



Lessons from New Designs
The Medical Ward of the 21st Century



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Medical Ward of the 21st Century



Challenge/Opportunity

- There is a need for innovation in health care:
 - Preventable deaths (~20,000 per year)
 - Evidence-care gaps
 - Workforce retention
 - Lack of continuity across care providers & sectors
 - Inefficiency
- Opportunity:
 - Renovation required on a unit built in the 1970's



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Key Milestones

- Unit 36 Opens (May 2004)
- Development of the W21C Research & Innovation Agenda (2004 - present)
- Strategic alignment with Alberta Health Services (AHS) and University of Calgary (U of C) goals
- Numerous funding successes
 - Philanthropy, research grants, business sector
- Funding received to build Research and Innovation Centre (January 2008)
- Research and Innovation Centre Opens (July 2009)



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What is the Living Laboratory?

- A state-of-the-art medical teaching unit at the Foothills Medical Centre (FMC).
- A super-imposed research agenda involving Patient Safety and Quality of Care.



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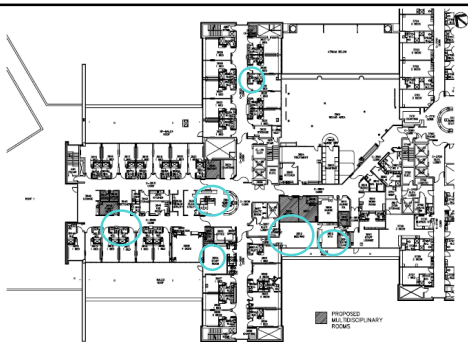


Mission Statement:

“To innovate, create, educate, and evolve to build new paradigms of health care delivery.”



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calgary health region
Alberta Health Services

FMC - Special Services Building - PCU Unit 3B
27 Jun 2007 Scale N1A



Research and Innovation

• Multidisciplinary team

- Medicine
- Nursing
- Para-medical disciplines
- Engineering
- Computer Science
- Environmental Design
- Communications
- Psychology
- Sociology
- Anthropology
- Various faculty from outside Calgary
- Industry partnerships



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Innovation Projects

- Seamless Discharge Innovation
- Remote Vital Sign Monitoring
- Provider Wellbeing
- RFID-WiFi Location Tracking
- Smart Camera System
- Patient Safety Monitoring – XSENSOR Technology
- South Health Campus – Simulation in Health Care
- Infection Control



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Smart Camera System

- Calgary technology
- Motion-sensing
- Potential clinical applications
 - Fall prevention
 - Tracking recovery



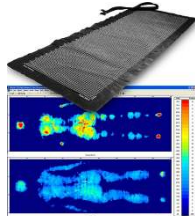
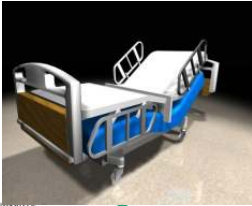
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Patient Safety Monitoring

XSENSOR Technology

XSENSOR PatientShield® is a hospital bed overlay designed to continuously monitor patient body pressures on any mattress surface in order to reduce the occurrence of pressure ulcers.



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South Health Campus:

Simulation in Health Care

- 44 acre hospital in South Calgary
- Evidence-informed decision making into the planning and design:
 - Patient simulation
 - Usability engineering/Human Factors
- Identify potential unsafe conditions
- Provide timely feedback to designers



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South Health Campus



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South Health Campus

Problem:

A major challenge in health services delivery and facility planning is finding and applying relevant evidence to inform decisions.



Solution:

Partnership between the University of Calgary (U of C) and Alberta Health Services (AHS) to address challenges of safety and quality of care through the development of a "Ward of the 21st Century" (W21C).

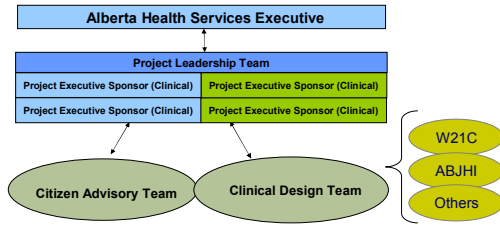
- To optimize knowledge translation, a knowledge exchange relationship between the W21C and the SHC was developed.
- Decision makers, researchers and clinicians work collaboratively throughout the research process to inform SHC planning.



