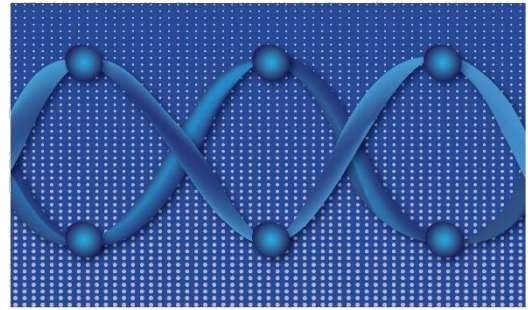


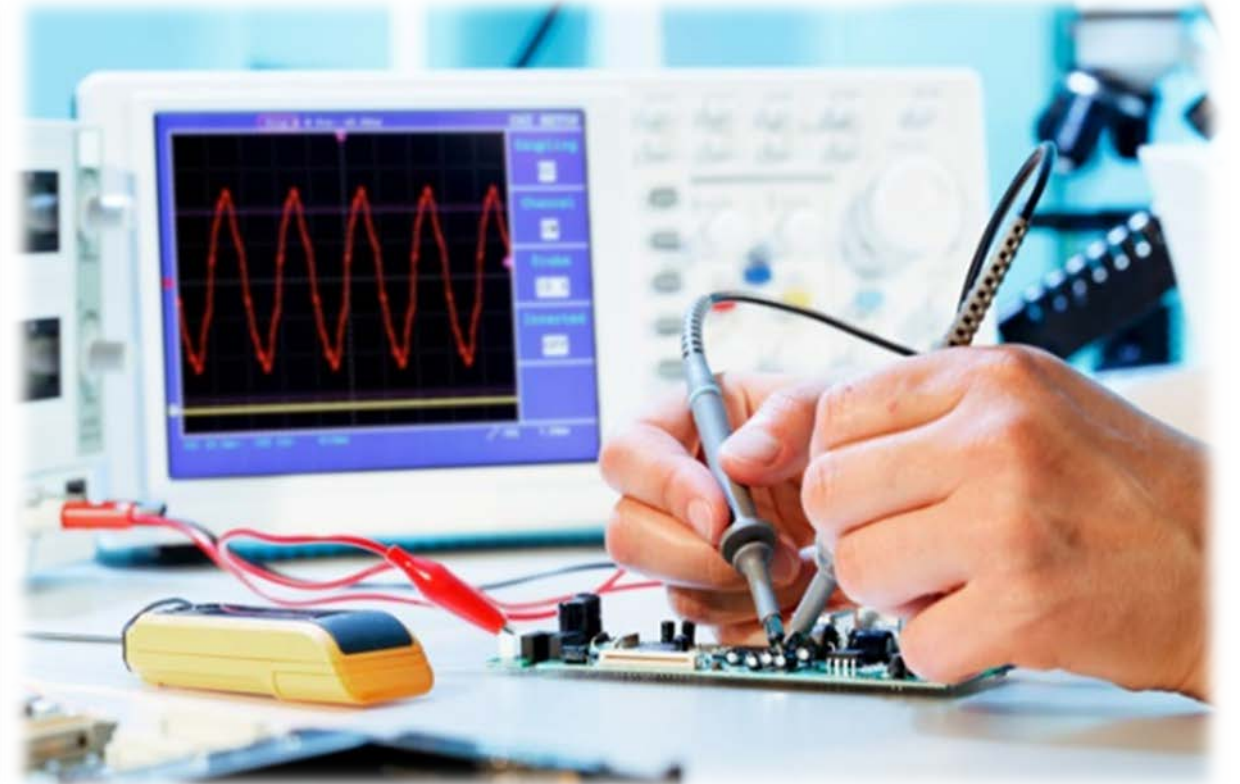
Importance of standards for fostering the medical devices supply chain

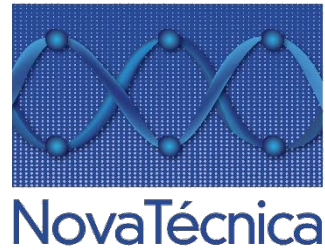
**Bogotá, April 12th 2018
GS1 Healthcare Event**

**Esteban Lizarazo Lizarazo, MBA, 6-sigma BB,
Doctoral Candidate
CEO- Group Amarey**



NovaTécnica





INFORMATION SYSTEMS

- PATIENT'S SAFETY
- TECHNOLOGY
- EFFICIENCY



Added Values to Hospitals Services

- Social Responsibility
- Distribution and SC network
- Structure
- Results
- Customers satisfaction

Hospital Logistics

- Outsourcing of the internal supply chain of hospitals.
- **New Information Systems, New Inventory Policies.**
- **New Process re-engineering.**



Actual Doctoral Research stage:

I just finished my Systematic Literature Review:

RQ1: What drives inventory management performance within a hospital?

