Clinical leadership and CIS implementation

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and the MUHC/CHUM OACIS team

OUTLINE

- The Vision
- The Implementation
- The Technology
- Our Experience

The VISION

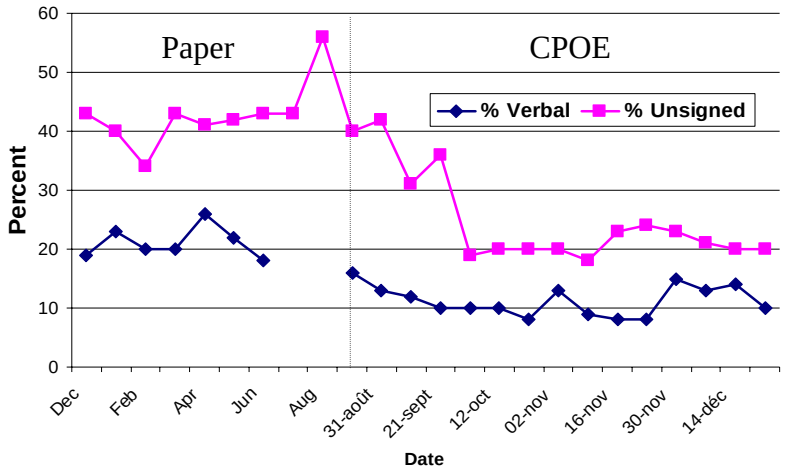
- Important to find **clinical arguments** to sell the project
- Important to dissociate IT from the project: make clinicians the owners
- **Change** is necessary to get to the next clinical level (generational buy-in)
- Important to never waver from “the vision” … but…
- Important to be flexible enough to make adjustments

What can a CIS do for you?

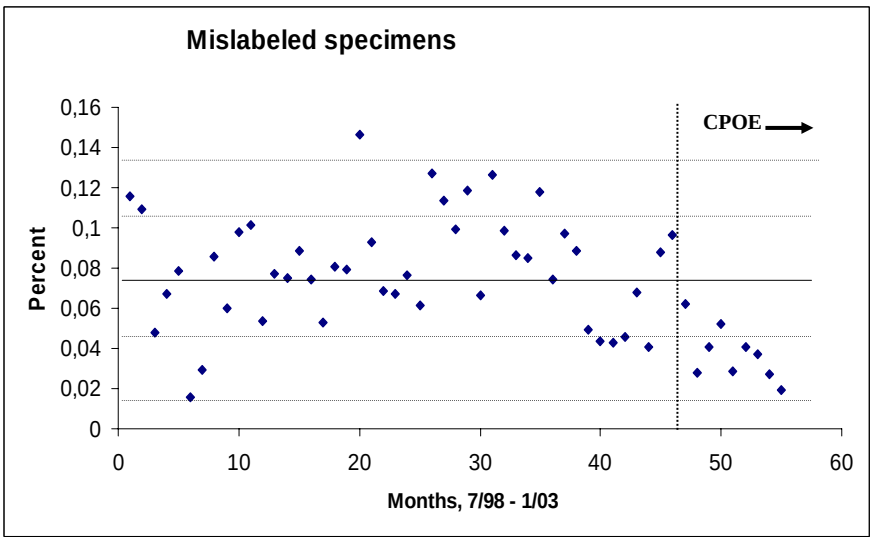
Proposed Benefits of CIS

- Improves **efficiency** of, and consistency in work processes
- Improves **communication** among health care providers
- Allows for **timely management** of complex clinical data
- Reduction of **medication errors**
- Improves **quality indicator documentation** by reducing duplication of data entry

Benefits: Verbal and Unsigned Orders



Benefits: Correct Specimen Labeling



Benefits: Timely information

Unit type	Total Orders	Total requiring adjustment	%	p-value
Neurology/Neurosurgery	203	43	21	
General Medicine	735	216	29	0.02 *vs. Neuro/NS*
Medical/Cardiac Intensive Care	1234	569	46	<0.01 *vs. General Med*
Medicine: Renal	308	209	68	<0.01 *vs. ICU*

