Applying Lean Thinking and Principles in Building Design

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C&W Redevelopment Project
About Provincial Health Service Authority (PHSA)

PHSA plans, manages and evaluates specialty and province-wide health care services across the province of British Columbia.
Children’s and Women’s Health Center Redevelopment Project

- A replacement of current Children’s inpatient building

- Three phases
  - Demolishing and relocation
  - Acute Care Center
  - Renovation

- Estimated $682 M for all phases
PHSA has been on Lean journey for almost 4 years

90 RPIWs (Rapid Process Improvement Workshops) in Children’s & Women’s Hospital in these 4 years

Areas that had RPIWs include but not limited to:
  – Women’s maternity service line
  – Neonatal Intensive Care Unit
  – Children’s Pediatric Intensive Care Unit
  – Children’s Emergency Department
  – Children’s Surgical Service Line
What is 3P?

• **Production Preparation Process**

• Data driven qualitative and quantitative analysis to inform design decisions

• Often used when
  – Designing new facilities or layout
  – Adding new service lines or products
  – Creating new processes or changing providers
Event Week

- Lean Education
- 7 Ways Exercise to warm up
- Review data and current state flow to identify waste
Event Week - Understanding Current Service Flow

- Flow of Patient
- Flow of Providers
- Flow of Medication
- Flow of Information
- Flow of Equipment
- Flow of Supplies
- Flow of Process Engineering
- Flow of Family
- Flow of Food

Tracking flows on current building

Tracking Activities on Takt Time Map
Developing Future Site Wide Service Flow
Develop Future Service Flow For Service Area

Blue Dots – Necessary non-value added activities
Red Dots – Non-value added waste still exists

Simulate patient flow according to waterfall (leveled workload) in future layout
Define Future Space Requirement

- Determine room types
- Determine equipment requirements
- Mock up room and space requirements using paper doll and lego
A Few Principles For the Future State

- Patient and family center
  - Value stream from patient arrival to patient leave instead of departmental focus (Horizontal vs. Vertical)
- Minimum patient and provider travel distance
- Level workload / waterfall schedule
- Resource allocation based on Takt Time (patient demand)
- Flexibility in the utilization of the space
- Standardized patient room
- Standardized work
- Visual Management
- Just In Time delivery
Mock-Ups at Room Levels

• Objectives of mock up
  – To determine an appropriate room size(s) that allow the care team to provide optimal patient and family care in the most efficient way.

• Types of Rooms
  – NICU
  – PICU
  – Inpatient Room
  – Emergency Exam Room / Clinical Decision Unit
  – OB-OR, Labor Delivery Room and High Dependency Unit
  – Physiotherapy room
  – Rehab room
  – Anesthetic Care Room
Teams In Action

PICU

Inpatient & Oncology

Elevator

Emergency

NICU

Birthing
What did 3P tell us?

- How patients flowed to the site and into the building based on services and care required
- Volumes of patients
- Where models of care needed to be changed
- Where there was waste in the system
- What were the appropriate sizes of key rooms and spaces
- How many of each type of room would be required based on TAKT time and waterfall scheduling
- What the adjacency relationships needed to be for best flow
- Allowed compliance team to create the Indicative Design
What is IFD?

- A systematic design approach that embraces principles of lean thinking and integrates the expertise of all stakeholders in a simultaneous way using data to increase value

Three stages of IFD

- Evaluation and Planning Stage
- Design and Development Stage
  1. Project Management and Governance Phase
  2. Conceptual Design Phase
  3. Functional Design Phase
  4. Detailed Design Phase
- Delivery and Implementation Stage
  1. Work Design – Process Standard Work and Reliable Methods
  2. Leader Standard Work
  3. Daily Management System and Daily Accountability
  4. Visual Management
Leader Sponsor Group:
- Ultimate accountable for the building and system transformation
- Define project expectations
- Develop project goals and metrics
- Hold all participants, teams, organization accountable
- Own the project

Core Team
- Decision making team for the design
- Establish the principles and clarify assumptions that guide design action
- Participate in the development process from beginning to end
- Act as a steward of the lean principles and assure organizational alignment as decisions are made

IFD event Team
- Provide consultation and input to the IFD
Reasons

• Many breakthrough ideas have been generated through 3P workshops and room mock up event but many of them have not been investigated and tested

• The organization is continuing on Lean imPROVE journey but these improve activities are not integrated with the project Lean activities

• The ownership of the project
  – What is in and what is out
  – Who should be responsible for the building design concepts
  – Who should be responsible for the implementation
The Project Governance Session

Develop the project charter

Establish Guiding Principles (Examples)

- **Values / Belief / Philosophy**
  - Patient Family Centered Care
  - Safety first
  - Create and build a green and healing environment
  - Define value from the perspective of patients as they move through the value stream

- **Assumption**
  - The project has a fixed budget and time line
  - There are system solutions in place for the greater overall good that will deliver the best care
  - Our academic mandate is considered as important and integral to delivering clinical care
  - We will have an engaged work force – culture shift to an organization of problem solvers

- **Principles**
  - The building is designed and organized in value streams based on common patient flows or logical patient groupings.
  - Support services are integrated within the value streams as patients move horizontally through the system
  - Forms follow function
  - Variation drives waste
  - Standardization is the source of efficiency and flexibility and is the foundation of continuous improvement

- **Concepts**
  - Single piece continuous flow and pull are essential in eliminating blocked flow.
  - Line of sight and visual management promote flow and identify abnormal conditions at a glance
  - Cellular processing or subassembly designs are utilized to promote single piece flow and dedicated services
  - Level loading is used to reduce waste
  - Just in time approaches support supply and material delivery
Impact of IFD Planning

Initial Inpatient Concept

IFD Inpatient Concept
Results of IFD Findings

Initial Concept PICU

IFD Concept
Things to know before you start

- Lean design is the most effective when the organization has had a lean management system in place for several years.
- Organization leaders must champion the process.
- Requires more up-front planning time than a traditional design approach.
- Requires ability to collect and analyse large amounts of data.
- Designers/architect team must be on all events and function as a team player instead of information collector.
- Requires a large dedicated space where mock-ups can be built.
Key Benefits of IFD

• Mitigates risk of change requests in design when the staff are able to experience the flow rather than see a 2-dimensional design
• Generates huge buy-in from physicians and clinical staff who take ownership of clinical decisions that drive design
• Makes it obvious to staff where time is wasted in travelling between areas and facilitates design decisions to remove that waste
• Facilitates discussions of the need for standardizing models of care
• All participants in events have an equal voice in the event – staff, families, physicians
Lean Design and Public Private Partnerships (P3)

• Lean design must be built into P3 procurement process path
  – More time required for planning

• Many P3 processes require an Indicative Design as part of the RFP documents.

• Bidders often submit a design that is different than the Indicative Design

• Contract language will have to be clear about maintaining lean flows in the RFP design submissions