RQ2: How different is inventory management performance between developed world and developing world?

Lead Supervisor: Dr. Nicky Yates

Assistant Supervisor: Professor Michael Bourlakis.

Previous research work in lateral transshipments in the blood Supply Chain (NHS, UK)

	1st	2nd	3rd	Weighted totals
Michigan State University	28	26	11	147
Massachusetts Institute of Technology	27	9	16	115
Pennsylvania State University	20	12	15	99
Arizona State University	13	16	4	75
Stanford University	15	7	10	69
Georgia Institute of Technology	12	12	7	67
Cranfield University	16	7	3	65
University of Tennessee	10	4	2	40
Harvard University	5	5	8	33
Ohio State University	4	6	5	29
Purdue University	3	3	3	18
INSEAD	3	2	2	15
Rutgers University	2	4	1	15
Warwick Business School	2	4	0	14
University of Karlsruhe	1	2	2	9

Source: SCM World Chief Supply Chain Officer Survey 2013

Findings

RQ1: What drives inventory management performance within a hospital?

- 1. Inventory Policies (Influenced by RFID and Bar-codes)***
- 2. Information systems (traceability, data standards, RFID)***
- 3. Power and interest of Stakeholders (physicians, regulators)***

Findings

RQ2: How different is inventory management performance between developed world and developing world?