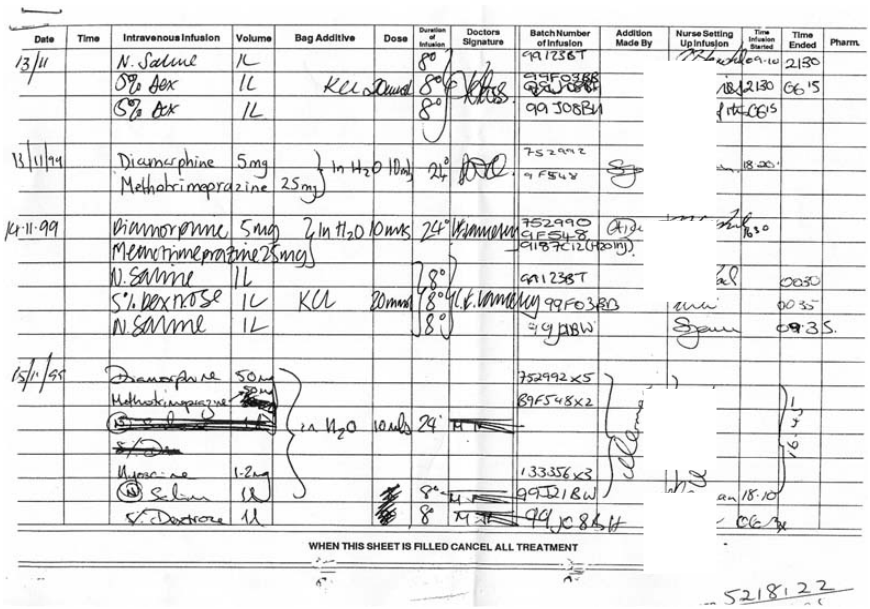
Oppenheim et al, NY Presbyterian Hospital

Electronic vs. Paper prescriptions

		Paper	Electronic	
Drug Name	**Illegible**	**62 (5)**	**0 (0)**	**p<0.0001**
Drug Dose	**Absent**	**25 (2)**	**3 (0.3)**	**p<0.0007**
	Illegible	**177 (15)**	**0 (0)**	**p<0.0001**
Admin. times	**Illegible**	**30 (2)**	**0 (0)**	**p<0.0001**
Start date	**Present**	**1143 (94)**	**1121 (100)**	**p<0.0001**
	Illegible	**45 (4)**	**0 (0)**	**p<0.0001**

Hughes DK, Farrar KT, Slee AL. Hosp. Presc. Eur. 2001; 1: 74-6

Electronic vs. Paper prescriptions



Date	Time	Intravenous Infusion	Volume	Bag Additive	Dose	Duration of Infusion	Doctors Signature	Batch Number of Infusion	Addition Made By	Nurse Setting Up Infusion	Time Infusion Started	Time Ended	Pharm.
13/11		N. Saline	1L			8°		9912367			09.10	2130	
		5% Dex	1L	KCl 20mmol		8°		99F0388			18.00	06.15	
		5% Dex	1L			8°		99 J08BH			06.15		
13/11/99		Diamorphine	5mg	2 in H_2O 10mls		24°		752992			18.00		
		Methotrimeprazine	25mg					9F548					
14.11.99		Diamorphine	5mg	2 in H_2O 10mls		24°		752990			16.30		
		Methotrimeprazine	25mg					CLE548					
		N. Saline	1L			8°		9912367				0030	
		5% Dextrose	1L	KCl	20mmol	8°		99F0388				0035	
		N. Saline	1L			8°		99J08W				0935	
15/11/99		Diamorphine	50mg	2 in H_2O 10mls		24°		752992x5					
		Methotrimeprazine	50mg					89F548x2					
		[illegible]	1L										
		[illegible]											
		Haloperidol	1-2mg					133356x3					
		N. Saline	1L			8°		9912184			18.10		
		V. Doctors	1L			8°		99J08BH			06.15		

WHEN THIS SHEET IS FILLED CANCEL ALL TREATMENT

5218122

Adverse Medical Events

<u>IOM report estimates:</u>

- Adverse events in hospitals are responsible for 75,000 to 100,000 deaths per year in US.

(Ref.: To Err Is Human: Building a Safer Health System, 1999)

Rates of Adverse events across world

- State of New York: 3.7%,
  of which 58% are preventable
- Colorado-Utah: 3%
- Australian Health care study: 16.6%
- UK: 10.8%

