



Developing an Institutional Garden for The Ottawa Hospital

Summary

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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 pre-packaged foods and create a healthier environment for patients, staff, and visitors. ¹

Research gap

Healthcare institutions face challenges related to accessibility, cost, food safety policies, and operational liabilities when incorporating gardens to their facilities (Mount & Knezevic, 2015). There are also few guidelines, little support, insufficient information on successful hospital gardens, and limited research on factors to be considered when developing hospital gardens (Perline, 2014). These limitations call for an exploration into the day-to-day functioning of institutions with existing gardens to serve as a guide for interested others.

Study aim and context

The Ottawa Hospital (TOH) plans to implement institutional gardens for therapeutic purposes on its current location (short-term goal) and for food production at its future site (long-term goal). This study aimed to create a model to support these goals by examining opportunities and challenges associated with developing gardens in hospitals. This was achieved by interviewing staff from relevant departments in TOH to identify its needs, consulting representatives from hospitals with existing gardens for advice on garden operations, and exploring potential future partnerships with stakeholders.

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 gardens.

Study significance

Institutional gardens would provide TOH with opportunities to improve patients and staff health and enrich the experience of hospital visitors, which align with TOH's mission and core values. Institutional gardens also offer opportunities to strengthen community engagement, foster research opportunities, and strengthen TOH's position as a leader in health promotion and improvement in Ottawa (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. A food production garden can enhance TOH's capacity to integrate fresh produce into its meals. Insights from the diverse departments consulted for this study will ensure optimal use and impact of the gardens. Finally, this study will add to research on the opportunities and barriers surrounding the creation of institutional gardens at hospitals.

Literature Review

General health benefits of gardening

Gardens and gardening activities can be beneficial to physical, nutritional, psychological, and social health. Gardening can lead to better physical health through activities like raking, digging, and compost mixing result of increased movement and exercise (Park & Mattson, 2008). For nutrition, gardening can help improve consumption of vegetables such as carrots, green beans, and leafy green vegetables rich in nutrients, minerals, and fibre (De Pee, Talukder, & Bloem, 2008; Faber & Laurie, 2011). Gardens and other natural green spaces have been shown to help relieve stress, reduce anxiety and depression, and improve cognition (Erickson, 2012; Cooper-Marcus & Sachs, 2014). Finally, gardens serve as spaces to foster social interactions beneficial to social health and wellbeing, especially amongst the elderly and other groups where isolation or social exclusion are common (Armstrong, 2000; Wakefield et al., 2007).

Use of gardens for occupational therapy

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. 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

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) 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).

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.). According

to Gay (2012), “optimal function for a person is developed through exposure to rich sensory environments and interactive experiences” (p.1). 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). Sensory engagement can be maximized by including colourful plantings and smells (e.g. lavender, roses), incorporating 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). 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 1990’s, 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, 2002).

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.

Use of gardens for hospital food production

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 benefit and skill development in a way that few activities do (Knezevic et al., 2016). However, 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).

Methods

This study employed qualitative methods to explore issues pertaining to the creation and success of institutional gardens at hospitals. Ethics approval was obtained from Carleton University Research Ethics Board on November 30th, 2016.

Participants

Three groups of participants were interviewed for this study. Group 1 ($n = 9$) participants comprised TOH staff in the Facilities, Food Services, Occupational Health & Wellness, Patient Advocacy, Finance, Security & Safety departments and were interviewed on organizational policies, finances, patient needs, and operational logistics. Group 2 ($n = 5$) participants comprised representatives from hospitals with garden programs for food production and were interviewed on the day-to-day running of garden programs, finances and funding opportunities, and community engagement. Group 3 ($n = 5$) participants were from local organizations and businesses with an interest in becoming potential stakeholders in the development of the gardens. Appendix A provides more details on participants.

Interviews

Nineteen semi-structured interviews were conducted in-person or using phone and video (Skype™) calls. 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. Data obtained from interviews were transcribed and analyzed with the aid of a qualitative analysis software.

