the Northeastern United States as a result of the referrals and based on climate similarity to Ottawa. For potential stakeholders (group 3), those contacted included local organizations, businesses, and government agencies directly involved in agriculture. Other

groups not directly involved in agriculture or gardening included garden supply stores and an educational institution. Of the 22 organizations contacted, a total of five took part in the study. Three of the five organizations were located in the Ottawa-Gatineau area and the remaining two were from Southern Ontario. Appendix A provides more details on participants.

Tables 1-3 (Appendix B) provide a summarized description of interview themes. Overall, the data analysis yielded the following 18 themes, explained in more detail in the next section:

- Group 1 (Five themes): Attitudes towards institutional gardens, challenges, design, measuring garden effectiveness, and sustainability.
- Group 2 (Eight themes): Education and engagement, research, design, finances, institutional policies and food safety, community partnerships, challenges, and sustainability.
- Group 3 (Five themes): Attitudes towards institutional gardens, contribution type, forming a fruitful partnership, design, and management.

GROUP 1: The Ottawa Hospital

Overall Attitudes

Therapeutic garden (short-term goal)

The Ottawa Hospital (TOH) staff strongly voiced their enthusiasm regarding the development of a potential therapeutic garden for occupational therapy patients. All TOH departments perceived gardening to be an activity of daily living that afforded a variety of features more conducive to an optimal healing environment relative to traditional treatment.

As far as the occupational health perspective, I personally from my clinical experience, know that a lot of our long-term rehabilitation patients spend 95% of their hospital stay (which can be up to 2 years long) in a hospital room. That is not conducive to good or rapid healing. We as an industry have a tendency to do things for our patients, because we think that's what they need; when in fact, they should be learning to do more things for themselves (especially in that setting). We should be progressing them towards activities of daily living and working outside. (Department of Food & Logistics)

For patients, I can see it being very therapeutic, especially for patients that are there for longer durations because they would be able to see the fruition of their work. But even shorter-term, it is still therapeutic from a lot of different perspectives. For example, it helps with balance, coordination, fine motor skills etc. Longer term, to see something actually grow that you've planted... it's very inspiring. (Department of Health & Wellness)

Considering a client-centered or patient-centered approach, an institutional garden may be meaningful for and desired by some patients. I think an institutional garden may offer several biomedical, cognitive and social benefits (e.g., improvements in active range of motion, strength, endurance and activity tolerance; the opportunity to engage in more complex cognitive functions such as planning a sequence of tasks and monitoring the garden short- or long-term; interacting with and collaborating with other patients/clients). (Personal communication, March 24, 2017)

Not only did staff members support the concept of a therapeutic garden for occupational therapy, but they also believed that the garden would help to promote an image of an innovative and socially and environmentally responsible hospital. Although the original focus of the study centered on patient use of the garden, various TOH departments articulated a desire to include a dedicated section of the garden for staff. Enabling garden use for staff is important since "the health and well-being of the staff reflects in the health and well-being of the patients" (Department of Safety and Security). According to multiple TOH departments, strolling through a designated path in the garden and being in the presence of nature would aid in stress management, which in turn could improve employee satisfaction and enhance patient care.

Food production (long-term goal)

The longer-term goal of using the garden for food production was met with mixed reviews. Despite the majority of staff advocating for the inclusion of fresh, local produce in hospital meals, many wanted to better understand the feasibility and sustainability of such an endeavor. Multiple TOH departments wanted to see more compelling evidence that a garden could function as an efficient and effective food production vehicle for the hospital. Various smaller-scale recommendations were proposed. For example, multiple departments suggested initiating a monthly farmers' market or using the produce for cafeteria meals. Another department proposed using the food produced in the garden for the once-a-month special meal in the geriatric unit.

Challenges

All of the departments understood the benefit of introducing an institutional garden, and they were also able to recognize various challenges, risks, and key considerations to be taken into account throughout the development, implementation and maintenance of the garden. Those considerations included costs, food preparation, patient safety, and space constraints.

Cost (short- and long-term)

Cost and available funding for such a project were identified as a challenge almost unanimously across departments. Both the initial therapeutic garden and longer-term food production garden would require initial start-up funds and ongoing maintenance costs, although phase-specific costs were not identified (short- vs. long-term). One suggestion made by the Accounting Department centered on incorporating food production into the therapeutic garden

from the beginning. According to this TOH staff member, the food production aspect of the project is the revenue-generating component, which in turn, can reduce costs and improve financial viability.

Obviously [the] therapeutic [garden] is going to run me costs, and it could have benefits [for] the patients, which are good things. I would almost prefer it did run into producing food that we can sell. Just doing it for therapeutic reasons and not doing much with the product or not selling it or whatever else, that just generates costs for me. There is not necessarily any revenue coming in. So in my opinion, if you are going to do one, we should do both. Right? (Accounting Department)

In our current fiscal environment, the garden may be perceived as a “nice to have” and not a “must have.” We are saying “no” to a lot of “nice to haves” right now because of all the “must haves” we need. (Department of Food & Logistics)

Food preparation (long-term)

Utilizing the crops produced from the institutional garden for patient meals was commonly cited as a challenge for a variety of complex and interrelated reasons. Several years ago, the patient food services department was reorganized to accommodate a re-therm model (flash-frozen and reheated), which eliminated all aspects of food preparation. The shift to this model facilitated the mass production of meals needed to supply an extremely large patient population, while also decreasing costs. If the produce from the garden were utilized for patient meals, food preparation would have to be re-introduced, subsequently initiating labour costs and increasing the cost per patient/day.

If you were to go down that road and the decision was made to introduce some food preparation into the kitchen, that cost per patient/day would go up. You would have to add labour to it. (Department of Patient Food Services)

According to multiple departments, it is very unlikely that the proposed garden would be able to accommodate the volumes needed to adequately support the TOH patient population. Additionally, following the elimination of food preparation and cooks, the Patient Food Services

Department observed a decrease in injuries (e.g. ergonomic, cuts) and food waste. Furthermore, if produce from the garden were to be used in the patient meals, food preparation would have to be re-introduced which could implicate the union (as positions were previously eliminated). Based on the aforementioned elimination of food preparation within the patient sector, unrealistic volume expectations, and potential union litigation, incorporating hospital-grown produce into patient meals may not be a feasible endeavour at the present time.

The cafeteria was considered by many to be a more viable option for integrating hospital grown produce, as it does not require the same volumes as patient food services and has a kitchen with the necessary equipment and food preparation staff. Should the cafeteria incorporate hospital grown produce, communication between garden staff and cafeteria staff would be essential to ensure a supply/demand balance and to ensure that crops grown are conducive to seasonal meals etc. Unfortunately, the cafeteria manager was unable to participate in an interview due to time constraints. Based on the other TOH interviews conducted, it is clear that consultation with this group is critical moving forward.

I think very few people understand the scope and the size of the operation that we run here. We run a million meals a year. To serve a thousand breakfasts, a thousand lunches, and a thousand dinners... that's a lot of vegetables. That's a lot of stuff to grow. We have, well before my time, looked at partnering with some local conglomerates and they couldn't produce enough broccoli [example] for us to sell or have on the menu. There are no local people that can produce enough.
(Department of Food & Logistics)

This comment resonates with the Department's perception of gardens more generally, as something that would be "nice to have" (noted above). The Department is certainly not unsupportive of gardens and the use of produce on-site, but for them these ideas have to be

balanced with the pressures of managing day-to-day operations in an efficient and cost-conscious manner. The intricacies of their operations are further elaborated below.

When we do the food for the cafeteria, we bring in raw broccoli. We cut it, we clean it, we do everything to it, and we serve it. Just like you would from a grocery store. Patients on the other hand, go through HFS [Healthcare Food Services] and the food is processed, bagged and frozen (or flash-frozen) so that it can be mass-produced. (Department of Food & Logistics)

You wouldn't need the same volumes as patient food services [referring to cafeteria]. Like I said, on average we prepare 600 trays/meal. But in the cafeteria, you could introduce a vegetable program there that would probably do very well. In the past, I have overseen retail operations and I know that the flexibility and adaptability is much better in the retail side than it is on the patient side. There are much fewer restrictions. (Patient Food Services Department)

Environment (long-term)

Environmental issues that could potentially affect plant and crop yield included season, pest control, and pollution/noise. Given the weather conditions in Ottawa, the growing season is limited and fresh produce grown on site would not be available year-round without a major investment (e.g., greenhouse). Furthermore, there is no guarantee that the garden will yield a good harvest, even in optimal weather conditions. The problem of minimal crop yield can be further exacerbated by outdoor pests feeding on the crops and by poor growing environments caused by the pollution and noise associated with urban settings. A plan to mitigate loss of plants/crops is required to ensure that sufficient crops can be produced and prepared for meals.

The thing about nature is that you can't guarantee that you are going to get a harvest, or a good harvest for that matter. You're left at the winds of nature. If I was to compare that to now, if there is bad weather in California, my supplier will go look in Mexico or Florida. (Patient Food Services Department)

I think also all the elements that affect a garden like the weather; the little furry animals that come out at night, bugs and all those kinds of things will be a factor. (Department of Health & Wellness)

The amount of road traffic, the amount of construction noise, dirt and debris might make it not particularly friendly to plants, depending on where the garden is situated. So that is a consideration. Because we have a lot of asphalt surfaces, we have a lot of car traffic. The General Hospital can get 80,000 vehicles in a day. (Facilities Department)

Patient safety (short- and long-term)

All departments voiced critical considerations regarding patient safety. All aspects of preventable harm need to be minimized. When contemplating a therapeutic garden (short-term goal), mobility safety (e.g. paved walkways free of tripping hazards) was often cited as a primary concern, given that many patients are confined to a wheelchair or accompanied by intravenous (IV) poles. An occupational therapist mentioned additional factors that need to be considered for patient safety.

Is supervision by another staff member or health care provider required for the patient to safely use gardening tools and/or navigate the garden? Is the patient able to use regular gardening tools safely (especially sharp tools) or do the tools need to be modified/adapted (e.g., larger handles)? Does the lack of strength, range of motion, and endurance impact the person's ability to participate [in gardening activities] safely? Does the patient present with behavioural or psychosocial issues (e.g., anger, outbursts, frustration), which may make it difficult to work in a team setting or in the presence of other [garden users]? (Personal communication, March 24, 2017)

The Department of Safety and Security also made a point of highlighting potential risks associated with allergies (e.g. anaphylactic shock caused by a bee sting) or environment-induced reactions. Although this risk is relatively low, a plan of action needs to be established to appropriately manage these types of circumstances should they occur in the garden, to ensure patient safety and to avoid liabilities. Given the immunocompromised clientele of hospitals, there are also issues associated with the tracking of dirt and foreign bodies into the hospital

vicinity. Hygiene and sanitation practices for garden users (patients, employees, etc.) would have to be integrated into the program to ensure routine compliance.

A lot of our patients are very vulnerable to aspergillus, which comes from outside and working with soil, but [this] wouldn't be a problem for people who are not immunocompromised. And so we are very careful in many areas of the hospital not to bring in palettes of boxes from outside because they carry mould. How would we keep it from being [tracked in] from patients who are in the garden to then [bring it] into their wards or floors? (Facilities Department)

When reflecting on the long-term goal of using the garden for food production purposes, additional patient safety concerns regarding food contamination were raised. In addition to the implementation of sanitation and food handling practices, specific attention should also be given to the choice of produce grown in the garden, as certain crops are considered to be higher-risk than others.

There are risks associated with using food grown from a garden. So obviously, you wouldn't want to have any contaminants in the food. The garden vegetables would need to be washed properly. What kinds of vegetables are they growing? Bean sprouts? Bean sprouts can be a high-risk vegetable, in terms of different contaminants. If you guys remember, a few years ago in Europe, they had a huge problem with bean sprouts. (Patient Food Services)

Adherence to food related policies did not seem to threaten the idea of producing food on-site. Departments consistently stated that there were food-related policies that would need to be considered. However, they did not seem to believe that these policies would compromise the project or be difficult to attend to.

Certainly, we would have to meet standards, but there is no shortage of experts that could make sure we meet those standards. I don't see that as a barrier, so much as us understanding them well. We don't understand them well right now because we don't have to. Everything we buy is already approved. However, I am confident that we could get the right expert on board to say, "Yes, this is what we need to do." (Department of Food & Logistics)

Space constraints

The most prominent obstacle expressed by multiple departments was the lack of space available to accommodate a garden. Although there seems to be more green space available at certain campuses than others, it is difficult to secure space, given it is at a premium.

It is still an issue, but there is more available space [at the General] because the General is actually a campus of multiple facilities (CHEO, TOH, University of Ottawa and community organizations groups that run the Ronald McDonald house). There are multiple users of that type, so although there is more space, it is shared. (Facilities Department)

I would say we have two risks to this project. The first is physical space. Everyone wants that space. The space that I have in my head, where we could run some gardens, is right now a space where our staff wander, talk and spend their time. So there are going to be conflicting values. (Department of Food & Logistics)

Garden design

The various TOH departments had diverse ideas about garden design, but there were many commonalities in how they imagined it. A number of departments suggested situating the garden in an area that is easily visible from many areas around the hospital, to spark interest and engagement. The Patient Advocacy Department also proposed locating the garden in an area where patients would not have to cross busy streets, to ensure safety. With a few exceptions, the majority of TOH staff members visualized the design as a typical backyard garden, beginning with raised gardens beds. Accessibility in design was a topic commonly discussed across the various departments, since the garden needs to be tailored to the specific needs and capabilities of particular user groups (e.g. able to accommodate wheelchairs, IV pumps, the visually impaired, etc.).

