

Building Better Healthcare Facilities through Evidence-Based Design: Breaking New Ground at Vancouver Island Health Authority

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Abstract

Many of today's healthcare facilities were constructed at least 50 years ago, and a growing number have outlived their useful lives. Despite renovations and renewals, they often fall short of providing an appropriate care setting. Clinicians and staff develop a mixture of compromises and workarounds simply to make things function. Evidence-based design principles are often absent from new healthcare facilities, perhaps because of lack of awareness of the principles or because implementing them may fall foul of short-term and short-sighted budgetary decisions. In planning a new healthcare facility in 2008, the executive team at Vancouver Island Health Authority decided to adopt the evidence-based design approach. They conducted site visits to newly constructed hospitals across North America and beyond, to determine best practices in terms of design and construction. These engagements resulted in the implementation of 102 evidence-based design principles and attributes in Victoria's Royal Jubilee hospital, a 500-bed Patient Care Centre. This \$350M project was completed on time and on budget, showing that using evidence need not result in delays or higher costs.

To date, the results of the evidence-based design are promising, with accolades coming from patients, staff and clinical partners, and a number of immediate and practical benefits for patients, families and care teams alike.

Around the world, much of the current emphasis on quality and patient safety has focused on the actions and omissions of clinicians, the use of new technology and the efforts of leaders to create safer cultures and supportive environments. Until now, in the writers' opinion, limited attention has been given to the physical contexts and design of work environments. In Canada, as in other countries throughout the world, the work of health professionals is often challenged by having to deliver services in less than ideal physical environments. With many of today's healthcare facilities having been constructed over 50 years ago, and some significantly before that, a growing number have outlived their useful lives. Evidence can be seen on balance sheets of health organizations, where many physical assets have long since been fully depreciated. While a number of these settings may have been renovated, and to some extent renewed all too often, they continue to fall short of providing an appropriate care setting. As a consequence, clinicians and staff often become used to these work settings, and, out of necessity, develop a mixture of compromises and workarounds simply to make things function. This may, however, cause unanticipated or unknown risks for organizations with regard to the safety of patients and staff alike. Such concerns are clearly articulated by Accreditation Canada (2011) in their *Required Organizational Practices* document, which outlines risks associated with a congested work environment and the need for reduced "clutter."

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The opportunity to address and resolve many of these issues is provided when funding approvals are received to build a new hospital or clinic. However, it is our opinion that the potential of these opportunities is rarely fully optimized, as health leaders have to deal with a large number of competing pressures and priorities. As a result, they may fail to ensure that design principles and functional requirements adopted in new facilities are truly evidence based. It has been our experience that the absence of evidence-based design principles in contemporary healthcare facilities generally stems from two main reasons. First, in the haste to meet project deadlines in the creation of a new hospital, clinic or department, managers may be unaware of, or not fully utilize, the growing body of peer-reviewed articles on evidence-based design. On other occasions, they may defer the responsibility to incorporate evidence to an architect or design team without doing the due diligence themselves. As a result, designs may be based on staff or architectural preference, with little or no attention paid to life-cycle costing or current best practice and evidence. Secondly, as costs escalate in the project planning cycle, managers may inadvertently fall into a short-term cost-cutting trap and disregard best-laid plans, making decisions based on capital cost alone to return the project to a number within (or close to) budget. As a result, while shiny new structures are created without evidence-based design, they may have higher than necessary operating costs and may unnecessarily compromise quality and patient safety. Additionally, post completion, capital projects often require changes or renovations in the not-so-distant future to adapt to changes driven by heightened care standards, technology and innovation. So, ironically, there is a risk that any short-term savings may inadvertently result in increased costs over the medium to longer term.

The “Evidence” for Evidence-Based Design

For years it has been assumed that optimal physical environments, while desirable, were unaffordable to design and construct. Challenging this presumption, a multidisciplinary team set out to examine the actual cost and quality implications of building a hospital designed on the best available evidence (Berry et al. 2004). Creating a “Fable Hospital,” an ideal, albeit theoretical facility that incorporated proven evidence-based design innovations from recently built or redesigned hospitals, the authors developed a business case for better healthcare facilities. Touting a message that was both simple and profound, Berry et al. (2004) argued that health leaders need

to be aware of a growing and compelling body of evidence that correlates the design of the physical environment of a healthcare building to health outcomes and quality. Through their work, the authors showed how the careful selection of appropriate evidence-based design factors such as oversized single rooms, double-door bathroom access and natural lighting can significantly improve a range of quality and outcome indicators, and at the same time reduce operational costs. For example, citing a study by Ulrich (1984), the authors pointed out that benefits of one factor, the provision of natural daylight and an attractive view, reduced operational costs by \$500 per case due to a reduced length of stay. According to the study, in situations without this single attribute, length of stay and resulting care costs did not decrease.

While the work of Berry et al. (2004) and others has been well received, it has done little to the change mainstream thinking and practices of health leaders. Nevertheless, the authors’ characterization of an imaginary amalgam of the best design innovations created a compelling vision for the future of healthcare design. This case was recently strengthened by Sadler et al. (2011), who wrote a follow-up article titled “Fable Hospital 2.0: The Business Case for Building Better Health Care Facilities,” which incorporated more recent innovations and evidence-based design features such as improved signage for guests, respite areas, the use of environmentally responsible building materials and hydraulic ceiling lifts in patient rooms.

