Supply Chain Resilience in the Post-Pandemic Future

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COVID19: the Fragility of Health Supply Chain

- Critical Supply shortages, reliance on single geography sourcing, no surge capacity

- Global “Me First” export policies, limited ability to identify alternative product sources accurately

- Lack of digital infrastructure linking patients, infection rates, contact tracing, products (PPE, Vaccines), and testing

- “Moral Imperative”: supply chain no longer just a corporate function, supply chain is now a moral imperative
Objectives:
1. Conduct a comparative analysis of provincial health system supply chain infrastructure and processes that support health services capacity to deliver care.
2. Measure the digital maturity of supply chain infrastructure to examine how digital maturity influences COVID-19 management and outcomes in Canadian provinces.
3. Examine policy frameworks that support health services procurement, product sourcing and validation.
4. Examine the effectiveness of federal-provincial-territorial supply chain coordination.

Provinces:
British Columbia, Alberta, Manitoba, Ontario, Quebec, Nova Scotia, Newfoundland and Labrador
CRITICAL SUPPLY SHORTAGES

Supply allocation prioritized to hospitals

- PPE conservation using allocation formulas: “hospitals 1st”
- Long term care, home care sourced PPE not prioritized initially.
- GPO’s and distributors assigned allocation based on contracted volumes only.

Severe shortages in early phase (March-April)

- Absence of pandemic stockpile
- Global race to source PPE, < 1% suppliers identified were viable
- Intense competition for sources of products
- Product Identification inconsistent, counterfeit and poor quality products

“Just in Time failed” (domestic sourcing)

- Local businesses pivoted production of critical supplies (face shields, gowns), couldn’t certify
- Breweries made hand sanitizer
- Legislation required to overcome trade barriers to domestic suppliers
- Federal agencies competing with provinces for supply
DIGITAL INFRASTRUCTURE: “FLYING BLIND”

- No digital infrastructure able to track use of critical products such as PPE, the exception is Alberta
- Limited or no ability to accurately forecast demand of PPE
- Tracking distribution and utilization of products very limited.
- Relied on manual counting, utilization models with high rates of error.
- Created dashboards (Tableau) to track utilization, no jurisdiction had accurate utilization of supply
Workforce Impact

- Fear and Uncertainty: fear of contracting virus and bringing it home to their family, high absenteeism

- Lack of Confidence in safe work environments, approx. 20% resignation rate, high infection rates among workers

- PPE Directives changed frequently:
  - Allocation strategies (PPE) replaced precautionary principles
  - Loss of Professional Autonomy to make decisions

- Transparency of supply chain data engagement of clinicians in supply strategy was associated with higher levels of confidence in their workplace, lower rates of absenteeism
What is Clinically Integrated Supply Chain?

Tracking and traceability of products, care processes, provider teams, all linked to individual patient outcomes.

A Strategy for Strengthening Supply Chain Resilience

Real World Evidence of Value
Key Features of Supply Chain Resilience

1. **Integrated Data Infrastructure linking products to patient outcomes**

   - **ERP**
     - Supply Chain Data

   - **EMR**
     - Patient Data

   - **Integrated Data Set**

   - **Analytics Engine**
     - Real world informs solutions and innovation priorities, for specific patient segments, to enable procurement teams to procure priority solutions that offer best outcomes for patients

   - **Predictive Analytics**
     - Enabling proactive risk management, personalized to population segments

   - Procurement Best Practice informed by real world evidence emerging from supply chain data, identifies solutions needed, products which work best for patients
The Supply Chain Pathway to Personalized, Precision Health Care Delivery

- **Global Standards Adoption** enables global traceability of products used in care processes.
- **Product Traceability and Recall** is fully automated, which offers accurate case costing at the individual patient level.
- **Transparency of Patient Care Outcomes Across the Journey of Care** tracks outcomes for patient populations and conditions under which best outcomes are achieved.
- **Personalized Health System** Proactive Care delivery informed by real-world evidence of outcomes.
- **Inventory Optimization** reduces waste, generates 7:1 ROI and cost savings offer potential for self-funding.
- **Predictive AI Tools** identify patients at risk, cue clinicians to proactively intervene to reduce risk, and support health outcomes at individual patient level and population segments.
- **Improved Quality and Safety Outcomes, reduced medical error** – clinically integrated supply chain tools are used by program teams to measure quality and safety outcomes in real time at individual patient level to reduce medical error.
The Urgency of Tracking Outcomes

The 10 highest grossing drugs in the USA, number of people that improve (blue) vs. number of people that fail to improve (red)

Consider the Value:
- Cost of drugs
- Emerging genomic therapies
- Harm or adverse outcomes for patients

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**IMPRECISION MEDICINE**

For every person they do help (treat), the 10 highest grossing drugs in the United States fail to improve the conditions of between 3 and 24 people (blue).