The features of the garden should take into consideration the diverse range of abilities and medical issues that patients may present with. The following are some

features that I [Occupational Therapist] would consider: Grab bars/railings for support, raised beds, wide walk ways [and] ramps, modified gardening tools (e.g., larger handles, hand straps, weighted or lighter tools), a design that promotes energy conservation and proper positioning [of patients conducting gardening activities] (e.g., reduces excessive bending/squatting; chairs/benches to rest, etc). (Personal communication, March 24, 2017)

When focusing on the long-term goal of using the garden for food production, the idea of growing the crops organically was contemplated by many TOH staff members. If the decision is made to grow the produce in this manner, certain considerations will need to be taken in account. For example, as iterated in the quote below, when using an organic approach to grow food, the plants need to be spread out at a greater distance to avoid contamination.

We've been able to increase our yield by putting plants closer and closer together. The challenge is, as they get closer together, there's increased risk of disease, weeds, and other organic materials consuming the nutrients in the soil. So you have pesticides and insecticides, right? You need modern, chemical science to beat back these things so you can get the yield improvements. So without chemicals, your plants are typically a little further apart. (Healthcare Food Services)

The final consideration to take into account when developing a design plan for the garden (for both therapeutic and food production purposes) is collaboration with the Facilities Department at TOH. The Facilities Department is well versed in attending to building/property code regulations stipulated by various levels of the government. Their involvement in the initial design planning will be necessary to ensure feasibility.

And because it is an institution, you need to meet certain rules and regulations stipulated by both municipal, provincial, and federal jurisdictions that would guide what you could possibly do internally and externally. And we would provide that guidance or we would do that design, if you request, to provide an estimate. (Facilities Department)

Measuring the effectiveness of the garden

To determine whether the garden was effective in achieving its short-term and long-term goals, the TOH staff shared many similar thoughts. To measure the effectiveness of the therapeutic garden in addressing occupational therapy goals and patient satisfaction, multiple departments suggested relying on patient feedback (either informally through conversation or formally through surveys) and patient outcomes. As recommended by the Department of Safety and Security, subsequent evaluations could include research studies examining specific patient outcomes following use of the garden for treatment, provided they can secure expertise and resources. The Occupational Health and Wellness Department stated that if the garden were used for staff occupational therapy (for those who have been injured on the job), they would measure effectiveness by looking at sick time, return to work, and recurrence of injury data (information that is already collected at the hospital).

The focus of the questions would be around patients' well-being. Maybe there is a more complex study around their recovery time, their state of mental presence, blood pressure, or even their mobility. You mentioned occupational therapy...is their treatment time lower? Are they able to get to their maximum functionality more quickly or maybe even more efficiently? (Department of Security & Safety)

Evaluating the effectiveness of the food production aspect of the garden (the long-term goal) was quite simple. The use of crops in cafeteria meals, advertisements marketing the use patient-grown food, and maintained or reduced costs were all considered to be features of a successful garden.

What I'm looking for, for KPI [Key Performance Indicator], is just having the ability to collect/produce food, and sell it to maintain or reduce my costs in the cafeteria. That would be a benefit to us. I'm not looking to make money, I don't want to take the world by fire, but I would like to at least maintain where I am and get some clinical benefit on the side. (Department of Food & Logistics)

I would like to see patients out there doing work in the gardens, staff walking around in them, and us collecting fresh tomatoes and using them in our salads in the cafeteria. I see it all being tied together and it saying, “brought to you by our patients.” I can see the marketing campaign for our cafeteria. Selling things that have been produced by our patients. (Department of Food & Logistics)

Ensuring sustainability of the garden

Securing appropriate management of the garden was most commonly cited as being essential for long-term sustainability and success. Since there is currently no department with the time or expertise to fully manage the garden, multiple TOH staff members suggested enlisting the help of a local farmer who could actively participate in and oversee garden operations. Volunteers were also deemed necessary to help carry out daily garden duties and minimize operational costs. Lastly, several departments suggested utilizing champions to help advocate for the garden and its uses. One department was concerned about front-line clinicians appreciating the value of the garden and accepting the extra work involved with its use. Therefore, it may be of value to enlist the help of a champion within the clinical sector.

“Which one of us is going to have a farmer on our team?” That is a job classification we don’t have at the Ottawa Hospital yet, but certainly could. We are going to need to build this in our future plans to make sure it becomes part of an overall strategy to help us keep it going. We are going to need some experts to help us do it right. Sustainability will be part of the original design. (Department of Food & Logistics)

I think there would be local farmers out there who would love to participate in this and help get this off the ground. Maybe even they could be the ones ensuring sustainability, because they bring a certain expertise to the table. (Patient Food Services)

So you may need to find a way to have non-union labour do the harvesting. You know, a volunteer, or find some way to be able to do that, otherwise, you’re going to find that’s a bloody expensive tomato that you’re growing at your back door. (Healthcare Food Services)

I think there are a lot of gardeners out there...so something that might be good to do is to reach out to the staff to get some champions that would be interested in being a part of the project. (Department of Health & Wellness)

Additional considerations to ensure sustainability of the garden also included the appropriate choice of crops. The CEO of Healthcare Food Services stated that there would be a stronger business case for growing tomatoes, lettuce, and other salad ingredients as opposed to commercial crops like corn. Again, should the hospital-grown produce be used in the cafeteria, consultation with the cafeteria manager would be necessary to confirm the appropriate choice of crops for that setting.

I think they're looking at something fresh for salads...tomatoes, lettuce...that sort of stuff. I don't think it would make sense to do what are called the more commercial crops, like corn. Corn is grown by the millions of acres, it's automated, it's cheap, it travels well, so I think they're more talking fresh produce going into a salad or something like that. (Healthcare Food Services)

GROUP 2: Model Institutions

Description and uses of the institutional gardens

Several institutional models were examined to serve as examples from which TOH can draw inspiration. These models were all food-producing gardens or farms and had a wide range of design features. An outline of the five institutional models is included below.

Eskenazi Health in Indianapolis, Indiana operates a 5,000 square foot rooftop garden at the Sidney & Lois Eskenazi Hospital that is seven stories above ground. The garden is visible from the windows of the inpatient ward of the hospital. The majority of the produce is used in “food and nutrition classes that are run by [an] on-location dietician, typically with patients that are diabetic or pre-diabetic” (Eskenazi Health). Some produce is also used in the hospital

cafeteria. The garden is open 24/7 to patients and visitors and includes seating space. Nurses often bring patients to visit the garden in mobile beds, and physical therapists and nurses can bring patients to do their therapy outside if they so wish. The garden runs tours for school and garden groups. The garden is also used as an event space for groups such as IndyHub (a young professionals group), the public library, schools, and in-house meetings. The garden is maintained by a farmer as well as volunteers and an intern when available.

The gardens at the University of Vermont Health Network are part of the network's "commitment to educating and supporting its community as a non-profit" (University of Vermont Health Network). The network operates a 1,100 square foot rooftop garden one-and-a-half stories above ground atop the Radiation/Oncology ward of the University of Vermont Medical Center in Burlington. The network also operates an 8,000 square foot garden at the Fanny Allen campus in Colchester. This garden comprises a learning garden for education programs, a cutting garden to grow flowers for sale benefitting the local food bank, a garden which grows food to support the local food bank, and a community garden which is used by previous participants from the garden education program.

The rooftop garden is visited by patients, visitors, and staff. The garden contains seating for approximately sixteen people, and hospital staff often eat lunch at the garden in a pergola-shaded dining area. The produce grown in this garden is used to supply an on-site cafe called the 'Garden Atrium.' For two hours per week, the garden space is used by patients with Cystic Fibrosis, who come and participate in garden activity. This patient population is unique in that:

After a week or so after being in the hospital, their health improves to a point where they can go outside and they can be exposed to soil... although they still have another couple weeks to be [at the hospital]. (University of Vermont Health Network)

Although there are many activities offered for pediatric Cystic Fibrosis patients, there are fewer planned activities for adults in this patient population. Thus, the garden provides an additional activity option for this patient group.

The garden is maintained by a part-time garden coordinator and two volunteers who are also employees of the hospital. The time commitment for the garden coordinator is approximately 20 hours per week and for each of the volunteers the commitment is 3 hours per week.

The Henry Ford West Bloomfield Hospital in West Bloomfield, Michigan operates a 1,500 square foot hydroponic greenhouse with an attached education centre. The hydroponic greenhouse uses the Nutrient Film Technique (where nutrients are dissolved in a stream of water rather than soil), plant towers to grow herbs, and Dutch Buckets for “long-term crops such as tomatoes” (Henry Ford West Bloomfield Hospital). Where soil is required, perlite and coconut coir are used as a substitute.

The greenhouse is within view of approximately half of all patient rooms. The primary focus of the greenhouse is “education and outreach to people of all ages around [the] community and to educate in preventative healthcare” (Henry Ford West Bloomfield Hospital). The garden is part of a larger movement at the hospital to serve healthy food, and Henry Ford is known for “local, delicious food,” prepared “from whole produce” (Henry Ford West Bloomfield Hospital). Thus, the purpose of the greenhouse is outreach and public relations, to show a commitment to health, rather than a moneymaking venture. The garden itself is not directly profitable, although it is valuable in its success as an outreach and public relations venture. The produce grown in the greenhouse goes to the hospital kitchen and supplements the hospital’s produce market. Plants

such as flowers and lavender are used in the health spa and cafeteria. Herbs are used both in the hospital kitchen and sold through a CSA model with weekly delivery to clients.

The greenhouse allows patients and visitors to tour and talk with the gardener, although visiting the garden space requires secure badge access. Due to distance from Occupational and Physical Therapy rooms, the space is not used for therapy. The educational centre is rented out as an event space, and has been used for in-house meetings, weddings, and birthday parties.

The greenhouse is maintained solely by the resident farmer. Approximately 25% of the farmer's time is spent maintaining the greenhouse, with 75% of time spent on programming. The farmers' market is run by volunteers such as students and seniors.

The garden at St. Joseph Mercy Hospital Ann Arbor is comprised of three hoop houses (passively heated metal structures covered in plastic), an outdoor classroom, and approximately 2 acres of outdoor garden space with a staff community garden and a pollinator garden. One of the hoop houses, created in partnership with the Eisenhower Center, a traumatic brain injury recovery group, is completely handicap accessible. The Eisenhower Center uses this space for therapy three to five days per week (weather-dependent). The space is also used for mindfulness and meditation programs for staff and patients.

Part of the mission of the garden is to “create advocates for change at a personal and community health level” (St. Joseph Mercy Hospital). The garden is symbolic of “the hospital's commitment to shifting the paradigm of healthcare away from sick-care to one of well-care: how do we keep people healthier and longer?” (St. Joseph Mercy Hospital). Recognizing that a great deal of illness is preventable through lifestyle, St. Joseph Mercy envisions its garden as “one part of [their] answer” to the challenge of preventable illness (St. Joseph Mercy Hospital). The

hospital seeks to address this challenge by using the garden for education, community engagement, therapy and wellness, and to grow food.

Produce grown in the garden is used in patient meals, at the hospital cafeteria, and at an on-site cafe called 'Joe's Deli.' Produce is also sold through the hospital's farmers' market on Wednesdays in the hospital lobby as well as through the CSA. Produce can also be sold at the coffee shop during peak season. Most of the food is sold directly to consumers through the CSA, which is a collaborative effort "with six other producers... to [ensure] a wide variety of crops" (St. Joseph Mercy Hospital). St. Joseph Mercy also grows alfalfa on approximately 22-23 acres of land in partnership with a farmer.

The garden is maintained by the project manager, volunteers, and interns. In 2016, volunteers contributed 1,700 hours and interns contributed 350 internship hours. The community garden section is maintained by the staff members.

The purpose of the farm at St. Luke's University Health Network in Bethlehem, Pennsylvania "is to get fresh organic produce into the kitchens of the hospitals for patients" (St. Luke's University Health Network). The seven-hospital network operates an eleven-and-a-half acre farm, with seven acres dedicated to production, and four acres dedicated to cover crops for soil revitalization. St. Luke's also operates a 420 square foot greenhouse for seedlings. The farm produces in excess of 100 types of produce, mainly focusing on staple crops, including carrots, broccoli, potatoes, and onions. Produce is used both in patient meals and in the cafeteria, with excess produce sold at farmers' markets at various hospitals in the network, and wholesale to other clients. The farm also regularly donates produce to community organizations. The farm runs school tours and an internship program. The internship program operates with a philosophy

of ‘learning by doing,’ in addition to standard training in areas such as food safety. Each intern works on a farm-related project of their choice.

As a working farm, the space is not open to patients or visitors outside of planned school or group tours. However, there is a fenced-off viewing area with informational signage allowing those curious about the farm to stop and get more information.

The farm is maintained by a farmer, several interns, and a paid assistant manager/labourer. Due to liability concerns, volunteers are not engaged on the farm. Interns work 8:30am-4:30pm Monday to Friday and are paid a stipend and provided with on-site housing.

This section has provided a description of the institutional models, which provides context to the following emerging themes.

Education and engagement

In the interviews with representatives from institutional gardens, education and engagement emerged as a significant focus of most of the institutional gardens. All five models reported having some kind of education program at the garden. Three of five models had an internship program, and four of five models reported guiding school and/or other group tours. The farmer from the garden without dedicated garden tours reported engaging with visitors on a regular basis to answer questions about the garden.

Four out of five models allowed for visitors into the garden itself. The model that did not allow visitors to enter is in fact a working farm with heavy machinery, and thus cannot allow

visitors outside of scheduled tours for safety reasons. This model did, however, have a parking lot with informational signage for those interested in finding out more about the farm.