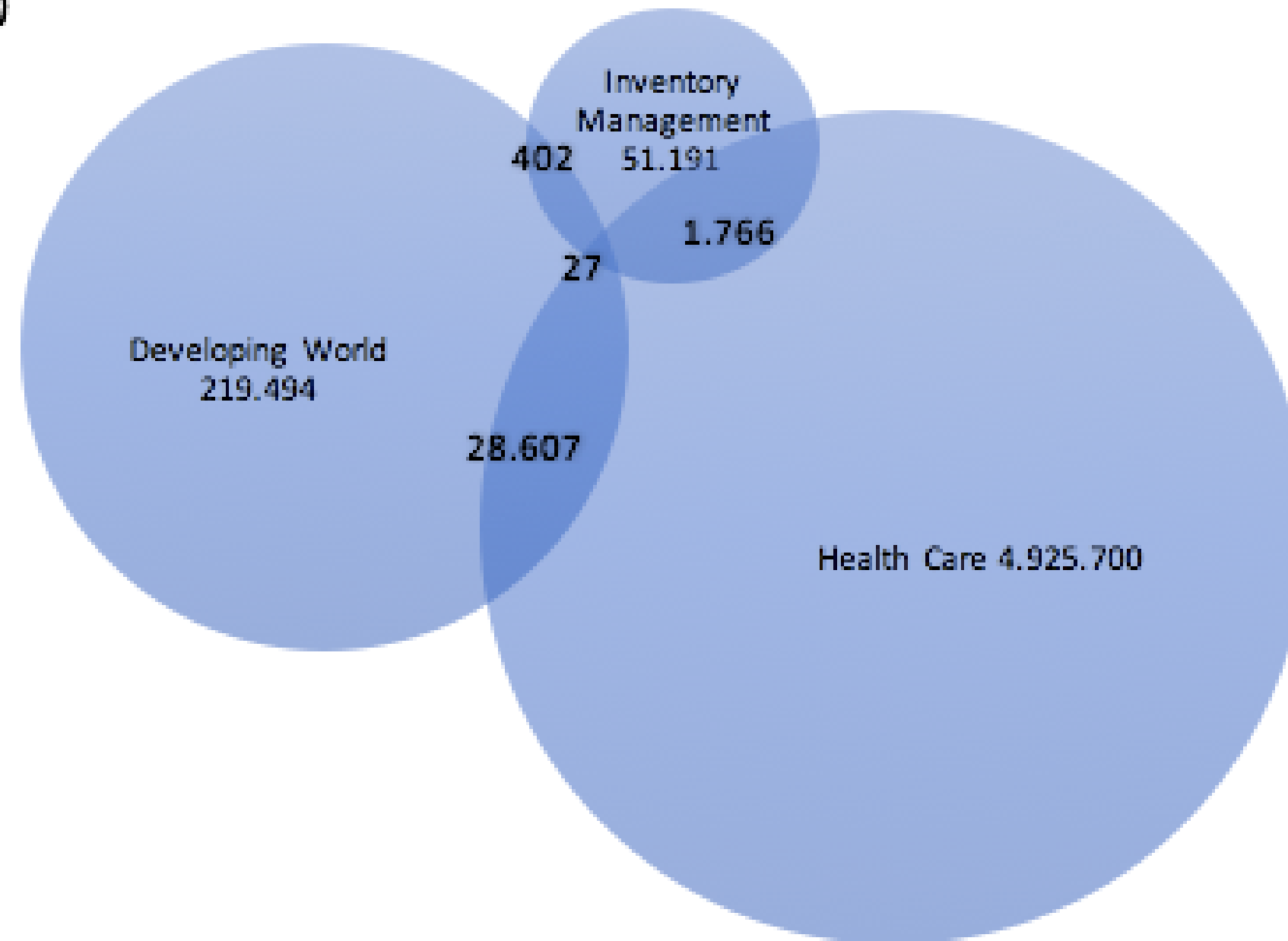
1. Information Systems

2. Special Characteristics (interest rates, currencies, cash flow, regulators, local logistics infrastructure, training in Supply Chain)

3. Power and interest of Stakeholders (physicians, regulators)

A need to increase research in healthcare Supply

Number of publications in Academic Journals per literature domain (only peer-review articles)



Source: The Author.

More about complexity

- The supply chain management of the Hospital is more complex and knowledge-intensive than other traditional Inventory management on five factors (Chen, Preston and Xia, 2013b).
- First the needs of patients are diverse and require of accurate and adequate supplies (Beier, 1995).
- Second, an average hospital uses thousands of items in medical devices, drugs, pharmaceuticals and medical equipment and most of them are of high value and special for handling to avoid obsolescence and spoilage.

- Third, unlike the industry or retail there is a lack of universal product number classification system that helps to identify functional equivalent products that are important for standardisation and synchronisation for the SCM.
- Fourth, supply selections in hospitals are often influenced by physicians and it depends in criteria like training, brand experience and context-specific demands. In the other side, the purchasing areas of the hospitals are disconnected from the decision makers like physicians (Burns and Lee, 2008).
- Fifth, supply products are quickly changing due to innovation in technology and medicine and therefore obsolescence of purchasing items and a large based of suppliers are issues that Supply Chain Management must address

Complexity for medical devices

- “Complexity as previous explained is part of the context of healthcare inventory systems and surely, one of the most complex inventory system is the management of medical devices for surgical procedures” *The author, SLR Cranfield University*
- The optimization of the logistics of sterilized items has received little attention from Academia (Klundert, Muls and Schadd, 2008).