On the ground, and in parallel to academic pursuits, the Center for Health Design – a not-for-profit research group in California – has, since 1993, been trying to bridge the research–practice divide, creating a movement of like-minded planners and health leaders with the singular mission to design and build better healthcare facilities. The premise of their organization is to bring forward-thinking health organizations together to collaborate and share learnings from the direct application of evidence-based design to create continuous improvement and innovation. Their work has been coined the “Pebble project” – the use of the word “pebble” signifying the ripple effect of throwing a pebble (an idea) into a pond and watching the impact (its adoption) of the ripple (The Center for Health Design 2012).

The “Fable Hospital” – Vancouver Island’s Royal Jubilee Hospital

Sufficiently captivated by the “Fable Hospital” analysis and the work of the Center for Health Design, the executive team at Vancouver Island Health Authority (VIHA) sought membership with the Center in 2005, becoming Canada’s first “Pebble” affiliate. Tasked with building a new care facility, VIHA leaders consulted extensively with other Pebble members and conducted site visits to newly constructed hospitals across North America to determine best practices in terms of design and construction.

These engagements resulted in the implementation of 102 evidence-based design principles and attributes in Victoria's Royal Jubilee hospital, a 500-bed Patient Care Centre (PCC). This \$350M project, which broke ground in July 2008, was completed in December 2010 on time and on budget, using a P3 (public–private partnership) contract methodology, which in effect proved that using evidence does not need to unnecessarily delay builds or drive up costs.

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In November 2010, the Centre for Health Design was invited to visit the PCC to critique VIHA's journey and the application of evidence-based design principles. The verdict was incredibly positive, with the assessors publicly announcing that, in their opinion, Berry et al.'s (2004) Fable Hospital was no longer an imaginary amalgam of design attributes, but now existed – in Canada, in Victoria – at the Royal Jubilee Hospital site. Evidence supporting their claim is visible throughout the state-of-the-art facility, with virtually all of Berry et al.'s suggestions living on in the PCC. Some examples of the evidence-based design principles outlined in Berry et al.'s (2004) Fable Hospital, now realized at Victoria's Royal Jubilee Hospital include the following:

- 83% of all rooms are single patient rooms with a private ensuite bathroom
- A pullout bed settee for family members, to promote their overnight stay, in every room
- Standardized design and equipment in every room
- A quiet hospital, with sound-absorbing construction and the absence of overhead paging
- Hand-sanitizing areas and sinks in every patient room (1,400 sinks throughout the building)
- Maximized use of natural light (large window in every room), fresh air in each room as a result of opening windows, and HEPA filtered air in appropriate locations
- Decentralized nursing stations with optimum visibility and accessibility to patient rooms
- Dedicated meeting and teaching spaces for staff and students on each floor

Additionally, there are many other examples of evidence-based design incorporated into the PCC that go beyond the scope of the original Fable Hospital concept and were recently

outlined in Sadler et al.'s (2011), "Fable Hospital 2.0," including a ceiling-mounted patient lift at the head of every bed, an electronic health record input station at every bedside (smart beds), a total separation of clean and dirty materials and supplies, a dedicated patient rehabilitation facility on every floor, use of sustainable (green) materials, and a staff gym and cafe. Further information on this project, including video and images, is available at http://www.viha.ca/patient_care_centre/.

TABLE 1.
Key performance metrics to be evaluated at the Patient Care Centre

1.	Hospital-acquired infection
2.	Patient falls
3.	Adverse events
4.	Work-related injuries (all causes)
5.	Staff injuries related to patient handling
6.	Medication errors
7.	Length of stay
8.	Medication use for delirium
9.	Labour costs (overtime, sickness rates, etc.)
10.	Use of ceiling mounted lifts

The final move of patients into the new facility took place in December 2011, when a number of mental health patients transferred to the new psychiatric Intensive Care Unit.



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To date, the results of the evidence-based design are promising, with accolades coming from patients, staff and clinical partners, and a number of immediate and practical benefits for patients, families and care teams alike. Further, the build has received numerous awards, including the 2007 Journal of Commerce Project of the Year, the Best International Project at the 2010 Public Private Finance Awards and the Community Award at the 2011 Commercial Building Awards. However, as can be expected after any major move, there are some minor

teething problems to resolve as patients and staff settle into their new home at the PCC and adapt to their new, redesigned work environments.

Still in the very early stages of the application of their evidence-based journey, VIHA remains cautiously optimistic, with only "soft" data supporting assumptions around cost and quality improvements at this point. However, it will not be long until the early implications of Canada's first truly evidence-based care setting become apparent, as data (pre and post move) are presently being collected and carefully analyzed by a team of internal and independent external reviewers (details of some of the key areas being measured are shown at Table 1). While we can share only the promising beginnings of VIHA's experience in this article, we feel that with the evidence-based design and construction of the PCC, a corner has been turned in building better healthcare facilities. We strongly encourage other healthcare organizations to join the Center for Health Design and VIHA in the quest to enhance quality and safety by incorporating evidence-based designs into capital projects. Our patients, families and communities should expect nothing less. **HQ**

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