Research

Only one model reported research activity at their garden, with students from the state university periodically conducting research at the garden. The current project described was a community research project to assess how “community members.... would like to see the farm grow in the future” (St. Joseph’s Mercy Ann Arbor Hospital). One model noted that using the site for research purposes had been discussed in the past but had not come to fruition, while another indicated that although the garden had not been used for research, they would be open to such an opportunity if it presented itself.

Design

The design of the garden was a key consideration identified by all models. As suggested by one model, the design must be tailored to the needs of the user groups. If visitors are allowed at the garden site, then hygiene practices need to be considered. One model emphasized the importance of consulting a farmer early on in the design process to ensure the garden includes the necessary design features and equipment. Communicating with the Facilities Department was also deemed important in the design process.

The majority of the institutional garden models conducted maintenance by hand or with small machinery, with the exception of the large farm at St. Luke’s University Health Network, which used heavy farm machinery. Absence of a heated greenhouse space to start seedlings was

a concern for some gardens. Without a greenhouse, Eskenazi Health started seedlings both indoors with lights and outdoors on the raised beds using a caterpillar system, comprised of hoops covered in plastic and weighted with sandbags. A partnership between St. Joseph Mercy Hospital and the University of Michigan allowed St. Joseph Mercy to use a university space to start their seedlings. Instead of growing seedlings themselves, the University of Vermont Medical Center managed this challenge by purchasing their seedlings from a local organic producer.

Organics

All of the models used organic methods, although none were certified organic at the time of the interview. One of the five models is working towards organic certification while the others cited the cost of certification as prohibitive. One model had been certified organic in the past but discontinued because of cost and the time demands of the process. The resident farmer at Henry Ford West Bloomfield Hospital mentioned that organic certification would allow any produce grown to be sold for a higher value, however, since the produce is only used at the hospital, organic certification does not make a difference. The farmer at Eskenazi Health emphasized that although the garden uses organic methods, when speaking with patients and visitors, they focus on the importance of “eating more vegetables as opposed to eating more organically or using non-GMO[s]” (Eskenazi Health).

Accessibility

Accessibility was an important consideration for all models open to the public. Four of five models were either completely or partially accessible to wheelchairs. One of five models was accessible to mobile beds. Accessibility considerations included some raised beds at

wheelchair height, a smooth surface in the garden navigable by wheelchairs, a ramp, and paths wide enough to accommodate wheelchairs, including allowing for 360 degree turns. Two of the models made reference to the Americans with Disabilities Act (ADA) Standards for Accessible Design and said that they complied with ADA.

Seasonality

Common seasonal considerations included crop selection, using greenhouses or hoop houses during the colder weather to extend growing capabilities, and coordinating with the kitchen to accommodate for the changing produce availability. Models also mentioned that the winter season is when a large part of “planning, hiring, [and] ordering equipment” was done (St. Luke’s University Health Network).

Finances

Initial setup costs were covered by philanthropic funds for two of five models, while another model relied solely on hospital funding. Two of five models were not able to speak specifically about how initial setup costs were covered.

Ongoing costs were partially or fully supported by philanthropic funds for two of five models, while one reported a transition from philanthropic funds to hospital and grant funding after the donation was exhausted. Three of five models reported some or all of the ongoing costs as covered by the hospital itself, including funding from nutrition departments or hospital community benefit funding. Three models either used or were looking to use grants to cover ongoing costs.

Institutional policies and food safety

Good Agricultural Practices (GAP)

Two out of five models have GAP certification and a third model aims to obtain the certification. The model aiming to acquire GAP certification identified GAP as a way to facilitate the use of produce for patient and cafeteria meals.

Legal team

In order to address liability issues, the majority of the models (three of five) identified the legal team at their institution as responsible for liability issues. One model explained that volunteers are required to sign a waiver to address liability problems that may arise. Another model noted that liability issues were limited because most of the garden volunteers were also hospital employees.

Community partnerships

Although most model institutions had some form of collaboration with community members or organizations, most (three of five) did not formally identify them as community partners. Institutions collaborated with a wide range of organizations, including a Parks and Recreation Department that invited people to the garden, local garden networks that provided assistance in the form of volunteers and teaching programs, and a public library that hosted book club meetings at the garden. Other partnerships included providing produce for the local food bank, a community centre, and a soup kitchen, a partnership with a traumatic brain injury recovery group to build a wheelchair accessible hoop house for patients, a university to provide greenhouse space to start seedlings, and with a local farmer who uses 22-23 acres of land to grow

alfalfa (hay). The Project Manager at St. Joseph Mercy Hospital provided the following explanation of this alfalfa production partnership:

[W]e now don't have to mow it and apply chemical fertilizers and herbicides, so we are doing good for the planet...It's also good for our pocket books, it costs less to have it in alfalfa than it does to have it in grass. And then we are supporting a local farmer by providing him with space to grow produce and then sell [it] to local horse farms or other groups that would want hay. (St. Joseph Mercy Hospital)

Another representative from St. Joseph Mercy Hospital provided further detail on the collaboration:

What it means is that the land which we turn over to the farmer to use, and we turn that over free of cost because in essence, what it's doing is it's saving us several thousand dollars a year in maintenance costs. And the other thing it does is that it then allows him to have a land resource to use that otherwise he wouldn't be able to afford to have. So it's a win-win, it's a win for the farmer and it's a win for the hospital. (Personal communication, November, 3, 2017)

Other partnerships included a collaboration with a program that provides free produce to patients who receive a produce "prescription" from doctors, a collaborative CSA with local producers, providing space to a local apiary group, recruiting volunteers from local church groups, and working with a stewardship group to certify the hospital campus as a national wildlife habitat.

When forming partnerships, two models emphasized the importance of identifying existing resources, building on those relationships, and finding people who are excited to be a part of the garden. One of these models worked closely with their Community Health Department to examine existing relationships and strengthen the connections the institution already had in place.

Challenges

The large volume of produce that would be required to supply patient meals was considered to be a challenge by many models. In order to bypass this challenge, one model decided to use most of the produce for an on-site cafe instead of using it in patient meals, since the cafe had fewer clients. Another model decided to focus on using the produce for food and nutrition classes. An additional suggestion included running trials to test the institution's capacity and ability to integrate locally grown produce into meals.

Funding was identified as a common challenge faced by these institutional gardens. To deal with this challenge, many models emphasized the intangible benefits of their project rather than direct financial benefits:

[T]his isn't a money making venture, this is an outreach/public relations venture and in that it is 100% successful. People come to our hospital because they know they are going to get local delicious food in their meals. We don't have fryers or anything like that. All of our food is prepared from whole produce and not from, you know, already diced things in bags. The greenhouse is icing on the cake in that they know our commitment to their health through what we do for them. (Henry Ford West Bloomfield Hospital)

There's so many other benefits.... people are just delighted to come to the garden. In a place that is not always joyful, it provides just a wonderful respite for patients and visitors alike, even if it's just a five minute stroll through the garden, it allows people to access something of beauty. So even above and beyond the educational piece, it's just been a really wonderful addition to our hospital. (University of Vermont Health Network)

One model identified the importance of relating the benefits of an institutional garden to hospital staff to help justify resource allocation and increase acceptance and use. Without such communication, the garden may not be perceived as valuable. Another challenge identified was a lack of communication between garden and kitchen staff. It was particularly important to communicate with food services and the kitchen employees (e.g. head chef) to ensure that what

is grown can be used in the kitchen. A simple solution to ensuring that the grown produce will be used in meals was provided by the resident farmer at Henry Ford West Bloomfield Hospital:

I work directly with the kitchen, the head chef. And when I first started the job, I got a list of all the things I could grow in my hydroponic setups and then a list of all the things that he wanted... or to use in his kitchen. And where those overlapped, that's what I grew.

Models noted that volunteer labour comes with its challenges, including the time demands required to supervise them. One model ensured regular communication with volunteers to provide clear expectations and division of labour. Reliability was also a concern with voluntary labour. One hospital had a farmers' market run mostly by volunteers, however, sometimes it was necessary for the farmer to accommodate for a shortage of volunteers. Interviewees emphasized the importance of maintaining positive relationships with volunteers and staff that help with the garden. One institutional model provides gift cards to the hospital cafe as rewards for garden volunteers. An example of maintaining positive relationships was provided by the resident farmer at Henry Ford West Bloomfield Hospital:

I make requests all the time to different departments to do things for me and keeping good relationships with them is absolutely key to not be put on the bottom of the list when there is something urgent that I need to have done. I grow tomatoes in the summer and I will take some extra tomatoes, maybe three or four harvests of tomatoes a year, and I will give them directly to the department that supports me. Or maybe during market season, security staff which helps me with my signage putting it on the road and all of this.... I will give them honey a couple of times a year.

Sustainability

Interviewees emphasized the importance of having staff members who champion the garden cause. Two of the models mentioned the importance of support from the CEO, which

helped the institutional garden become a reality and remain a priority. General organizational agreement was also mentioned as an important factor contributing to the success of an institutional garden. As the farmer at Eskenazi Health described:

If I didn't have cooperation from the people in the hospital, or just their excitement and want of programs, I don't think that this would be a success. It's not that hard to grow food, it's not that hard to make a space look very nice, it is very difficult to run programs and get people excited about coming. Even getting the attendance to a point where you can show that this is worth the effort and money that we put in. So those two people have been quite amazing, and I didn't know that I would need them, but I really honestly don't think that it would be a success without them [referring to two project champions: one food service staff member and a dietitian].

Another model emphasized the importance of volunteer help in the farmers' market, noting that "without the volunteers we wouldn't be able to run the market" (Henry Ford West Bloomfield Hospital). A third model also spoke about the value of volunteers:

Yeah, probably the volunteer support is one thing I couldn't really do without. Those 6 hours per week that I'm getting from the two volunteers that we have are really pretty crucial. So I would say we would struggle with running the program if we didn't have some of that volunteer support. (University of Vermont Health Network)

The importance of having one person who is fully committed to the garden in order to ensure sustainability was also mentioned by another model. Community outreach and education programs in the institutional gardens were made possible through the work of a department (e.g. Community Health) or a resident farmer with the time and commitment to organizing these programs.

GROUP 3: Potential Stakeholders

Overall Attitudes

Therapeutic gardens

Potential stakeholders were enthusiastic regarding therapeutic gardens and voiced interest in this aspect of the project. Their optimistic opinions on this component of the project stem from the fact that they have realistic experience and expertise with therapeutic gardens, specifically in healthcare institutions. The potential stakeholders agreed that therapeutic gardens have a high value for a range of patient groups, staff and visitors, even if they are not taking part actively in the therapeutic process (planting, weeding, etc.).

The therapeutic garden has been as significant for friends, family, visitors to the hospital [and] staff [as it has been for patients.] (Just Food)

The other side is the therapeutic side.... That kind of rewarding relationship between people and nature, it has a huge impact and this could be applied to people who have physiological ailments to overcome... or it could be emotional and psychological therapy... (The Growing Connection)

The Canadian Horticultural Therapy Association (CHTA) representative fondly described her horticultural therapy gardening experience with elderly patients in long-term care facilities. She described how she tailored her therapy program around the elderly population's needs and the weather. In warmer weather, her clients conduct planting of seeds or seedlings with ergonomically correct tools and supplies from Lee Valley in raised garden beds. She described the tools which she uses as being lighter and smaller (plastic) and having curved handles in order to pick them up easily. She also said that the tools, for example, “might have a strap to put on [the patient’s] hand/wrist if they had a stroke and they can’t hold it tight.” In the winter time, her programs focus on pressing flowers to make bookmarks, drying out old flowers, and making

dried arrangements. She noted that even though some elderly patients can't physically participate in gardening activities, they still enjoyed coming to the therapeutic gardens to socialize. She explained that therapeutic gardens are conducive to social support, inclusivity and empowerment.

[Therapeutic garden sites are] very social... Many of the residents who I bring in [to] use the on-site therapeutic garden are not able to do anything. They are physically unable to lift their hands or participate in any way except the social aspects, and their lives have really been enriched by the [horticultural therapy] program...Some people are not able to do things [horticultural activities], and I will tell them "I want you to be in my program and you don't have to participate, you don't have to garden. I want you to come and sit' and the social aspect is a very big part of it. 'Share your experience, come sit with me. (CHTA)

Overall, all the interviewees who would consider being potential stakeholders in this project expressed positive attitudes towards therapeutic gardens.

Food production

The potential stakeholders found the idea of a healthcare facility, specifically TOH, having food production capabilities intriguing. Potential stakeholders believed that there are benefits to having food production on-site, such as being environmentally, nutritionally, and socially responsible. The Ottawa Horticultural Society (OHS) representative candidly said that hospitals having food production capabilities is very beneficial. The founder of The Growing Connection remarked that implementing on-site food production would heighten the interest that patients and clients have in the food that is served to them. He believed that freshly grown produce is the "absolute freshest, most tasty, and most nutritious" food. Just Food's representative has years of experience growing and incorporating food into healthcare facilities food services and shares the same sentiment as The Growing Connection's founder. Just Food's

representative noted that there are multiple benefits for hospitals growing food such as good public relations. From his experience, the incorporation of fresh produce at hospitals was well received by patients and staff. He emphasized that the hospital staff will greatly benefit from such an endeavour. Moreover, he specified that kitchen staff were excited about the potential to use fresh food, which they typically don't deal with, in meal preparation.