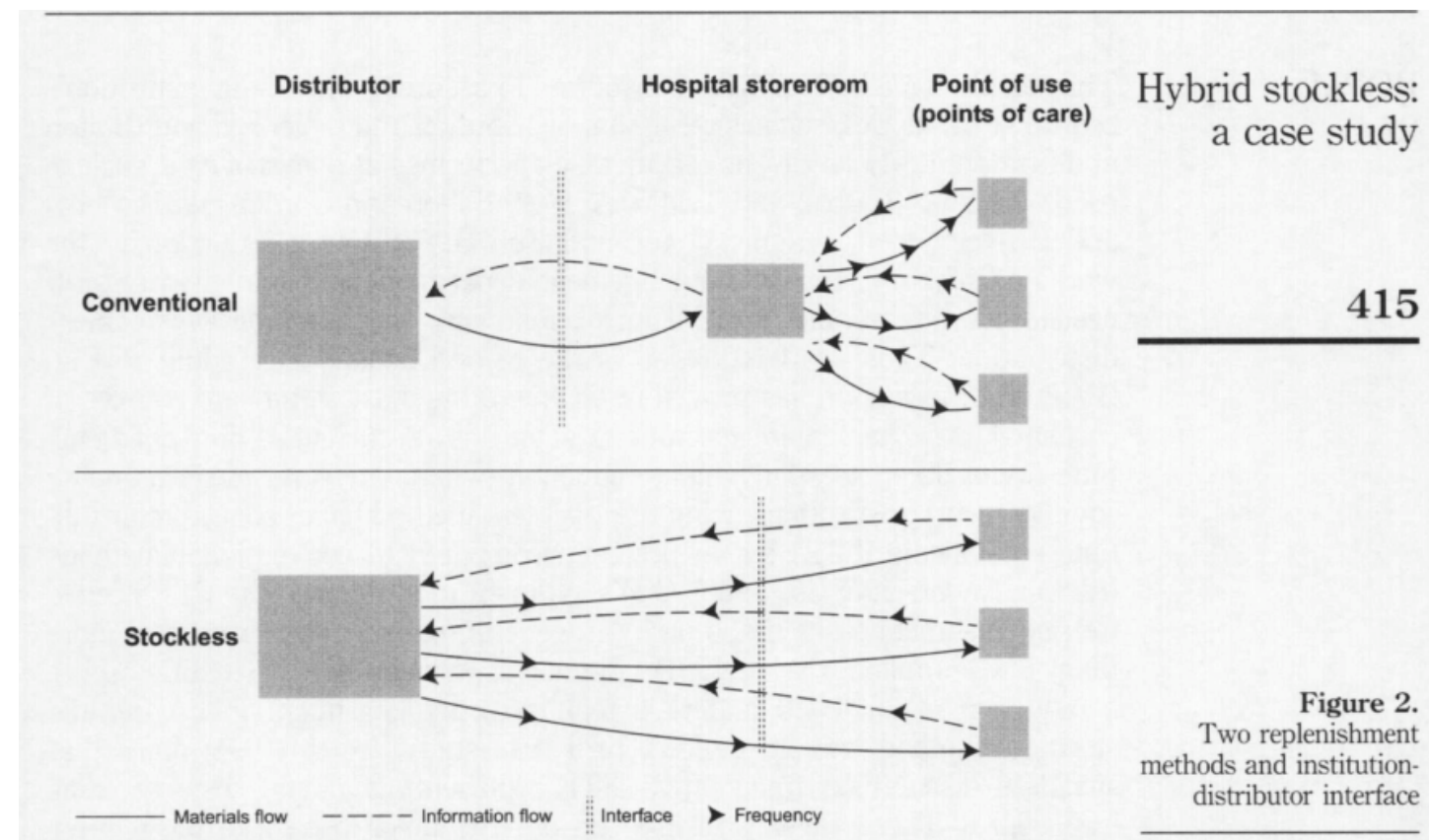
About Medical Devices Complexity...

About surgical related products, the SLR found that complexity is higher mainly because:

1. Many of the patients arrived unexpectedly,
2. The surgery of expected patients evolves in unexpected manner and therefore the need of extra sterile items could be needed.
3. Complexity of the nets for surgery, there could be lack of sterile items, sterile items that become unsterile.
4. The tailor-made nets that are used by different surgeons.
(Klundert, Muls and Schadd, 2008).

For Medical Devices a Hybrid Policy

- Rosales, C.R. et al. (2015) 'The 2Bin system for controlling medical supplies at point-of-use.', *European Journal of Operational Research*, 243(1), pp. 271–280.
- Rosales, C.R. et al. (2014) 'Point-of-Use Hybrid Inventory Policy for Hospitals', *Decision Sciences*, 45(5) Wiley-Blackwell, pp. 913–937.



Source: (Rivard-Royer et al., 2002)

Data Standards help Inventory management policy.

- From Periodic review policy to Continuous review policy
- Benefits are higher to PPI (Physicians preference Items)
- Integration to External Supply Chain enhances Level of Services and Inventory turn-over.