Adverse Medical Events

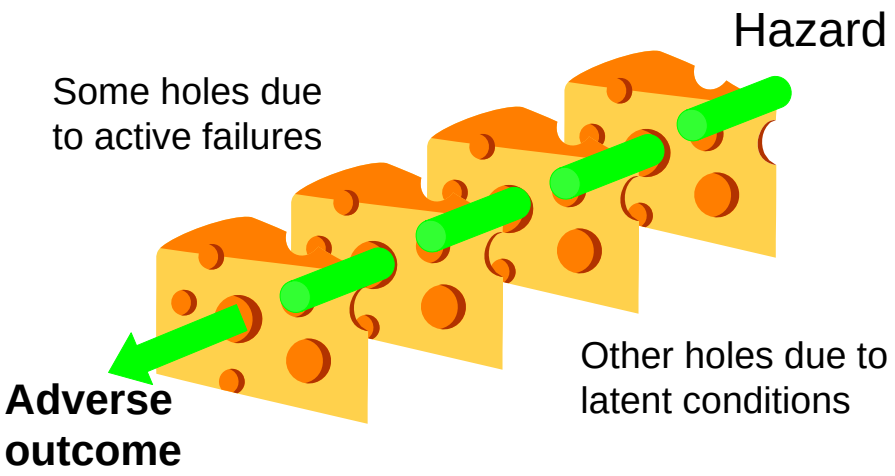
- Baker et al (R.Tamblyn): Established the Rate of adverse events (AE) for admissions in the year 2000, in Canada

- Of 2.5 million admissions to acute care hospitals, 7.5% (185,000) experienced one AE or more during their stay

- 70,000 of these events were avoidable.

Baker GR. Et al. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. CMAJ, 170(11):1678-86, 2004

The Swiss Cheese Model of Accident Causation



Successive layers of defences, barriers and safety

Adverse Medical Events

Safety and Systems

- Safety is a property reflecting a system

IOM, Crossing the quality chasm

- Every system is perfectly designed to achieve exactly the results it gets

Donald Berwick

Decreasing Adverse Events

But … IT can be a crucial help

33% of Adverse events involve adverse drug reactions which could be avoided by introducing information technology when the prescription is issued.

(IOM, 2001, 2003)

IT and Adverse events

- CPOE *
- Smart pumps
- Smart monitoring
- Notification of critical results *
- Adverse drug event monitoring *
- Track abnormal results *

* related to CIS

Prevention of In-patient AE and CPOE

- 55% reduction in serious medication error rate (Bates, JAMA, 1998)
- 83% reduction in overall medication error rate (Bates, JAMIA, 2000)

→ Need associated decision support
→ Monitor and make iterative changes

Systematic review of CPOE

- Reviewed 5 trials
- 2 showed decrease in serious medication AE
- 1 showed improvement on 5 types prescribing behaviors
- 1 improvement in nephrotoxic drug prescribing

Kaushal,Shonaja, Bates, Arch Int Med 2003

Bangs for buck of CPOE

- Renal dosing guidance
- Tools to help nurses
- Specific drug guidance
- Adverse drug event prevention

Kaushal, et al, JAMIA 2006

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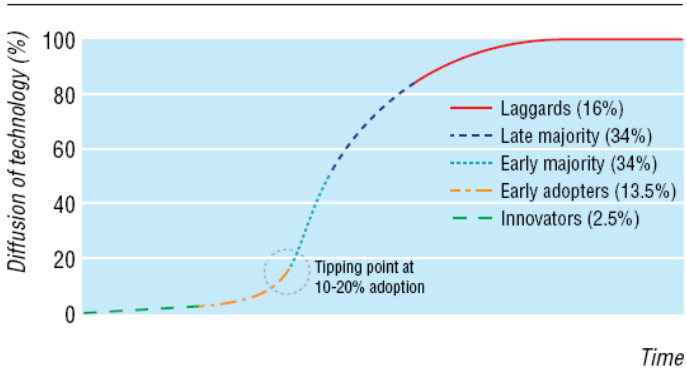
The Implementation

What to expect?

- Change is hard
- Medical culture is hard to change (tradition of business process, opportunity cots)
- Surgeons are stubborn…
- Change is hard for anyone (esp. older crotchety workforce)

Theory of Social Change:

Adoption of innovations

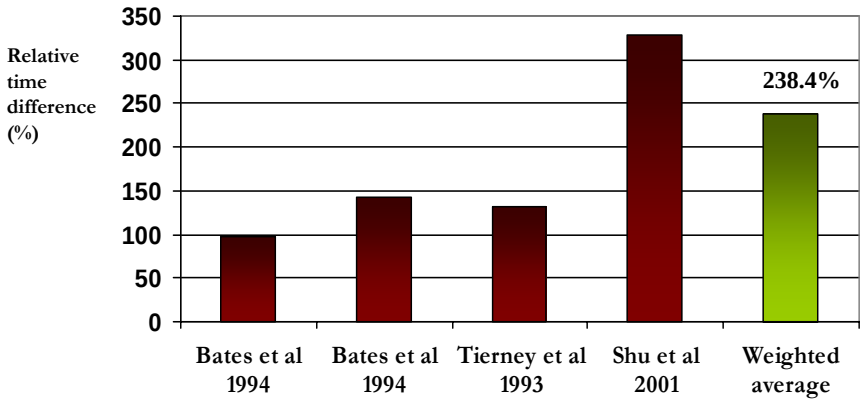


S-curve showing the five stages in adoption of innovations[2]