Patients and staff love the idea of food grown on-site. It's something that you don't see anymore. So there are definitely benefits because it gets people talking about what fresh food can do.... It is the conversations that [fresh produce] starts that are as important as the actual food. (Just Food)

The staff is there year in, year out. So who is going to benefit more from something like changing what we do with our food on-site? It's going to be more the staff that benefits than patients, because patients are gone after a couple of months. The staff is there all the time. If you are feeding crappy food on-site, it's going to be your staff that pays the price. They are the ones that come in and go to the cafeteria to grab something to eat every shift. (Just Food)

Potential stakeholders felt that initiating a food production garden at TOH was an innovative idea. The stakeholders understand that TOH may be concerned about possible unknowns, such as crop failure, crop/food safety, food policies and managing the food production site. The interviewed stakeholders offered their expertise and advice on this subject matter. One potential stakeholder, a horticultural educator, emphasized the importance of TOH understanding the logistical considerations associated with this new venture. He mentioned that:

Producing food is a very different type of thing; it involves a lot more ongoing maintenance, involves a question of preparing food, you have to get into health and safety and hygiene. Certainly there is much more of a movement in this day and age to using local products and growing your own food... If you are planting a garden for food production, you are getting into very different considerations. (Horticultural Educator)

Just Food's representative stated that it can sometimes be difficult for a healthcare facility to serve produce grown on-site due to hospital and food service regulations. Just Food and The Growing Connection's representatives advised that the hospital be realistic about the quantity and volume of food produced at a food production site. Moreover, they and other potential stakeholders agreed that the hospital should not internally take on planning, implementing, and maintaining food production by themselves. Just Food noted that barriers (such as those mentioned above) can be overcome by:

...bringing in someone who can grow the food and then [the hospital] can partake in [growing food by] bring[ing] in [hospital] patients or staff... but at least [the hospital] will have someone out there who will be growing food and keeping everything working, the way it needs to work. Then [the hospital] will have food anytime [they] want. (Just Food)

When the possibility of TOH transitioning from a therapy-based garden to a food production site was proposed, potential stakeholders hypothesized that setting out clear objectives in advance may allow for a smooth transition to incorporating food production into the therapeutic gardens.

Contribution type

The types of contributions suggested by potential stakeholders include volunteers, labour, product, expertise, and conducting research.

Volunteers

Two potential stakeholders have the ability to offer volunteers for the therapeutic garden. The OHS is a volunteer-based group that organizes garden-centred activities, development and design. They have no staff or permanent workers. All the work is carried out on a volunteer basis

by dedicated and experienced individuals. The OHS has the ability to contribute volunteer services to TOH in the capacity of garden design, planning, preparation, sourcing, planting and storing plant material. The OHS representative mentioned that their business model is geared towards starting or rejuvenating a garden and then putting the onus back on the main organization for ongoing maintenance and upkeep. The OHS has limited resources due to the volunteer nature of their organization.

We have many members who have lots of experience in different elements and aspects of garden and horticulture and I think that we have people who will be interested to share their knowledge and expertise.

Even if we don't end up ...[partnering]... with The Ottawa Hospital, it is possible that some of our members may be interested in getting involved and we can certainly put The Ottawa Hospital and whoever is in charge of this project in touch with some people with expertise.

The demographic of dedicated OHS volunteers tend to be an older population. From the OHS member's experience, the younger population seemed to be more involved in community gardening, organic seed growing, and heirloom seeds.

Most of the dedicated people [volunteers] tend to be people who know what they are getting into. They're often people who like gardening or like to get outside, they maybe people who live in apartments and don't have a garden of their own but want to do some gardening. These are people who are willing tend to stick around for the long term. (OHS)

The other potential stakeholder who has the ability to contribute volunteers is the horticultural educator we interviewed. The educator has a cohort of students every year that must volunteer for 40 hours over a summer period in order to fulfill part of their curriculum. The students are educated and well-versed in therapeutic garden design, maintenance, and urban and

organic farming. He has heard from previous students in his program that volunteering for initiatives, such as community gardens, is often rewarding and a great opportunity to exercise their skill set. He feels that his students would enjoy and be best suited to involvement with the therapeutic garden aspect of the project rather than food production. The educator noted that the students are not experts, but can volunteer their educated labour.

I'm pretty sure that our students would be happy to participate in a large portion and some of them would choose to do so. That means that you would have, let's say, free educated labour for the hours for each student that you are able to attract to a program like that. (Horticultural educator)

Volunteering starts in their third semester which means that they are halfway through their program. They would have a little understanding in urban agriculture and vegetable production in an urban setting. They would know a little about organic growing and they would have some design planning kind of expertise... They would be very good at [maintaining] crops, installing crops [and] taking care of crops. (Horticultural educator)

Labour and expertise

A few potential collaborators mentioned that they have the resources and ability to contribute labour and expertise to the therapeutic garden aspect of the project. The horticultural educator noted that students have a paid co-op term over the summer. The CHTA representative, a horticultural therapist, mentioned that she has ability to come to Ottawa and give design recommendations to the TOH during their planning phase. She also stated that she would be interested in conducting research on the garden once it is established.

Another potential stakeholder, Just Food, has the ability to contribute to the food production aspect of the project. This organization trains farmers to learn how to grow a significant amount of produce using intensive growing techniques in a confined space. However,

these skilled farmers do not have the land to grow food or utilize their expertise. This organization has the ability to contribute highly-skilled farmers to effectively and efficiently run a healthcare food production site. Just Food has been actively trying to gain access to land in order to offer possibilities for new and young farmers. Just Food aims to:

...marry together new and young farmers who [have] the skills, with institutions that [have] land but [don't] have the capacity or knowledge to grow food on their own land. (Just Food)

Products and services

The potential stakeholder of Just Food also spearheads the program Savour Ottawa, which has the ability to brand food that is grown locally. This program can aid TOH in selling produce in farmers' markets.

Savour Ottawa also tries to strengthen the connections so that farmers have another outlet for their sales. Rather than just selling direct to consumers, they are able to expand their direction to restaurants or to small natural fresh stores that use locally produced foods. (Just Food)

The Growing Connection is a business venture that can contribute a container-based growing system. The Growing Connection's founder invented a unique product that allows the growth of fresh food anywhere. The containers are easily moveable and can fit into non-traditional spaces. The Growing Connection's container system has been used in healthcare facilities and institutions that are oriented toward therapy rather than food production. The founder stated:

We can make contributions in terms of product, but in the small scale, because we are a tiny company—we can't make huge donations. We can certainly make contributions in terms of using our experience in the design, installation, the training elements of new gardens. (The Growing Connection)

He described how his company could help design, configure, install and adapt his product to the goals and physical space of TOH. He also mentioned that he can train the volunteers or staff who are going to be responsible for the container-based therapeutic garden. He reiterated that the system is incredibly easy to move around.

If you are doing some container mode and you find out that there are some facility-oriented objections to things then you just move it. (The Growing Connection)

One of the reasons why we use these containers: you can move it up, you can move it down, you can have it at different heights, you can make it dead easy for people, and I am a great believer in making things easy for people. (The Growing Connection)

We thought that a hurricane would hit the next day, we just picked it up [container system] from the garden and we moved it. Leave it indoors for 36 hours then bring it back outside. It gives you an incredible flexibility to avoid the issues. (The Growing Connection)

Forming a fruitful partnership

Expectations and responsibilities

In forming a fruitful partnership, most potential stakeholders indicated that as more progress was made in implementing the project, providing them with a clearer idea of their expectations and responsibilities would allow them to better assess their work and resource capacities. For example, one possible stakeholder wanted to know which TOH campus would house the gardens:

But there would be a lot of discussion involved in terms of the expectations, the requirements, the time commitments, time availability and everything else...If the civic campus is moving, if I understand it, sometime over the next 20 years, I would certainly question whether it would be worthwhile putting a garden in the civic campus if the hospital is planning to move across Carling Avenue. (OHS)

Potential stakeholders also highlighted volunteer contribution as a means of reducing the cost of initiating and maintaining the gardens. Further, they suggested that as the project moved forward, more discussion would be needed on TOH's desired extent of volunteer services. As one noted:

I mean there are lots of professionals in this city who are available and willing to set up gardens. That of course costs money...I am not sure whether they're [TOH] interested in putting money into this kind of project or do it through volunteers so that's the sort of thing that needs to be discussed. (OHS)

Overall, in addition to information provided in the interviews, a greater level of discussion with TOH would offer an opportunity for potential stakeholders to obtain more details on their expectations and extent of contribution.

Meaningful contributions

Potential stakeholders expressed interest in getting involved with the project when they could contribute in a meaningful capacity. Some potential stakeholders stated that they typically work with smaller organizations with fewer resources like nonprofits and community groups. Therefore, partnering with TOH would require greater resources on their behalf, which may allow them to strengthen their work portfolio.

Potential stakeholders briefly spoke about possible constraints. The horticultural educator remarked that partnering with TOH could create external project opportunities for students. However, the school's program structure and time constraints for faculty members could make it difficult for students to be adequately supervised when undertaking such projects. The Growing Connection's representative, based in Southern Ontario, stated that living outside Ottawa posed a possible constraint. Regardless, the representative remained committed to contributing to the project so long it fit the organization's "physical abilities and our business plans."

These findings demonstrate important considerations for TOH in building successful partnerships across the board with stakeholders and that the organizations, in return, feel equally satisfied with their contribution.

Design

Features

Multiple potential stakeholders had extensive experience with gardens in healthcare facilities, which led to valuable discussions about the necessary design features. Just Food, OHS, and CHTA representatives advised that particular attention be paid to where the garden is situated. All potential stakeholders agreed that the gardens should be close to patient quarters at the hospital with unrestricted access. The OHS representative thoughtfully remarked that it is important for the garden to be visible from the inside of the hospital, as not all patients are able to leave their rooms. The horticultural educator, the CHTA horticultural therapist, and the Just Food representative candidly recommended that the garden be accessible to all types of patients, including those with walking aids and IVs. The OHS and Just Food representative proposed wide, barrier-free paths and walkways so that wheelchairs or walkers can easily maneuver through the garden.

All potential stakeholders suggested that therapeutic gardens include raised beds so that individuals with wheelchairs and walkers can work with plants and carry out gardening activities. The CHTA horticultural therapist expanded on her firsthand knowledge of raised beds, describing those in her garden as large wooden structures with protrusions that allow patients to

sit while gardening or for visitors and staff to sit. She also mentioned that the raised beds have an installed self-watering, timer-based sprinkler system, since watering the garden can be a hassle.

I love [my] raised beds, and the wheelchairs can go right into the raised beds. And each person has their own... raised bed so that the wheelchair can sit smoothly underneath and that they can do everything independently and with minimal help, and the patients can help plan with all those things going on [gardening activities].

Design features also extend to planting material. The horticultural therapist and Just Food Associate Director seemed to agree that gardens need different textures, colours, and smells that appeal to all the senses. They mention that a sensory-engaging raised garden bed containing herbs may be good way to engage all five senses. The Growing Connection's representative also agreed with the importance of appealing to the senses, but he added that simplicity is important as well.

The projects that seem to have lasting success tends to be those who focus on simplicity. Keep things simple. There are many complex systems that can be used: aquaponics, hydroponics, tower gardens, all kinds of things. But keep it simple. Keep it simple! (The Growing Connection)

Maintenance

The upkeep of a therapeutic garden is just as important as the physical features. Potential stakeholders spoke to the fact that there needs to be a constant overseer or manager of the facility, whether it is the therapeutic garden or the food production site. The Growing Connection's representative stated that a garden coordinator or 'green team' is necessary in the oversight, cleanliness, maintenance and management of the therapeutic garden facility.

Facilities people [management] have to buy into the process that you are undertaking 'cause if they don't see it... that is a threat to them. [For example] "Who's gonna clean up after this? What if water spills?, What if it smells? Or if there's leaves around, who is gonna sweep it up?" (The Growing Connection)

If you put in a big raised bed in the garden...and then you find out that it is leaking something and it is affecting the concrete [who takes care of it?] (The Growing Connection)

The Just Food representative spoke about maintenance from a food-production perspective.

There...always [needs to be] someone there getting the food and taking care of all the steps along the way such as planting at the right times, weeding, watering, harvesting the food at the appropriate times. If there isn't someone dedicated to it [maintenance of food production], it will be someone else doing it [only] when they have time. (Just Food)

Management

Stakeholders spoke about management in terms of the day-to-day operations of the garden and the relationship between current hospital staff and future employees and volunteers.

Incentives

One piece of advice regarding management was to use incentives as a means of employee recognition and motivation. As one stakeholder described:

So, one portion that we can never overestimate—we always have to be aware of—is the ability to provide incentives to those who are responsible for the gardens. (The Growing Connection)

The same potential stakeholder explained that these incentives need not be material or monetary. Interestingly, the incentives were not reserved only for those working at the garden. The existence of a garden could on its own serve as an incentive. Explaining how incentives could work for patients and hospital administrators:

The incentives can be defined for a gardening project in a number of ways. One, if you have a patient who needs to be up and moving, needs to be getting some fresh air, needs to be moving around, then maybe the incentive is to have a reason to get

up and go outside—and [more quickly]. (The Growing Connection)

The incentive for a hospital administrator might be the ability to say to his donor community and to the taxpayers that “our facility is now greener than it was before and our food service program includes the freshest possible ingredients that are grown on-site.” (The Growing Connection)

These insightful responses highlight a salient point; the garden project was imagined with different groups in mind such as funders, staff, potential workers, hospital administrators, and patients. Each group has some degree of interest in the project and thus, would be motivated to perform their role when there is an aspect involving incentives. Incentives can help promote optimal use and management of the garden.

Relationships

The relationship between management and workers was another important driver for smooth garden operations. Potential stakeholders regarded this relationship as the foundation upon which all other things, including the success of the garden, were built.