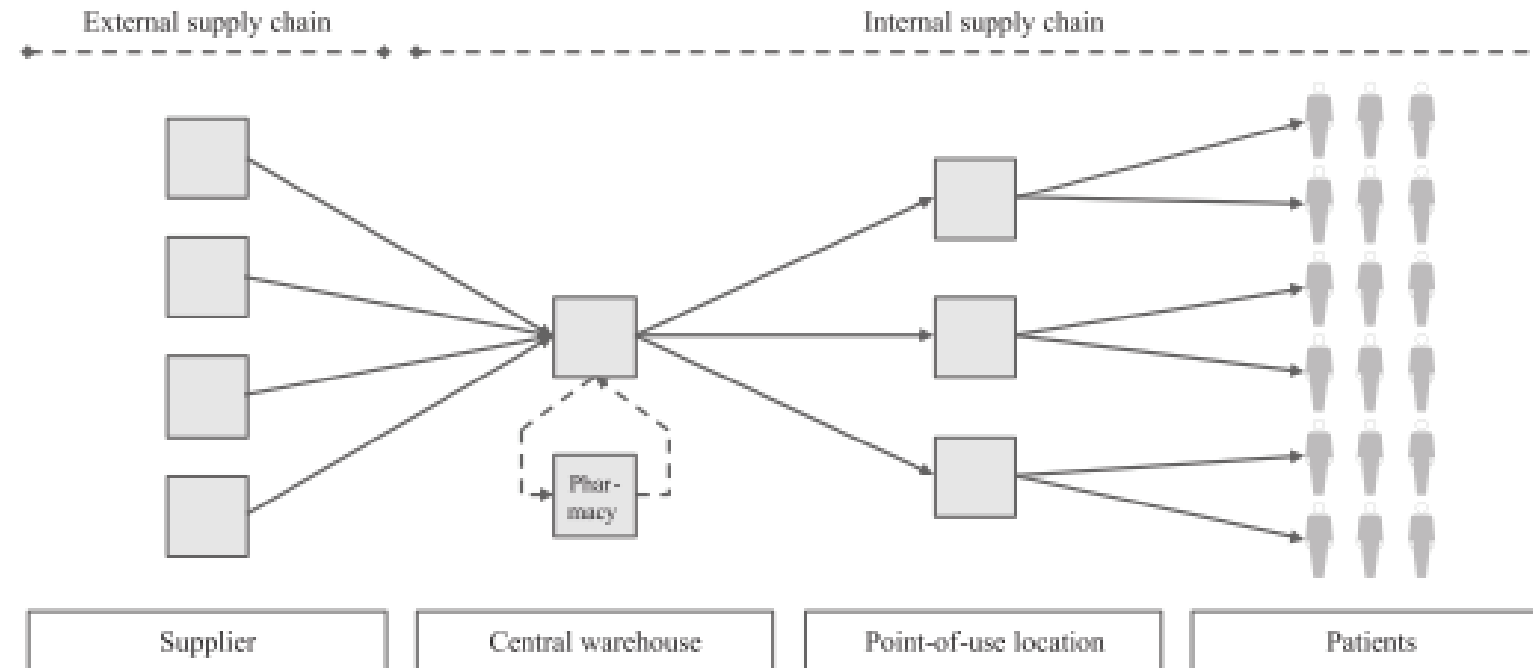


Fig. 5. Illustrative supply chain.

Source: (Volland et al., 2017)

Horizontal inter-arrangements

- The findings of this research were that horizontal inter-arrangements can benefit in better terms hospitals because of pooling the risk.
- From a geographic point of view, operation in a weak logistics service infrastructure can produce higher inventory costs, (in this study almost 40% higher than good logistics infrastructure) (Zepeda, Nyaga and Young, 2016).

IRON CAGE EXPOSED

In the other hand regulators are important in developing world context. Jarret's (1998).

The coercive pressure of regulators has had important benefits in other national healthcare agencies (Bhakoo and Choi, 2013)

Mimetic pressure

Normative pressure

Coercive Pressure

Wrap-up

- Data Standards have a enormous potential to foster Medical devices supply chain (PPI).
- In a developing world context Hybrid models could be a good alternative with data standards.
- Sterile Items for Surgery are the complex inventory items in the medical supply chain
- Future trends? Hospital collaboration? Importance of data standards
- Who Should start? Regulators? Vendors? Hospitals?