1. ABILIFY (aripiprazole) - Schizophrenia
2. NEXIUM (esomeprazole) - Heartburn
3. HUMIRA (adalimumab) - Arthritis
4. CRESTOR (rosuvastatin) - High cholesterol
5. CYMBALTA (duloxetine) - Depression
6. ADVAIR DISKUS (fluticasone propionate) - Asthma
7. ENBREL (etanercept) - Rheumatoid arthritis
8. REMICADE (infliximab) - Crohn’s disease
9. COPAXONE (glatiramer acetate) - Multiple sclerosis
10. NEULASTA (pegfilgrastim) - Neutropenia

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Personalized medicine: Time for one-person trials
Nicholas J. Schork

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2. Data capture at the Point of care with Automated Clinical Workflows

- Point of Care Capture of Data – products, procedure, patient and provider data, builds clinician confidence

- Transparency of product utilization, inventory, to inform accurate modeling of risks such as shortages

- Automated recall and expiry alerts to clinicians, to advance quality and safety.
3. Integration of Supply Chain and Clinician Teams

• Supply chain teams work collaboratively with clinicians to make decisions informed by data to support and sustain on quality and safety
• Outcomes:
  • **Transparency**: builds confidence among clinician teams
  • **Procurement**: informed by evidence of value (patient outcomes), capacity to surge product volumes, not lowest cost
  • **Outcomes tracking**: patient outcomes, workforce outcomes linked to supply chain capacity and product performance.
  • **Standardization of care to reduce variation**: reduced error, elimination never events, standardized product use
  • **Real World Evidence** of Outcomes and Value
Surgeon Performance Indicators

Supply Cost/Case

Block Utilization

Readmission Rate

Use of Pathways

Patient Satisfaction

Supply Cost/Case

Block Utilization

Readmission Rate

Use of Pathways

Patient Satisfaction
Data Driven Decision Making – Actionable Analytics

React & Respond

Predict & Act
- Prescriptive Analytics/Optimization
  - Prescriptive: What should I do?
    - Apply advanced analytic techniques to make specific recommendations
    - Decisions automated or Provides Decision Support
- Predictive: What’s likely to happen?
  - Predictive: What’s likely to happen?
    - Historical Patterns being used to predict specific outcomes using algorithms
- Diagnostic: Why did it happen?
  - Diagnostic: Why did it happen?
    - Ability to identify root-cause
    - Ability to remove/isolate confounding information

Bubble Size:
- Complexity

Value

Maturity
Governance and Leadership

- Supply Chain as a **strategic asset**
- **Transparency** across the organization decisions
- **Outcomes informed decision** across the journey of care
- **Workforce**: automated, safe work environments

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**Data >>> Information >>> Knowledge >>> Action >>> Accountability**
Clinically Integrated Supply Outcomes Model

Supply chain infrastructure to support system improvement and personalized care
CISOM Key Focus Areas

**Automation**
- Point of Care Capture products, procedure, patient and provider data
- Automated EDI exchange with vendors
- Automated recall and expiry alerts to clinicians
- Online adverse event reporting and analytics to proactively track outcomes

**Predictive Data Analytics**
- Proactive alerts at point of care
  - *Eg. Risk of sepsis, guard against “never events”*
- Proactive and predictive management of *risk* to patients, clinician teams
- Automated adverse event tracking Enables population segmentation based on outcomes and value

**Clinical Integration**
- Procurement decisions *informed* by clinicians, outcomes data; Reduced Variation in Care to drive standardization
- Quality and safety outcomes *tracking*
- Real World *Evidence* of Outcomes and Value

**Governance & Leadership**
- **C-Suite**: view supply chain as a strategic asset
- Transparency = Accountability for Outcomes
- Clinicians lead Quality and Safety initiatives,
- *Patients* have access to digital tools, product data, report progress and outcomes.
Global Evidence of Return on Investment: Three Health Systems