It’s critical. We’ve found in every single one of the projects that we’ve either studied or been involved in starting, the relationships with the folks at the hospital, or whatever institution... are critical to the success of the program. (Just Food)

A good working relationship was also important for the garden workers, especially in situations when they needed a staff to help ‘champion’ an issue to high level hospital administrators. As described by one potential stakeholder:

If you do not have a strong relationship with them, then it is much more difficult to get them to take things on board or to advocate on your behalf/benefit of the garden. If they’re sort of an ally, but you have not really built a strong connection, they can listen to you and be supportive, but when they turn around and advocate with administrators at their institution, they are not necessarily going to have the passion or the knowledge that they might have gained if you would have built a strong relationship. (Just Food)

Unsurprisingly, most potential stakeholders agreed that the short-term goal of establishing a therapeutic garden required simpler logistics than the long-term goal of food production, which would require a more intensive approach to execute and manage. Regarding the degree of oversight an institution should have, one stakeholder advised that an external staff member be brought in to manage the garden.

When the institution tries to keep control of the food production, it is far, far less successful. I always advocate that what you need to be doing is bringing in someone who can grow the food and then you can partake in that... Then you will have food anytime you want and you can purchase it from them or build that relationship however you want. When the hospital or healthcare facility tries to take on food production itself, it usually falls apart because you need a whole bunch of people to do that (Just Food)

Overall, the management of garden was most likely to succeed when strong connections were developed between workers and management staff and when someone was recruited—and could dedicate enough time—primarily to oversee the food production aspect.

Potential stakeholders also discussed volunteer management. In any organization, volunteer turnover can pose a problem. However, stakeholders felt that this could be addressed by ensuring workers have a clear understanding of their responsibilities. Potential stakeholders emphasized the importance of this human side of management.

I guess the lesson that we've learned is that the human side is harder than horticulture...that can be a fairly intangible thing that is absolutely vital...otherwise, like a chain some of the links will rust away and the chain won't work anymore. (The Growing Connection).

Discussion

The aim of this study was to develop a model to support the short- and long-term goals of TOH to develop a therapeutic garden and a garden for food production. To develop this model,

opportunities and challenges associated with constructing and maintaining institutional gardens and engaging with potential community partners were examined. The findings highlight three overarching themes emphasized by all three participant groups. Finance, design, and sustainability are all considered to be critical for the development of successful institutional gardens. TOH should thoroughly consider these factors throughout the planning and implementation of the project.

Finance

Over the last twenty-five years, the scientific and design communities have documented the advantages and benefits of institutional gardens for therapeutic and food production purposes in healthcare facilities (Terrapin Bright Green, 2014). Study participants from TOH noted the importance of planning for any associated setup, maintenance, long-term, recurring and unexpected costs. The representatives from institutional models expressed that despite the associated expenses, the value generated from institutional gardens extends beyond standard financial gain. Institutional model representatives emphasized that therapeutic gardens and food production sites have extensive intangible and social benefits. Even though many therapeutic gardens and food production sites are not directly profitable, the return on investment comes from better hospital rankings, happier and healthier staff, elevated moods of patients, staff, and visitors, and faster patient recovery (Cooper-Marcus & Barnes, 1999; Ulrich, Zimring, Quan, Joseph, & Choudhary, 2004; Cooper-Marcus & Sachs, 2014). These benefits translate into overall financial value and are in alignment with TOH's vision, mission and core values

(Cooper-Marcus & Sachs, 2014; Terrapin Bright Green, 2014; Souter-Brown, 2015; TOH, 2017).

Numerous studies have found that even a small institutional garden has the potential to improve medical outcomes while reducing costs associated with patient care and staffing (Malkin, 2003; Ulrich et al., 2004; Terrapin Bright Green, 2014; Cooper-Marcus & Sachs, 2014; Souter-Brown, 2015; Mount et al., 2016). These outcomes can help contribute to better hospital rankings (Terrapin Bright Green, 2014; Cooper-Marcus & Sachs, 2014). As detailed in the literature review, the positive influence that views of nature have on patient recovery time, medication quantity and complications yields a significant reduction in costs for the hospital as well as the patients, through a decrease in average length of stay per diem (Ulrich, 1984; Taheri, Butz & Greenfield, 2000; Malkin, 2003).

The psychological benefits for staff and patients associated with the incorporation of institutional gardens in healthcare facilities also have economic benefits (Malkin, 2003; Benedetti, Colombo, Barbini, Campori, & Smeraldi, 2001; Terrapin Bright Green, 2014). The literature shows that institutional gardens in healthcare provide positive distractions and evoke pleasurable memories for patients, which results in better mental health and well-being. This in turn leads to a reduction in the need for medication (Malkin, 2003). These positive effects benefit the patients' financial and mental well-being and also result in lower operational costs over the hospital's lifespan (Terrapin Bright Green, 2014). These outcomes can also result in the patient promoting the hospital, free of charge, by creating an advocate in the community.

According to TOH staff, they and others would enjoy and benefit from a therapeutic garden. Institutional model representatives mentioned that staff enjoy using the gardens. The

literature also demonstrates that implementing institutional gardens is beneficial to staff. As mentioned previously, horticultural and therapeutic garden studies have established that there is also a reduction in stress experienced by staff, which results in increased staff satisfaction and decreased staff turnover (Sadler et al., 2011; Huisman, Morales, van Hoof, & Kort, 2012; Yamaguchi, 2015). Increased staff retention directly affects the hospital's bottom line and patient outcomes, since decreased staff turnover reduces recruitment costs and the average number of staff-in-training (Huisman et al., 2012; Yamaguchi, 2015). Overall, the literature demonstrates that the implementation of institutional gardens in healthcare facilities (both therapeutic gardens and food production sites) can serve as a cost-effective investment rather than a burdensome expense.

Reaching out to community organizations and harnessing their potential can significantly mitigate costs associated with therapeutic gardens and food production, which was demonstrated by the institutional models and suggested by the TOH staff themselves. Potential stakeholders can aid in addressing the cost concerns brought up by TOH staff through unique contributions (see sustainability section below). Potential stakeholder organizations have passionate volunteers, garden experts, and relevant products. Subcontracting to these potential stakeholders to help design, plan, implement, and maintain the therapeutic garden or food production site would be a cost-effective investment. The use of both free and paid highly-skilled labour will help manage risk and save time and money by decreasing errors, and create a high-quality, evidence-based design. Initiating community partnerships may also reinforce TOH's brand by creating greater buy-in in the community. This may lead to the recognition of TOH as a community leader. Serving as a beneficial public relations tool will facilitate positive media

reviews, which could assist the hospital fundraising efforts. Furthermore, creating partnerships in the community will give TOH a network of supporters that can be called upon when advocacy is needed (Washington State Hospital Association, 2014).

As noted by TOH staff and institutional models, the short-term profitability of therapeutic gardens is typically minimal or none, but the ROI is measured by the aforementioned health benefits (Cooper-Marcus & Barnes, 1999; Ulrich, 2002). As the therapeutic garden expands to include food production, the potential exists to offset costs of future expansion to food development. The scope of the therapeutic garden has the potential to expand into food production. The expansion into on-site food production through the existing therapeutic garden infrastructure will not be as costly as the creation of a new off-site food production area. A new site would require a larger upfront financial investment, such as more land, expensive tools and expertise such as a farmer. Costs of expansion can be partially offset by the proceeds earned through selling produce harvested from the institutional garden (See Appendix D).

According to the literature, food service directors are under pressure to develop strategies to increase revenue budgets while decreasing expense budgets. One way to increase revenue while decreasing expenses would be to sell harvested produce at farmers' markets, CSAs, or to incorporate harvested produce in patient or cafeteria food (Silverman, Gregoire, Lafferty, & Dowling, 2000). In addition to supplying hospital staff, patients, and visitors with healthy food, selling produce at farmers' markets or CSAs can also function as a public relations tool to differentiate TOH from other hospitals and garner positive publicity (The Center for Health Design, 2006; Health Care Without Harm, 2007; George et al., 2011). Selling the produce and providing it to the cafeteria will lead to a greater diversification in revenue streams for the garden

(Health Care Without Harm, 2007). Overall, the investment in any type of institutional garden can have significant and long-lasting rewards.

Based on the interviews with institutional models, funding came from philanthropic sources, grants, donations, the hospitals themselves or a combination of these. The models also mentioned that buy-in from senior executives is very important in ensuring adequate funding for the garden. The effectiveness of this support has been established in the literature (Cooper-Marcus & Sachs, 2014). Cooper-Marcus and Sachs (2014), researchers on institutional gardens in healthcare facilities, stated that funding depends on the size of project, the design elements wanted by clients, and the partnerships involved. According to the literature and institutional models, philanthropic funding is a good source for initiating and maintaining institutional gardens (Cooper-Marcus & Sachs, 2014). One example of philanthropic funding in the literature is the Margaret T. Morris Center in Prescott, Arizona, which secured philanthropic funding from an organization and asked patients, family and friends to match the dollar value provided by this philanthropic organization to maintain the garden (Cooper-Marcus & Sachs, 2014). Funding can also come from local foundations (Jerrott, 2016).

Philanthropic funds are also often secured from private donors recruited through hospital foundations or development offices, such as the Jacqueline Fiske Healing Garden at Jupiter Medical Center in Jupiter, Florida (Studio Sprout, 2012). This Florida hospital also used funding campaigns geared towards hospital employees by offering payroll deductions and a one-time gift (Studio Sprout, 2012; Cooper-Marcus & Sachs, 2014). The use of corporate sponsors can be another potential source of funding as businesses may have the ability to make grant contributions (Cooper-Marcus & Sachs, 2014). An atypical funding technique included a

landscape architecture firm that constructed two hospital gardens in the Chicago area, shunting funds from restorative landscape construction to a new garden construction. Another landscape architecture firm stated that tacking onto an ongoing construction project, such as the renovation of the hospital entrance, is another creative way to secure funding for institutional gardens (Cooper-Marcus & Sachs, 2014). A method that could save a considerable amount of money would be using students in design-based programs to design and build the institutional gardens as part of a class project. For example, Carleton University has an Industrial Design and Architecture program where students have the ability to design institutional gardens. Algonquin College, for example, has a trades program which trains students in building such spaces.

Design

Based on the results of this study, we recommend that TOH engage with the Facilities Department when developing a garden design to ensure feasibility and compliance with all necessary building code regulations. This recommendation was made by representatives from institutional models and TOH staff. Collaboration with a TOH-based occupational therapist will be essential to ensure the incorporation of design features that are conducive to the therapy goals of patients. Consultation with an occupational therapist, physical therapist, or recreational therapist in combination with the extensive literature describing the necessary design considerations for therapeutic gardens will provide evidence-based suggestions to help ensure accessibility and utility for the desired patient groups. Should the garden be used for nutritional or educational purposes, consultation with a nutritionist or health educator may also be of benefit.

As demonstrated by Wagenfeld and Atchinson (2014), practitioners who are involved in the design process are more likely to use the garden as an occupational therapy intervention; therefore their participation in design development will enhance garden use. Although the food production aspect of the garden is considered to be a long-term goal of the project, a farmer should be consulted early on in the design process to ensure the initial plan can accommodate all the necessary equipment and storage (for tools and equipment) that may be required at a later date. These recommendations are consistent with the literature that suggests that a participatory design process using feedback from all user groups, from design through to installation, is indispensable to the creation of an institutional garden with relevant design features (Ivarsson & Grahn, 2012; Hearing, 2016; Naderi & Shin, 2008; Sherman, Varni, Ulrich, & Malcarne, 2005).

Garden location is another aspect of the design that must be considered. TOH staff, representatives from model institutions, and potential stakeholders all emphasized the importance of locating the garden in an area that is easily visible from patient rooms. Not only would this help to spark interest and engagement, but it is also a natural feature commonly desired by hospital patients (Douglas & Douglas, 2005). Additionally, studies have shown that patients with bedside windows looking out into natural environments experience faster recovery times in comparison to those looking out into the built environment, as mentioned previously (Smith & Watkins, 2016; Ulrich, 1984; Ulrich et al., 2004). Therefore, a therapeutic garden has the potential to improve patient outcomes for the occupational therapy patient population, and if situated in an appropriate location, can also improve the patient outcomes of those in viewing proximity.

Another key consideration regarding garden location articulated by TOH staff and institutional models is situating the garden in close proximity to the rehabilitation ward to facilitate easy access and patient safety (not crossing busy roads). This is considered to be a best practice by Lowitt (2011). Furthermore, in situating the garden away from busy roads, TOH will also be able to mitigate air pollution concerns (from car exhaust) for their long-term goal of food production (Foodshare Toronto, n.d). If the garden must be situated in close proximity to a road due to space constraints, FoodShare (n.d.) recommend using a non-ornamental (non-edible) strip (e.g. hedge, fence with vines, etc.) to function as a filter. Other fundamental garden location considerations include sun/shade patterns, water access, drainage patterns, soil conditions/quality, and ability to accommodate plans for expansion (Lowitt, 2011).

When speaking to the design features of a therapeutic garden, various TOH departments and potential stakeholders emphasized the importance of engaging multiple senses. The concept of sensory engagement in garden design has been highly recommended in numerous research studies (Colorado State University, 2005; Kamp, 1996; Wiseman & Sadlo, 2015). As mentioned in the literature review, optimal function in humans is developed through exposure to rich sensory environments and interactive experiences (Gay, 2012). This exposure can be achieved through the incorporation of coloured plantings, scents (e.g. herb garden), sounds (e.g. wind chimes) and differing textures (Cooper-Marcus & Barnes, 1999). Plants associated with common allergies should be avoided.

Although our study focused on patient use of the garden, many TOH departments voiced a desire to include a designated section for staff members, as seen in one institutional model. Based on the literature, there are various advantages of including a staff area in the garden. Use

of gardens by hospital employees has been shown to provide opportunities for staff to relieve mental fatigue and find respite from demanding circumstances (Cooper-Marcus & Barnes, 1999; Ulrich et al., 2004). Furthermore, evidence has shown that gardens can increase staff satisfaction with the working environment and can help hospital administrators recruit and retain personnel (Cooper-Marcus & Barnes, 1999; Ulrich et al., 2004; Whitehouse et al., 2001). As stated by one TOH staff member, “the health and well-being of the staff reflects in the health and well-being of the patients” (Department of Safety and Security).