Rogers EM. *Diffusion of innovations*. 4th ed. New York: Free Press, 1995.
Wilson C, **BMJ** VOLUME 332:112, JANUARY 2006

Studies examining CPOE systems are consistent:

CPOEs are time consuming



Bates' top pitfalls to CIS implementation

- Give users an easy mechanism to report ongoing problems
- Need ability to make application responsive to user needs (includes sufficient resources)
- This is the biggest IT project ever:
  - **Provide enough support**
  - **Provide enough hardware and network**
- Keep in mind… it will be worth it

Implementation principles

- Champion has to be the straw man for the project… → The buck stops with me…
- Recognize the strengths and weaknesses in the product- Integrity and honesty
- Try to change the major flaws in the product (eg Oacis)
- Always think in terms of risk reduction

Implementation principles

- Think small (pilots)
- Always minimize the number of clicks…
- Feel no shame in bribing pilot clinicians with software and hardware“goodies”
- Bribe different clinicians differently
- Stay the course. Don’t let a few laggards undermine the whole group
- Let the successful stories carry the message

Implementation principles

- Don’t promise what you cannot deliver
- Allow for some “scope creep”… but don’t tell your IT people…
- Make IT resources think like clinicians
- Avoid IT acronyms and “IT talk”
- The user is always right

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The Technology

- Leverage what others have learned
- Listen to the users…

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MUHC-History of CIS

- On-line surveys (2002)
- Working groups (2002- 2003)
- Two-days of walk-in demos at MGH (2003)
- CISSIT committee meets monthly (2002-)
- Request for proposal- Selection (2003-2004)

PROJECT PHASES

- Phase 0: Planning, Screen definition (Clinical Workgroups)
- Phase IA: 3 Pilot units
  - Viewing of results (results reporting)
  - EMPI
  - No electronic order entry, yet…
- Phase IB: IA+ Added interfaces + Full Deployment
- Phase II: Physician Order entry
- Phase III and IV: Clinical Documentation

What do we have available right now?

Phase 1

Deliverables → Display of results

Single system with close to 100 % of functionalities shared between the two CHU

- Labs
- Pathology
- Microbiology
- Radiology
- Nuclear medicine
- Pharmacological profile (in-patient)
- History of episodes
- Appointments
- Transcription reports

Phase II – General Scope

Phase 2 | Phase 3

Deliverables

Computerized Physician Order Entry and Prescribing (CPOE)
- Labs
- Medical Imaging
- Transfusion Medicine
- Nursing and Allied Care
- Pharmacy
- Nutrition
- Consultations
- Therapeutic alert system
- Diagnostic tests or procedures

Clinical Documentation
- Allergies
- Body mass parameters
- Medication reconciliation
- Vital Signs
- Discharge Summary
- Neurological signs
- Pain assesment
- Electronic medication administration record (eMAR)
- Etc.

Scanning Medical Charts

Display of other results
- Operating rooms
- Cardiology
- Medical chart coding and discharge summary

Interdisciplinary care plan and specialized clinical documentation

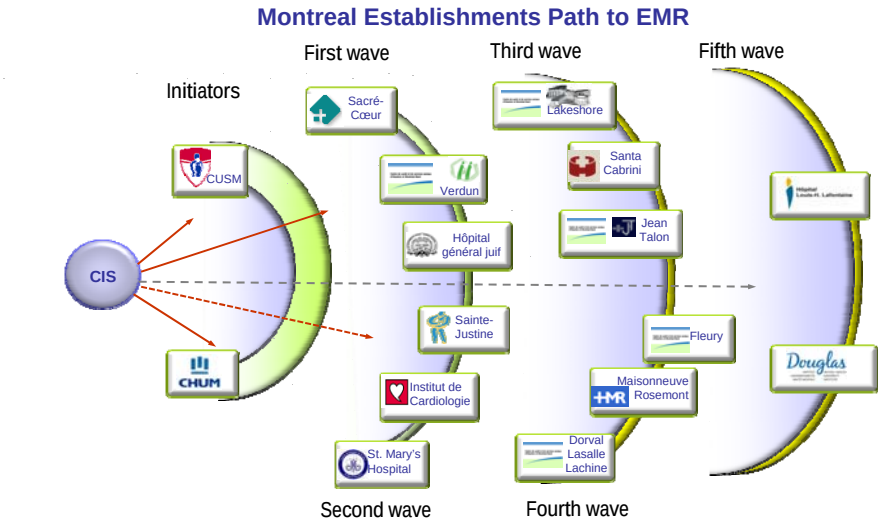
CIS Impact at MUHC

Main qualitative issues:

- Difficulty with printing, esp. labs
- Time-out at work station is too short

(both compared to legacy system)

Overview of the regional project: Immitation…



Parallel activities

Provide the ability of remote access to physicians and nurses

Collaboration with the Montreal Agency, the MSSS and the DSQ in the deployment of strategic projects

CIS Impact MUHC

Target population:

- Nurses, MDs (because residents and students would not be available for both measurements)
- Studied 8 CTU's (3 surgical, 5 medical), all on 1 site
- Of these CTU's, 3 were pilot units and 5 were not
- Questionnaires were hand-delivered but anonymous

CIS Impact MUHC

Measurements:

- Baseline measurements: evaluated existing ("legacy") systems
- "Post"-measurement evaluated OACIS system

Statistics:

- Crohnbach's alpha for internal consistency (items within same category)
- Wilcoxon-Mann Whitney non parametric unpaired* comparison of means
- Factorial analysis

CIS Impact MUHC: RESULTS

Questionnaire validity:

Level of internal agreement 0.73-0.96

ie very good agreement

Survey response:

Pre-survey: 55.2% (176/319)

Post survey: 58.8% (133/226)

Note: 1-poor score

10- maximal score

CIS Impact MUHC

	All Pre Score	All Post Score	P-value
Integration info (MDs)	NA	7.29	_
Reliability	5.42	6.55	P < 0.001
Response time	6.39	6.15	NS

CIS Impact MUHC

	All Pre Score	All Post Score	P-value
Ease of Use	7.19	6.57	P=0.023
Access	4.98	6.17	P= 0.001
Minimum IS skill	7.33	6.54	P=0.002 (Nurses)

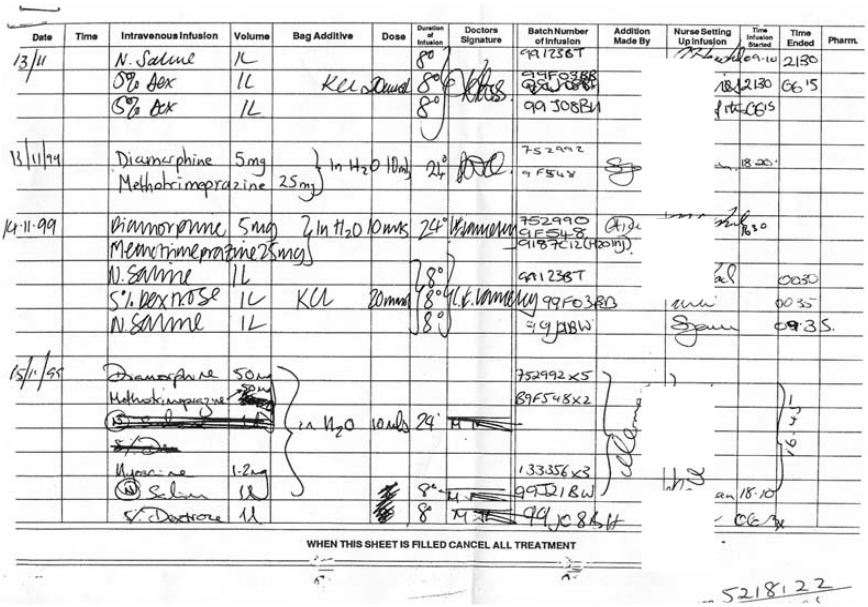
CIS Impact MUHC

	All Pre Score	All Post Score	P-value
Utilization	7.73	5.78	P < 0.001 (Nurses)
Use most functions	_	5.24	
Perceived as useful	6.78	6.01	NS
Prevents errors	6.14	5.6	NS

CIS Impact MUHC

	Nurses	MDs
Utilization	5.37	7.11
Still use legacy	6.54	4.71
OACIS better	5.86	7.00
“Prevents errors”	6.14	5.6

ELECTRONIC VS. PAPER PRESCRIPTIONS



CONCLUSION

Lessons learned from CIS Implementation:

- You are only as good as your team
- You are only as good as your word
- Failure is not an option
- Every fight has to be in the name of patient benefits