**Alberta Health System**
Alberta, Canada

- 7:1 ROI
- $301,438,786 in savings over 7 years, inventory only

**National Health Services, England (NHS), UK**

- 4:1 ROI by year 3 from inventory savings
- £30M savings/month when scaled to all Trusts
- 70% reduction in Never Events

**Large (44 Hospital) Health System, Midwestern US**

- $1 billion in savings, due to inventory management
- 29.5% decline in labor costs
- 33% decline in supply costs
**Impact and Value of Clinically Integrated Supply Chain**

(Based on supply chain data from 10 North American Hospitals, 2018)

<table>
<thead>
<tr>
<th>Performance Measures</th>
<th>Improvements</th>
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<tbody>
<tr>
<td>Clinical engagement in decisions</td>
<td>-55% to -80%</td>
</tr>
<tr>
<td>Orders, Replenishment, Stock Taking</td>
<td>-36% to -78%</td>
</tr>
<tr>
<td>Stock-outs</td>
<td>-90% to -98%</td>
</tr>
<tr>
<td>Inventory value</td>
<td>-20% to -53%</td>
</tr>
<tr>
<td>Expiries</td>
<td>-37% to -75%</td>
</tr>
<tr>
<td>Expense write-offs</td>
<td>-50% to -63%</td>
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Payback within 12 months (annualized)

- Work environments are much more automated, workflows streamlined
- Near real time flow of data at the point of care
- Greater Transparency:
  - Alerts of risk to reduce error
  - Utilization tracking of critical/high cost products
  - Product/care procedure performance linked to patient outcomes

Supply Chain Implementation: Automated capture of product use with point of care scanning across highest cost units and highest revenue/risks
Value For Patients

Transparency
- Patients can access all of their data
- Can track their progress and outcomes
- Report their progress and outcomes
- Can readily identify risk and respond proactively

Safety
- Point of care alerts to potential error: wrong medication, wrong surgery, allergic risk
- Evidence of 70% reduction of “Never Events”
Value For Clinicians And Provider Teams

Automated Work Environments
• Seamless flow of data to the point of care
• Integrated analytics automates workflow, reduces documentation time
• Proactively cues clinicians to risk to enable preventive measures

Confidence in Safety and Quality
• Visibility to critical products on hand, utilization
• Confidence in work environment
• Transparency of Practice variation
Features of Supply Chain Resilience (emerging)

• Digitally enabled supply chain infrastructure integrated into care delivery
  • Creates transparency
  • Builds confidence in supply capacity for safe care and safe work environments
• System wide connectivity of supply capacity at jurisdiction/country level
  • Manages competition within systems during times of shortage
• Data driven decision making focused on outcomes and risk mitigation
  • Supply chain expertise at the strategic level of decision making
  • Data mobilized to track utilization accurately, predict risks to enable proactive decisions
• Diversified, Balanced Supplier Networks – domestic and global
  • Greater self-reliance within country/jurisdictions
  • Tolerance of surge in demand or unexpected disruptions
Features of Resilient Supply Chain (cont’d)

• Flexibility in Supply Chain Responsiveness
  • Procurement models focused on purchasing “surge capacity” from suppliers
  • Stockpile management for critical products

Emerging Outcomes

• **Resilience** to sudden surge in demand critical shortages, informed by predictive approaches to risk management

• **System Learning**: data driven focus on outcomes and proactive risk mitigation, potential for global systems learning from each other.

• **Equity**: tracking outcomes across population segments to identify variation, risk to inform equitable outcomes
The Critical Role of Supply Chain for Digital Health Ecosystems

- Data stewardship, privacy, security, workforce integrity are foundational.
- Mobilize and enable data exchange across the journey of care.
- Transforms data into knowledge, insights and outcomes.
- Enables people to manage health, predicts risks.

Clinically Integrated Supply Chain

POPULATION HEALTH & WELLNESS

DIGITAL CAPACITY
- Individuals are meaningfully connected to providers to manage health.

ANALYTICS & TRACEABILITY: Outcomes

INTEROPERABILITY: Democratization of Data

GOVERNANCE & WORKFORCE
Beyond Tomorrow
(Berwick, 2020)

- Speed of Learning – faster
- Value of Standards – reduced variation in care
- Protecting the Workforce – trust, confidence in safe work environments
- New Models of Care – meaningful connectivity with patients
- Preparedness – resilience to disruptions
- Overcome Inequality – access

“Fate will not create the new normal, choices will”
Thank you!

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