The option of growing organic produce was contemplated by TOH staff and discussed by various model institutions when considering the long-term goal of the garden (food production). Although many institutions grow their produce organically, only one is working towards certification due to the high cost and time commitments. As highlighted by one TOH staff member, specific design considerations must be taken into account when growing crops organically. Similarly, Crouse (2001) states that switching to chemical-free gardening not only alters gardening practices, but also changes the gardening design. For example, a design that deters the development of disease and mitigates loss of crops due to pests is crucial to organic agriculture. This design can be achieved by ensuring sufficient distance between plants, including crop rotations, and considering companion planting (Canadian Organic Growers, 2001; Crouse, 2001; Gomez & Thivant, 2015). Some well-known companion plants in the literature include radishes (repel cucumber beetles) and marigolds (attract hoverflies and repel root nematodes, beetles and aphids). Most often a combination of flowers, herbs, and vegetables work best in a single garden bed (Crouse, 2001). Should TOH decide to grow the crops organically, it

would be essential to consult with the various organic garden guides in the literature and, more importantly, a farmer to ensure the design is conducive to appropriate organic growing practices.

One of the major challenges highlighted by various TOH departments is seasonality. However, numerous institutional models have confronted this challenge and can provide valuable insight for TOH. Some models built greenhouses to accommodate for colder weather conditions, while others relied on passively-heated, less expensive hoop houses. According to Damrosch (2013), these season-extension devices are able to capture some of the earth's natural warmth and obstruct the chilling, drying effect of wind. In addition to these temperature-shielding structures, the models also emphasized the appropriate choice of crops for winter growing. Contrary to popular belief, some vegetables grow and even thrive in cooler temperatures (Mercola, 2011). When selecting which winter crops to include in the garden, it is essential to consider not only their cold-tolerance, but also their growth habit and schedule. Some common crops suitable for winter conditions include spinach, chard (*argentina*), kale (*winterbor*), and carrots, among others (Damrosch, 2013). Other useful techniques recommended for protecting crops from cold temperatures include covering crops heavily with straw or leaf mulch and covering crops with sheets or blankets (Damrosch, 2013). Consultation with a farmer throughout the design process will also aid in identifying critical winter-accommodating design features. Additionally, continuous communication with the food services department will allow for the structuring of meals based on the availability of seasonal produce.

The final design recommendation that was elicited throughout numerous TOH and potential stakeholder interviews was to keep the garden design simple. Many departments voiced the desire to start with raised garden beds and potentially progress to something larger in the

future. This expansion plan is consistent with the Community Garden Best Practice Toolkit, which suggests keeping the garden plan simple for the first year and then expanding and adding new elements in future years (Lowitt, 2011).

Sustainability

Multiple TOH departments, representatives from institutional models, and potential stakeholders identified securing appropriate management for the institutional garden as critical for long-term sustainability and success. According to Mount and Knezevic (2015), a garden should have dedicated staff who oversee and manage garden operations. Given the heavy workloads and time constraints of TOH staff, securing dedicated management for the supervision of garden operations is necessary. For example, it was suggested that TOH hire an external farmer to manage food production and garden care. Garden staff can also be hired through an external party, through partnership with an agricultural or gardening organization. Mount and Knezevic (2015) recommend reaching out to local farmers as many have the expertise but cannot afford to purchase growing space.

Having champions can help to ensure sustainability by facilitating engagement and support of garden operations. The term champion refers to key individuals who contribute to the success of the garden by advocating for the project and supporting transformative change efforts (Mount & Knezevic, 2015; Shaw et al., 2012). These champions can serve as a conduit between garden workers and high-level hospital administrators to help communicate ideas, interests, and concerns surrounding the garden. Champions can also help to increase engagement and perceived value of the garden. As indicated by TOH staff, administrative acceptance of the

garden may be a challenge among front-line workers such as nurses. Therefore, having a nurse champion may help facilitate communication between other nurses and encourage their participation in garden activities and operations. Champions can also help ensure that the garden is achieving the purpose that it was designed for, such as being part of community outreach initiatives (e.g. educational programs, school tours, etc.) and ensuring that the produce is being used appropriately (e.g. in hospital meals, a farmers' market, etc.). Additional champions were identified by model institutions as CEOs who believed in the project, dedicated staff volunteers, and food or nutrition staff with an interest in the success of the project. According to Mount and Knezevic (2015), the role of institutional support cannot be overstated for both short- and long-term sustainability.

Due to the current organization of hospital food practices, as well as the volume of produce that would be required to supply patient meals, cafeteria meals are likely to be a better way to use garden produce. As identified by TOH staff, patient meals are not prepared in the same way as cafeteria meals. Patient meals at TOH are prepared off-site and are based on a re-therm model, which does not require any on-site food preparation at the hospital. Therefore, preparing patient meals on-site would require reintroduction of food preparation tools and staff, which could potentially introduce litigation issues. Furthermore, special meals would have to be made to accommodate for dietary restrictions of the patients. Researchers Allison, Wylie-Toal, and Varangu (2010) conducted an assessment to examine the use of local produce in patient and cafeteria meals and highlighted that patient meals do not change as often as cafeteria meals. Overall, use of hospital-grown produce in cafeteria meals is considered to be a more feasible and viable option as supported by multiple TOH staff and representatives from model institutions.

Any concerns about increased labour required by the cafeteria staff can be addressed by growing crops that require minimal preparation (e.g. cherry tomatoes) and can be readily served.

Another important consideration for the sustainability of the garden is the recruitment of volunteers. Although the literature described the challenges of using unpaid workers in institutional gardens (Knezevic et al., 2016), four of five institutional models that were interviewed used some volunteer labour in the garden or in the farmers' market. Volunteers were deemed necessary to help carry out daily garden duties and minimize operational costs. Institutional models identified some challenges with the use of volunteers in the garden and farmers' market, which included a lack of consistency and the time demands of instructing volunteers. Since volunteers are unpaid, they tend to be less reliable than paid staff. Research shows that community outreach events can help gardens recruit more dedicated volunteers (McKinne & Halfacre, 2008). Volunteers can contribute to the garden with their time, expertise, and connections to community members (Lowitt, 2011). Potential stakeholders OHS and a horticultural educator could provide volunteers to help with garden operations.

Potential stakeholders also emphasized the importance of tangible and intangible incentives in the success of the garden. Examples of possible incentives include recognizing workers and volunteers for their contributions and open access to the garden for patients. Model institutions encouraged the use of gifts, for example, giving some of the produce to staff and volunteers or providing hospital cafe gift cards. Lowitt (2011) recommends volunteer appreciation to ensure that volunteers remain engaged in the garden. These efforts can serve as incentives that help sustain the interests of all groups involved and have a broad positive impact on the success of the garden.

Collaborations with staff and community groups can help ensure the sustainability of the garden in several ways. In the short term, internal collaborations should include communication between garden staff and clinical staff who will use the garden for patient therapy such as nurses and therapists. In the long term, garden staff should communicate with the Food Services Department to confirm expectations and the necessary volumes of produce required. Collaboration was highlighted as a key factor in the success of several institutional gardens (Schilling, 2010).

Potential stakeholders can contribute to the development of the garden in the short term, and the maintenance of the garden in the long term, with their knowledge, expertise, and material contributions. McKinne and Halfacre (2008) suggested that providing meaningful opportunities for community engagement will encourage potential stakeholder involvement. Community partnerships can help to secure additional resources, increase program and service capacity, and increase efficiency (Department of Health & Human Services, 2014). For example, in the short term, the Canadian Horticultural Therapy Association can provide recommendations to help with the planning phase of the gardens at TOH. The Growing Connection can contribute a container-based growing system in the development of the garden. Just Food (through the Savour Ottawa program) can aid in selling the garden produce in farmers' markets once the garden is used for food production. With their extensive experience working with farmers, potential long-term partners like Just Food should be a starting point to link up with local farmers.

The importance of forming collaborations with community groups through engagement and partnerships is consistent with the literature. Lessons learned from food programs suggest that engaging community groups along with the champions mentioned above increases the

likelihood that the garden will be sustainable (LeGreco & Leonard, 2011). The authors referred to these connections as forming ‘networks,’ and the stronger the network, the more sustainable the project will be. According to Barnes and Schmitz (2016), community engagement is essential because even if the design of a project is evidence-based, without the dedication of the user groups and the community, then the project will not be sustainable.

The common themes of finance, design, and sustainability highlight key points that TOH should consider when developing institutional garden(s) for therapy and food production. Input from the three study groups (TOH staff, model institutions, and potential stakeholders) informed the creation of an evidence-based model by providing insights into the considerations and challenges which may arise in the development of institutional gardens.

Recommendations

Short-Term Recommendations for Therapeutic Garden

Long-Term Recommendations for Food Production

General Recommendations

-
- Create an interdisciplinary planning and design team that includes TOH staff (senior executives, nurses, doctors, facilities management, etc.) and community partners to ensure an effective and efficient design process.
 - Collaborate with the Facilities Department throughout the planning and design process.
 - Collaborate with an occupational therapist throughout the planning and design process to ensure accessibility and the inclusion of design features conducive to therapy goals.
 - Collaborate with gardening organizations/farmer familiar with institutional facilities throughout the planning and design process to ensure that the appropriate planting material is used for healthcare environments and to ensure that the garden will be able to accommodate future food production practices.
 - Collaborate with design programs at universities and trades programs at colleges to reduce costs.
 - Use produce from the garden in cafeteria meals or for an occasional on-site farmer's market.
 - Ensure close communication between kitchen staff and food garden staff to balance supply/demand of produce and to coordinate seasonal menus.
 - Grow crops that require the least amount of preparation (e.g. cherry tomatoes) and can be readily incorporated to meals.
 - Be cognizant of possible barriers such as crop failure or soil or weather conditions, etc. and how these may affect food production.
 - In order to extend the growing season, consider the use of crops suitable for cooler conditions (e.g. spinach) and hoop-houses.
 - Identify and connect with an external farmer who will be responsible for managing the food garden. With their extensive experience working with farmers, long-term partners like Just Food should be a starting point to link up with potential farmers.
 - Use evidence-based design and an interdisciplinary team in order to execute an effective and efficient design of The Ottawa Hospital's vision.
 - Collaborate with hospital departments and relevant external hires at each implementation stage. Drawing from this diverse knowledge will increase capacity of the garden to meet its expectations.
 - Create community partnerships to harness expertise, social capital, and community buy-in.
 - Assign the management of the garden to someone who will be fully responsible for overseeing garden operations.
 - Decide on funding strategies, sources and timeline early on in the process for planning, design, construction and maintenance. Funding sources include: philanthropic organizations, individual donors, corporate sponsors, fundraising campaigns, grants, and self-financing by the hospital.
 - Begin with a therapeutic garden and use this therapeutic phase to build capacity and proficiency with gardening operations before expanding into food production.
-

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- Select the location of the garden to meet needs of user groups (patients, staff and visitors).
 - Ensure garden is in an area that is visible from patient rooms and the hospital interior.
 - Ensure garden is in close (walking) proximity to the occupational therapy ward.
 - Ensure sufficient storage space.
 - Ensure unrestricted physical access for patients in wheelchairs and other walking aids through wide, flat, non-slip pathways with handrails.
 - Include a designated area for staff members.
 - Tailor garden features to needs of user groups (patients, staff and visitors).
 - Ensure raised garden beds are accessible to patients in wheelchairs and other walking aids.
 - Ensure that the garden stimulates the senses (touch, smell, sound, etc.) to optimize therapeutic effects.
 - Ensure sufficient seating area.
 - Outline clear goals and roles/responsibilities for staff and stakeholders. Align incentives for all groups involved to help sustain interest in the initiative.
 - Recruit volunteers from interested stakeholder groups to facilitate garden operations and alleviate financial costs.
 - Seek champions from senior administration and clinical front-line workers.
 - Use organic practices.
 - Implement community engagement programs (e.g. tours, food and nutrition classes) to advertise the institutional garden, and as a way to give back to the community.
-

The movement on integrating gardens at hospitals for therapeutic and food production purposes is gaining momentum. Implementing an initiative of this nature will no doubt come with its challenges. However, The Ottawa Hospital can uniquely position itself as a role model to other healthcare institutions in leading this movement by providing patients, staff, and hospital visitors with health and wellness alternatives, changing the conversation around what “hospital food” should feel, taste, and look like, and positively impacting the local community.

Limitations

Due to time constraints, we did not have the opportunity to interview an Occupational Therapist at TOH. Future consultation with an Occupational Therapist from TOH will be important in order to inform the design of a therapeutic garden, ensuring that design and accessibility features relevant to the patient population and treatment goals are included. Although we did not interview an occupational therapist from TOH, we did consult an external occupational therapist.

Following numerous interviews, it became clear that the food produced in the garden would be best suited for use in the cafeteria. Unfortunately, due to time constraints we were also unable to interview the Corporate Cafeteria Manager at TOH. Consultation with the Corporate Cafeteria Manager will be essential to ensure the feasibility of integrating hospital-grown food into existing practices. Furthermore, regular collaboration with the Corporate Cafeteria Manager and chefs will be needed to ensure that the hospital-grown produce is integrated into seasonal menus.