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Stakeholder Engagement



Inform, Advise, and Consult on clinical and operating processes, technology and facility design for the Campus



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SHC Mock Up Simulations

SHC Project Vision

"The future of health care"

SHC Project Mission

To engage all partners in building a campus that inspires opportunities for health and healing

SHC Mock-Up Objective

To support the SHC Project Vision and Mission by providing users with an opportunity to respond to design decisions and provide valuable input that will improve the safety and quality of health care at the SHC



ED Room Mock Up, SHC



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Mock Up Simulations (cont'd)

Purpose:

To embed evidence-informed decision making into the planning and design of the SHC hospital.

Results:

- Development of a large-scale research project
- Utilizing patient simulation
- Usability engineering
- Investigate new architectural designs and equipment in patient care rooms (ACU Room, ED Examination Room, Outpatient Room, ICU, and Operating Room)



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Conclusions

An integrated model of knowledge translation enhances:

- Planning of care processes
- The use of technology
- Facility design



Establishing knowledge translation practice in the planning phases of the SHC project will help achieve optimal design and care processes and is essential to creating a culture of innovation and best practice in the long term.



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Infection Control

- Extensive renovation/ redevelopment of an existing general medical ward was completed at the Foothills Medical Centre in early 2004
- Opportunity to measure infection rates in a pre post design study



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Background

- Nosocomial infections are a major contributor of adverse events, occurring in 3-20% of all acute care admissions
- Importance of optimizing design standards to maximize patient safety and prevent nosocomial infections increasingly recognized
- Recent evidence based review by Ulrich 2004 re links to nosocomial infections:
 - ratio private to multi-bed rooms
 - number of handwashing sinks
 - ease for handwashing, and
 - air handling



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Background (cont'd)

- The Foothills Medical Centre ~900 beds
- An extensive renovation of a general medical ward with optimization of physical plant design relevant to infection control provided an opportunity to conduct a natural observational before - after study to assess the impact of physical plant design



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Methods

- Previous 38-bed ward was over 80% multi-bed rooms (n=4) with single washroom and no dedicated hand washing sinks
- Highlights of the 36-bed ward included:
 - 28 private rooms with private bathrooms - 10 of which had negative pressure air handling
 - 4-bed observation room with bedside toilets
 - dedicated zonal configuration
 - ergonomically placed hand washing sinks
 - oversized bathrooms with wall mounted toilets and stainless steel fixtures
 - double outlets for oxygen and suction in each room
 - smart headboards
 - point-of-care wall mounted equipment
 - stainless steel door base and edging
 - extra door width



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Methods (cont'd)

- Before-after analysis (2 years prior to move in historic design 4-bed rooms and 4 years post move to newly renovated ward)
- Differences in incidence density were compared using the large-sample test.



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Results

- During the fiscal years 2002-04 vs. the fiscal years 2004-08, the nosocomial incidence density (1000 patient days) for MRSA, VRE and *C. difficile* were as follows:
 - MRSA 0.48 vs 0.44 (NS)
 - VRE 0.74 vs 0.04 ($p < 0.0001$)
 - *C. difficile* 1.77 vs 0.87 ($p < 0.0001$)



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Results (Cont'd)

- Overall rates of all three nosocomial pathogens was significantly reduced ($p < 0.0001$) for the same time periods
- Overall community cases of MRSA/VRE and *C. difficile* admitted to the ward increased by 2.7 and 1.9 fold/month, respectively, over the same time periods
- All other factors remained the same



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Conclusions

- Findings support the role of enhanced physical plant design and engineering controls in a general medical ward in limiting transmission of nosocomial pathogens



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General Learnings

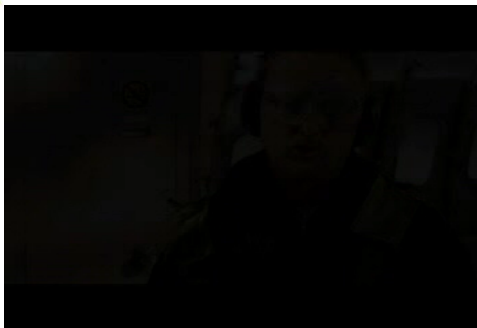
- Observation Room
- Noise
- Sinks
- Staffing
- IP&C
- Knowledge Translation



W21C Research & Innovation Centre



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Thank You

Health

Technology

Knowledge

Innovation

UNIVERSITY OF CALGARY

Alberta Health Services

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