Results

Group 1: TOH Staff

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: Model Institutions

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: Potential Stakeholders

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.

Discussion

Finance

The value generated from institutional gardens extend beyond standard financial gain. Although many institutional gardens are not directly profitable, the return on investment (ROI) comes from better hospital rankings, happier and healthier patients and staff, and enhanced experience of hospital users (Cooper-Marcus & Barnes, 1999; Ulrich, Zimring, Quan, Joseph, & Choudhary, 2004; Cooper-Marcus & Sachs, 2014).

Having natural views can improve patients' recovery time, shorten hospital stay, and reduce hospital costs (Ulrich, 1984; Taheri, Butz & Greenfield, 2000; Malkin, 2003). By providing pleasant experiences, institutional gardens improve patients' mental health and well-being, decreasing the need for medications and lowering operational costs (Malkin, 2003; Terrapin Bright Green, 2014). These outcomes can improve the image of TOH within the community as patients share positive impressions of the gardens. Institutional gardens can also lead to lower staff stress, higher satisfaction, and reduced turnover which decreases recruitment costs (Sadler et al., 2011; Huisman, Morales, van Hoof, & Kort, 2012; Yamaguchi, 2015).

Partnerships with community organizations and businesses can significantly reduce costs of developing gardens by providing garden experts, product donations, and passionate volunteers. Partnerships can reinforce TOH's brand as a community leader by creating community buy-in and serving as a public relations tool which can assist with fundraising

efforts. Starting out with a therapeutic garden which can later be expanded into a food production garden can offset costs; this on-site expansion will be relatively inexpensive in comparison to creating a new off-site food production area. Costs of expansion can also be partially offset by proceeds from sales of harvested produce (See Appendix B). Selling produce at farmers' markets, CSAs, or incorporating into cafeteria food can increase and diversify revenue streams (Silverman, Gregoire, Lafferty, & Dowling, 2000). Produce sales at farmers' markets or CSAs can differentiate TOH from other hospitals, an effective public relations tool (The Center for Health Design, 2006; Health Care Without Harm, 2007; George et al., 2011).

Funding sources may include grants, philanthropic sources, internal funding, or a combination of these. Support from senior executives is key in ensuring garden funding. Philanthropic funding is a good source and can be obtained from private donors recruited through hospital foundations. The Jacqueline Fiske Healing Garden in Jupiter, Florida used this strategy, in addition to funding campaigns geared towards hospital employees through payroll deductions and one-time gifts (Studio Sprout, 2012; Cooper-Marcus & Sachs, 2014). The Margaret T. Morris Center in Prescott, Arizona also secured philanthropic funding and encouraged patients, their family, and friends to match the dollar value (Cooper-Marcus & Sachs, 2014).

Corporate sponsorships and tacking onto ongoing construction project, such hospital renovations—an atypical but creative strategy—are other avenues to fund institutional gardens (Cooper-Marcus & Sachs, 2014). Involving students in design-based programs to design gardens as part of class projects can save a considerable amount of money. Examples include Carleton University's Industrial Design and Architecture program and Algonquin College's Skilled Trades program.

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. 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. 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).

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). 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 future 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). 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).

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. 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 was seasonality. However, numerous institutional models have confronted this challenge by building greenhouses to accommodate for colder weather conditions or relying 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. 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 ensure sustainability of the gardens 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 hospital administrators to help communicate ideas, interests, and concerns surrounding the garden. Champions can also help to increase engagement and the perceived value of the garden.

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, making the cafeteria a more feasible option.

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. 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.

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 such as Just Food should be a starting point to link up with local farmers. 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, the project will not be sustainable.

Recommendations

Short-Term Recommendations for Therapeutic Garden

- 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.

Long-Term Recommendations for Food Production

- 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.

General Recommendations

- 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

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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.

production.

- 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.

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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, $n = 5$
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*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: 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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