During our interview process, all five members of the research team conducted interviews. Although all interviewers used the same standard interview scripts, the interviews were semi-structured, meaning that the interviewers brought in follow-up probes based on the answers provided by the interviewee. Having multiple interviewers may have resulted in inconsistencies in probing style. However, to mitigate the effects of this limitation, we included secondary (and sometimes tertiary) interviewers at each interview. The secondary interviewer had the opportunity to ask any follow-up questions they felt the primary interviewer had not adequately addressed during the interview.

All of the institutional models that we interviewed were in the Northern United States. Therefore, some of the information about funding structure, while helpful, was not directly transferrable to the Canadian context. A potential stakeholder from Just Food has expertise on institutional gardens in the Canadian context within the Ontario region. In addition, Mount and Knezevic (2015) provide a comprehensive overview of several institutional gardens within the Canadian context. Dwyer et al. (2016) also provide a comprehensive and in-depth review of many institutional models in Canada.

Literature used for this study was limited to sources published in English language. It is also important to note that there are model institutions without an online presence that were not captured in our internet searches.

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We would like to thank our supervisors, Dr. Edana Cassol and Dr. Irena Knezevic for their support, guidance, and feedback throughout the project. We thank Dr. Phil Mount of Project SOIL for his insight during the project development phase and advice when selecting the potential stakeholders. Our sincerest thanks to our interview participants for their time and participation in the study. We would also like to thank The Ottawa Hospital for allowing us undertake this study. Finally, we thank the Department of Health Sciences and Carleton University for making this project possible.

Appendices

Appendix A: Study participants (Organizations and Positions)

| | | |
|------------------------------------|---|---|
| GROUP 1: The Ottawa Hospital | Department | Position |
| | Facilities, Capital Project, & Biomedical Engineering | Director |
| | Patient Food Services | Manager (Civic campus) |
| | Health & Wellness | Coordinator |
| | Patient Advocacy | Patient Advocacy Specialist |
| | Food & Logistics | Director |
| | Healthcare Food Services (HFS)* | Chief Executive Officer |
| | Financial Planning & Analysis | Manager |
| | Occupational Health & Wellness | Manager |
| | Staff Health, Safety, Security & Parking | Director |
| | Total number of participants, $n = 9$ | |
| GROUP 2: Model Institutions | Organization and Location** | Position |
| | Eskenazi Health, Indiana | Sky Farmer |
| | University of Vermont Health Network, Vermont | Garden Coordinator |
| | St. Joseph Mercy, Michigan | Project Manager |
| | Henry Ford West Bloomfield Hospital, Michigan | Resident Farmer |
| | St. Luke's University Health Network, Pennsylvania | Farm Project Manager (Rodale Institute) |
| | Total number of participants, $n = 5$ | |
| GROUP 3: Long-Term Stakeholders | Organization | Position |
| | Just Food/Savour Ottawa*** | Associate Director |
| | Ottawa Horticultural Society (OHS) | President |
| | The Growing Connection (TGC)*** | Founder |

| | | |
|---|--|-------------------------|
| | Canadian Horticultural Therapy Association (CHTA)*** | Horticultural Therapist |
| | N/A**** | Horticultural Educator |
| Total number of participants, <i>n</i> = 5 | | |

*HFS is the primary supplier of patients' meals for TOH

**All model institutions were in the United States

***Savour Ottawa is an initiative led by Just Food, Ottawa Tourism, and the City of Ottawa. TGC is based in Southern Ontario. CHTA is headed by board members across Canada

****Requested for organization to remain anonymous

Appendix B: Interview themes

Table 1: Description of interview themes (Group 1)

| GROUP 1: The Ottawa Hospital | |
|------------------------------|---|
| Themes | Description |
| Overall Attitudes | <p><u>Positive (overall)</u></p> <p><i>Therapeutic garden:</i></p> <p>Optimal healing environment. Space to help staff de-stress. Promote socially and environmentally responsible hospital.</p> <p><i>Food garden:</i></p> <p>Fresh, local produce inclusion in hospital meals.</p> <p><u>Negative (overall)</u></p> <p>Greater understanding of feasibility and sustainability of food garden needed. More evidence required on how food garden can meet hospital's needs.</p> |
| Challenges | <p><u>Cost</u></p> <p>Therapeutic and food gardens would yield start-up and ongoing maintenance costs. Food garden would increase in costs per patient per day and labour costs.</p> <p><u>Food preparation</u></p> <p>Food garden unable to produce enough to meet demands of patient population. Labour union issues with reintroduction of food preparation in kitchen. Garden produce may not cater to diversity in patients' diets.</p> <p><u>Environment</u></p> <p>Seasonality, pest intrusion, pollution/noise, etc. can affect plant growth and yield.</p> <p><u>Patient safety</u></p> <p>Mobility safety should be priority for both gardens. Risks associated with allergies and environment-induced reactions. Strict food hygiene and sanitation practices to be upheld.</p> <p><u>Space constraints</u></p> <p>Lack of space available to accommodate gardens. More green space at some campuses than others, but difficult to secure.</p> |
| Garden Design | <p>Garden to be situated in easily visible area. Accessibility features (e.g. accommodation for wheelchairs, IV pumps, and visually impaired) should be included. Collaboration with Facilities Department.</p> |

| | |
|--|---|
| <p>Measuring Effectiveness of Garden</p> | <p>Consultation with patients to evaluate their use and effectiveness of gardens. Measures (e.g. sick time, return to work) can inform on effectiveness for occupational therapy. Food production measures can include level of food produce use in cafeteria over time, advertisements on patient-grown food, and reduced costs.</p> |
| <p>Sustainability</p> | <p>Recruiting local farmer to manage garden. Volunteers to help execute daily garden duties. Have staff “champions” to advocate pertinence and use of garden.</p> |

Table 2: Description of interview themes (Group 2)

| GROUP 2: Model Institutions | |
|--------------------------------------|---|
| Themes | Description |
| Education & Engagement | Use for educational purposes such as internship programs and tours for schools and other groups. Engagement was through one-on-one interactions with garden visitors. |
| Research | Limited use for research purposes; only 1 of 5 institutions undertook garden research. Research was a community research project to assess what the community wanted to see at the garden in the future. |
| Design | <u>Organics</u> Organic methods were used (does not require organic certification). Organic certification deemed unnecessary due to cost and time demand of process. Patient engagement focused more on vegetable consumption as opposed to promoting eating organically certified or non-GMO produce. <u>Accessibility</u> Various key design elements including wheelchair accessibility, raised beds, paved surfaces, ramps, and wide pathways. <u>Seasonality</u> Considerations for crop choice and greenhouses or hoop houses. Coordination with kitchen staff to accommodate for seasonal variation of produce. Planning, hiring, and ordering equipment mostly accomplished in winter. |
| Finances | Donor funding covered garden start-up costs and some ongoing costs. Ongoing cost supported through self-financing, philanthropic funds, and external grants. |
| Institutional Policies & Food Safety | Good Agricultural Practices (GAP) certification useful to facilitate produce use in patient and cafeteria food. Legal departments at hospitals oversaw liability issues. Having hospital employees as garden volunteers reduced liability issues. |
| Community Partnerships | Partnerships with recreational centres, libraries, schools, universities, local food banks, and other local community groups. Some partnerships were a result of utilizing existing hospital connections with community groups. |
| Challenges | Large volume of garden produce required to supply patients' meals. Funding and profitability. Inadequate communication between garden and kitchen staff. Time commitment required to coordinate volunteers. |
| Sustainability | Important to have staff members serve as "champions" for the garden. Volunteer help very useful to carry out garden duties effectively. Having someone responsible for coordinating garden duties is vital for sustainability. |

Table 3: Description of interview themes (Group 3)

| GROUP 3: Long-term Stakeholders | |
|---------------------------------|---|
| Theme | Description |
| Overall Attitudes | <p><u>Positive (overall)</u></p> <p><i>Therapeutic garden:</i></p> <p>More realistic and easier to set up and manage. High value for patients and others not actively participating in the therapeutic process.</p> <p><i>Food garden:</i></p> <p>Initiative is nutritionally, environmentally, and socially responsible. Garden will heighten patients' interest in meals they are served.</p> <p><u>Negative (overall)</u></p> <p>Barriers may arise due to organizational policies, possibility of crop failure, insufficient volume for patient meals. Logistical factors make food garden generally more challenging to execute. Transition from therapeutic to food garden may be difficult; both phases demand different considerations. Clear objectives from the outset will be important.</p> |
| Contribution Type | <p><u>Volunteer</u></p> <p>Certain stakeholders can offer volunteer services for therapeutic garden on garden design, planning, preparation, and maintenance.</p> <p><u>Labour and expertise</u></p> <p>Labour and expertise contributions through design recommendations, research, connection to skilled local farmers, and produce sales.</p> <p><u>Product and services</u></p> <p>Products such as portable container-based growing systems, staff and volunteer training, etc.</p> |
| Forming a Fruitful Partnership | <p><u>Expectations and responsibilities</u></p> <p>Need for clearer sense of the project's scope, work expectations, and desired level of contribution.</p> <p><u>Meaningful contributions</u></p> <p>Partnerships need to be of value and mutually beneficial to both TOH and stakeholders.</p> |
| Design | <p><u>Features</u></p> <p>Garden should be close to patient quarters, have unrestricted access, and be visible from inside the hospital. Accessibility features include raised beds, barrier-free paths, and wide walkways for wheelchair and walker users. Use plants with different textures, colours, and smells that appeal to the senses.</p> |

| | |
|------------|---|
| | <p><u>Maintenance</u></p> <p>Need for designated garden manager or “Green Team” to oversee garden cleanliness, maintenance, and management.</p> |
| Management | <p><u>Incentives</u></p> <p>Provide incentives to sustain the interests of all groups involved with the garden.</p> <p><u>Relationships</u></p> <p>Good relationships needed to run garden effectively and to identify “internal champions” who can advocate for garden workers’ interests to hospital administration.</p> <p><u>Volunteer management</u></p> <p>Ensure volunteers have—and understand—clearly defined roles.</p> |

Appendix C: Interview questions

Questions for The Ottawa Hospital Staff

Thank you for taking the time out of your busy schedule to answer some interview questions. The main purpose of this interview is to better understand the day-to-day functioning of the Ottawa Hospital in order to develop a model for an institutional garden. This proposed model will start with a smaller-scale therapeutic garden and then expand to include food production. We will be looking at ways to develop partnerships with potential stakeholders to support their garden operations. We will also be looking at hospitals that have successfully carried out such programs. Any input you provide will be valuable to us and will help inform the development of the garden at the Ottawa Hospital.

In order to retain interview data and for future analysis, with your permission the interview will be audio recorded. However, if you do not wish to be recorded we will take handwritten notes. All audio recordings will be transferred to a password-protected USB immediately following the interview, and the original file will be deleted from the recorder. The audio file will be transcribed and then deleted from the password-protected USB. The password-protected USB will be locked in the supervisor's room. When required, it will be used by the group member who is actively working on the data analysis and transcription. The USB will be returned to the supervisor's office when not in use and will remain there after the study's completion for storage purposes (for a period of 5 years).

Consent to record will be ongoing, and you can withdraw at any time during the interview process by telling the interviewer. A copy of the transcript will then be sent to you if you wish to review for accuracy. Consent will be ongoing and you can withdraw from the study at any time. The data gathered from this study will be presented to the Ottawa Hospital and may be used for publications. You will not be identified by name. However, your respective positions and/or institutional names might be used as appropriate. You may withdraw from the study by contacting Dania Koudieh or any of the research supervisors. If you choose to withdraw from the study, all your data and information will be destroyed. **Do we have your consent to (a) record, and (b) commence the interview? (Y/N)**

1. **Can you please tell us more about your role in this organization?**
2. **What do you know about the use of gardens in health facilities?**
3. **How would you foresee an institutional garden functioning in this facility?**
Occupational Therapy Probes:
 - What are the primary patient diagnoses you treat at this facility?
 - Would you use the institutional gardens for patient treatment? If so, how often and for what purpose?
 - What are some of the reasons you would choose to use the institutional gardens for patient treatment (benefits)? What about therapy goals?

- Do you believe that the garden would allow patients to regain life skills or attain therapy goals in a way that is different from typical treatment within the clinic?
- Do you foresee the garden being used for academic or research purposes?

Food Service Probes:

- Does the Ottawa Hospital currently have plans to increase the use of local food products?
- How could hospital grown food products, if at all, be integrated into existing practices to enhance the nutritional value and taste of meals?
- Do you see any benefits to food production taking place at the Ottawa Hospital? Any drawbacks?

Patient Advocacy Probes:

- Do you think that patients would be interested in using the garden? Why or why not?
- Do you think that the garden will aid in addressing patient/visitor feedback (e.g. food quality, lack of green space, lack of activities etc.) ?
- Do you think the gardens could improve patient experience?

Accounting Probes:

- In the long term, would you recommend selling some of the garden produce at the farmer's market?
- Are there any hospital restrictions that would make it difficult to sell the produce?
- Do you see any benefits to food production taking place at the Ottawa Hospital? Any drawbacks?

4. How do you foresee *the design of an institutional garden at the Ottawa Hospital?*

Occupational Therapy Probes:

- What features of an outdoor environment/garden might facilitate the attainment of these therapy goals?
- What types of safety features would have to be present within the outdoor environment/garden to ensure safe and effective treatment (ramps, handrails, level terrain, etc.)? Which types of gardening activities would you use to as part of patient treatment?

Food Services Probes:

- Seasonality?
- Types of crop required?

Patient Advocacy Probes:

- Can you think of any potential safety concerns for patients using the garden?

Accounting Probes:

- Can you think of aspects of the garden's design and operation which would help ensure cost efficiency?

5. Can you think of any limitations or disadvantages of institutional gardens?

Occupational Therapy Probes:

- To the best of your knowledge are there institutional policies that would need to be considered in relation to having this on property?
- Would it hinder or help?
- Do you think that budget could be an issue?

Food Services Probes:

- Do you have a sense of any food-related policies that might pose a concern?
- Would any changes have to be made to ensure that the hospital-grown food products meet the current food regulations/policies (equipment, staff training, etc.)?
- Do any of your current food product suppliers have policies on integrating local, hospital grown food products?
- Do you think that budget could be an issue?

Patient Advocacy Probes:

- Do you have a sense of any policies in place that might hinder the use of the garden?
- Do you think that budget could be an issue?

Accounting Probes:

- Do you have a sense of any policies in place that might hinder the use of the garden for patient treatment?
- Do you have a sense of any policies in place that might hinder use of the garden for food production (ex: financial liabilities)?
- Do you think that budget could be an issue?

6. What would a successful institutional garden look like to you?

Occupational Therapy Probes:

- Do you have any thoughts on how the effectiveness or benefits of the garden might be measured (therapy goals, social, behavioural, mental, etc.)?
- How do you think we could ensure sustainability of the program?

Food Services Probes:

- Do you have any thoughts on how the effectiveness of the garden might be measured?
- How do you think we could ensure sustainability of the program?

Patient Advocacy Probes:

- Do you have any thoughts on how the effectiveness of the garden might be measured?
- How do you think we could ensure sustainability of the program?
- What is your opinion on expanding the garden for food production?

Accounting Probes:

- Do you have any thoughts on how the effectiveness of the garden might be measured?
- How do you think we could ensure sustainability of the program
- What is your opinion on expanding the garden for food production?
- What financial recommendations could you provide to ensure that this project is effective and sustainable (partnerships, reallocation of budgets, volunteers, etc.)?

6. a) (FOR ACCOUNTING ONLY) Can you share any non-proprietary information about how an institutional garden might fit into the Ottawa Hospital's budget?

Probes:

- Do you have a sense of how much money is available to get the project started?

- Do you know when this money will be available or how much recurring money will be available for this project once it is running?
- Can you think of any financial recommendations that could help ensure that this project is effective and sustainable (partnerships, reallocation of budgets, volunteers, etc.)?
- Do you have a sense of whether your department sees a need for revenue/profit from this project in the short term?

6. b) (FOR ACCOUNTING ONLY) Can you share any non-proprietary budget information about how food production on hospital grounds might fit into the Ottawa Hospital's budget?

Probes:

- Do you have a sense of the food budget per patient per day?
- Do you know how this budget is determined?
- Do you know when this money will be available?
- Do you have a sense of how much recurring money might be available for this project once it is up and running?
- Can you think of any financial recommendations that could you help ensure that this project is effective and sustainable (partnerships, reallocation of budgets, volunteers, etc.)?
- Do you have a sense of whether your department sees a need for revenue/profit from this project in the short term?

7. Do you know of any opportunities, businesses, or programs that may help TOH with the development of an institutional garden? Please disclose any possible conflicts of interest.

This concludes our interview questions. Do you have any further comments or questions?

Thank you for taking the time to speak with us and for providing us with many insights. This concludes our interview process. In the case that any follow-up questions arise, would you like to be contacted in the future?

Thank you and have a great day.

Questions for Model Institutions

Thank you for taking the time out of your busy schedule to help us with answering our interview questions. The main purpose of this interview is to examine different institutional models, such as yours, to allow us to highlight best practices in terms of the day-to-day running of an institutional garden, risk management, funding, program development, etc. We will also be looking at ways to develop partnerships with potential stakeholders to support their garden operations. Any input you provide will be valuable to us and will help inform the development of the garden at the Ottawa Hospital.

In order to retain interview data and for future analysis, with your permission the interview will be audio recorded. However, if you do not wish to be recorded we will take handwritten notes. All audio recordings will be transferred to a password-protected USB immediately following the interview, and the original file will be deleted from the recorder. The audio file will be transcribed and then deleted from the password-protected USB. The password-protected USB will be locked in the supervisor's room. When required, it will be used by the group member who is actively working on the data analysis and transcription. The USB will be returned to the supervisor's office when not in use and will remain there after the study's completion for storage purposes (for a period of 5 years).

Consent to record will be ongoing, and you can withdraw at any time during the interview process by telling the interviewer. A copy of the transcript will then be sent to you if you wish to review for accuracy. Consent will be ongoing and you can withdraw from the study at any time. The data gathered from this study will be presented to the Ottawa Hospital and may be used for publications. You will not be identified by name. However, your respective positions and/or institutional names might be used as appropriate. You may withdraw from the study by contacting Dania Koudieh or any of the research supervisors. If you choose to withdraw from the study, all your data and information will be destroyed. **Do we have your consent to (a) record, and (b) commence the interview? (Y/N)**

1. Could you please tell us about your garden?

Maintenance Probes:

- Can you speak about how your garden is maintained?
- Who runs the garden (volunteers, students, employees, farmers etc.)?
- How many people are involved?
- How did you recruit these individuals?
- What are their individual roles and time commitments?

Produce Probes:

- Are there seasonal considerations? (Effects on produce output, volunteers and employees)

If Relevant:

- Can you discuss the equipment that you use at your facility?
- Can you tell us about the greenhouse?

2. Can you tell us about how the garden is used?

Produce Probes:

- How is the produce used (sold in the farmers market, used in patient meals, etc.)?

- How much produce is used in patient meals (is this seasonal)?
- How do hospital food services staff and garden staff coordinate? Is there any excess produce?

Patient Probes:

- Who visits the garden?
- How do patients benefit from the garden (in meals, therapeutic)?
- How do you address accessibility issues?

Research Probes:

- Is the garden used in any research activity?

3. Could you speak to the financial side of the project?

Probes:

- How were initial setup costs covered?
- What about ongoing costs?
- How do you address sustainability of the project (ex: selling produce to support costs)?
- Do you have a farmers' market, and could you speak about the process of establishing the market?

If Relevant:

- Can you talk about the employment project?
- How did the farmer's market initially start and how did it expand?

4. Do you have any community partners involved in this project?

Probes:

- How many community partnerships?
- How were initial partnerships started?
- What are their individual roles and contributions?
- In your opinion, what is a key point to consider when forming community partnerships?
- How do you maintain ongoing partnerships?

If Relevant:

- What is the main purpose of the honey production by the hospital? Is it a self-sustaining project?
- Can you speak more about the mobile produce market for low-income areas?
- Do you collaborate with any academic institutions?

5. Can you talk about any barriers that your institution has encountered during this project?

Probes:

- How were they overcome?
- Did you encounter any difficulties as the garden expanded? Can you elaborate?

If Relevant:

- Where there any difficulties in expanding the garden?
- How were these challenges overcome?
- What were some of the challenges faced (if any) from turning the garden into one where patients can use?

6. Can you talk about any factors that have helped your project run successfully?

Probe:

- People, partnerships, financial support, policies, patient support

7. Were there any institutional policies that you had to consider in developing your garden?

Probes:

- Were there any particular policies that either helped the project or posed a challenge?
- How did the project address food safety policies?
- How did the project address any liability issues?
- Were there any problems with dividing responsibilities for the garden among staff and volunteers?
- How did you address these challenges?

8. Is there anything else you would like to add which may help the Ottawa Hospital going forward?

9. Do you know of any other organizations that are also involved in institutional gardening who would be interested in speaking with us?

This concludes our interview for today. Thank you again for your time. Do you have any questions for me? (Y/N). In the case that any follow-up questions arise, would you like to be contacted in the future?

Thank you,

Have a great day!

Questions for Potential Stakeholders

Thank you for taking the time out of your busy schedule to answer some interview questions. The Ottawa Hospital is interested in developing an institutional garden for therapeutic and nutritional purposes. The aim of our project is to investigate all the processes needed for the development of the food gardening model, which will start with a smaller-scale therapeutic garden and then expand to include food production. An institutional garden would benefit the Ottawa Hospital by providing rare dual opportunities to produce more varied and nutritious foods and provide therapeutic benefits to patients.

We will be examining ways to help the Ottawa Hospital develop partnerships with potential stakeholders for program development. The aim of this interview is to identify opportunities for collaboration.

In order to retain interview data and for future analysis, with your permission the interview will be audio recorded. However, if you do not wish to be recorded we will take handwritten notes. All audio recordings will be transferred to a password-protected USB immediately following the interview, and the original file will be deleted from the recorder. The audio file will be transcribed and then deleted from the password-protected USB. The password-protected USB will be locked in the supervisor's room. When required, it will be used by the group member who is actively working on the data analysis and transcription. The USB will be returned to the supervisor's office when not in use and will remain there after the study's completion for storage purposes (for a period of 5 years).

Consent to record will be ongoing, and you can withdraw at any time during the interview process by telling the interviewer. A copy of the transcript will then be sent to you if you wish to review for accuracy. Consent will be ongoing and you can withdraw from the study at any time. The data gathered from this study will be presented to the Ottawa Hospital and may be used for publications. You will not be identified by name. However, your respective positions and/or institutional names might be used as appropriate. You may withdraw from the study by contacting Dania Koudieh or any of the research supervisors. If you choose to withdraw from the study, all your data and information will be destroyed. **Do we have your consent to (a) record, and (b) commence the interview? (Y/N)**

1. **Would your organization be interested in taking part in this program? (Y/N)**
 - a. **If NO**, what would it take to garner interest in this project from your organization? (Go to end of interview)
 - b. **If YES**, what kind of contributions would you be able to make? (Continue to Question 2)
2. **Do you think there are benefits to hospitals growing food on their properties?**
3. **If the program is successful, would you be interested in collaborating?**

4. What role do you see your organization playing in this project in the short term and the long term?

This concludes our interview questions. Do you have any questions or concerns you would like to address?

Thank you for taking the time to speak with us and for providing us with many insights. This concludes our interview process. In the case that any follow-up questions arise, would you like to be contacted in the future?

Appendix D: Potential Revenue from Produce

Table 4 – Hypothetical proceeds that can be earned via sale of harvested produce. This table was adapted from Dr. Joel Gruver’s, North Carolina State University student and farm manager, planning spreadsheet for CSA and Farmer’s Markets (Tour, 2017). Currencies were converted from USD to CAD using a rate of \$1.33CAD/USD. The link to the adapted table is available here: <http://bit.ly/2pGzmNU>

| | Arugula | Beets | Cabbage | Cantaloupes | Carrots | Cauliflower | Collards | Cucumbers | Edamame | Eggplant | Garlic | Green onions | Kale | Lettuce | Mustard greens | Okra |
|---|------------|------------|------------|-------------|------------|-------------|------------|------------|------------|----------|------------|--------------|------------|----------|----------------|------------|
| Number of plantings | 4 | 4 | 2 | 3 | 1 | 3 | 1 | 2 | 3 | 1 | 1 | 7 | 2 | 4 | 3 | 1 |
| Number of harvests | 8 | 8 | 7 | 6 | 6 | 6 | 7 | 9 | 5 | 8 | 1 | 15 | 8 | 8 | 5 | 8 |
| Total row feet needed | 1,083 | 1,213 | 986 | 2,300 | 1,236 | 1,327 | 1,371 | 714 | 2,962 | 645 | 3,450 | 7,260 | 674 | 1,756 | 1,016 | 1,437 |
| Total amount of seed needed (oz., lbs) | 0.89 | 2.27 | 1.23 | 1.92 | 2.05 | 0.73 | 6.85 | 3.57 | 14.81 | 0.13 | 689.99 | 5.19 | 1.68 | 0.55 | 0.85 | 14.37 |
| Row feet needed per planting | 271 | 303 | 493 | 767 | 1236 | 442 | 1371 | 357 | 987 | 645 | 3450 | 1037 | 337 | 439 | 339 | 1437 |
| Total value per crop (CAD) | \$1,542.80 | \$2,314.20 | \$1,975.05 | \$3,950.10 | \$2,453.85 | \$2,633.40 | \$1,569.40 | \$1,090.60 | \$2,261.00 | \$984.20 | \$1,755.60 | \$4,987.50 | \$2,234.40 | \$931.00 | \$3,511.20 | \$2,234.40 |

| | Parsley | Peas | Peppers | Potatoes | Snap beans | Southern peas | Spinach | Storage onions | Summer squash | Sweet corn | Swiss chard | Tomatoes | Turnips | Watermelons |
|---|------------|------------|------------|------------|------------|---------------|------------|----------------|---------------|------------|-------------|------------|------------|-------------|
| Number of plantings | 2 | 1 | 1 | 1 | 4 | 3 | 4 | 1 | 3 | 5 | 2 | 1 | 4 | 3 |
| Number of harvests | 15 | 5 | 7 | 1 | 8 | 6 | 8 | 1 | 10 | 10 | 15 | 7 | 8 | 6 |
| Total row feet needed | 1,756 | 2,759 | 1,272 | 1,484 | 4,298 | 3,032 | 2,744 | 986 | 1,612 | 17,582 | 2,396 | 636 | 3,790 | 5,088 |
| Total amount of seed needed (oz., lbs) | 0.09 | 41.38 | 0.19 | 247.72 | 10.74 | 15.16 | 6.86 | 4.93 | 10.74 | 6.59 | 3.95 | 1.59 | 3.13 | 11.19 |
| Row feet needed per planting | 878 | 2759 | 1272 | 1484 | 1074 | 1011 | 686 | 986 | 537 | 3516 | 1198 | 636 | 947 | 1696 |
| Total value per crop (CAD) | \$2,859.50 | \$2,527.00 | \$1,941.80 | \$2,460.50 | \$3,936.80 | \$2,314.20 | \$4,468.80 | \$1,755.60 | \$6,517.00 | \$4,389.00 | \$1,941.80 | \$1,542.80 | \$5,266.80 | \$2,859.50 |

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