

# La simulation en santé



Sylvain Boet  
MD, PhD

[sboet@toh.ca](mailto:sboet@toh.ca)



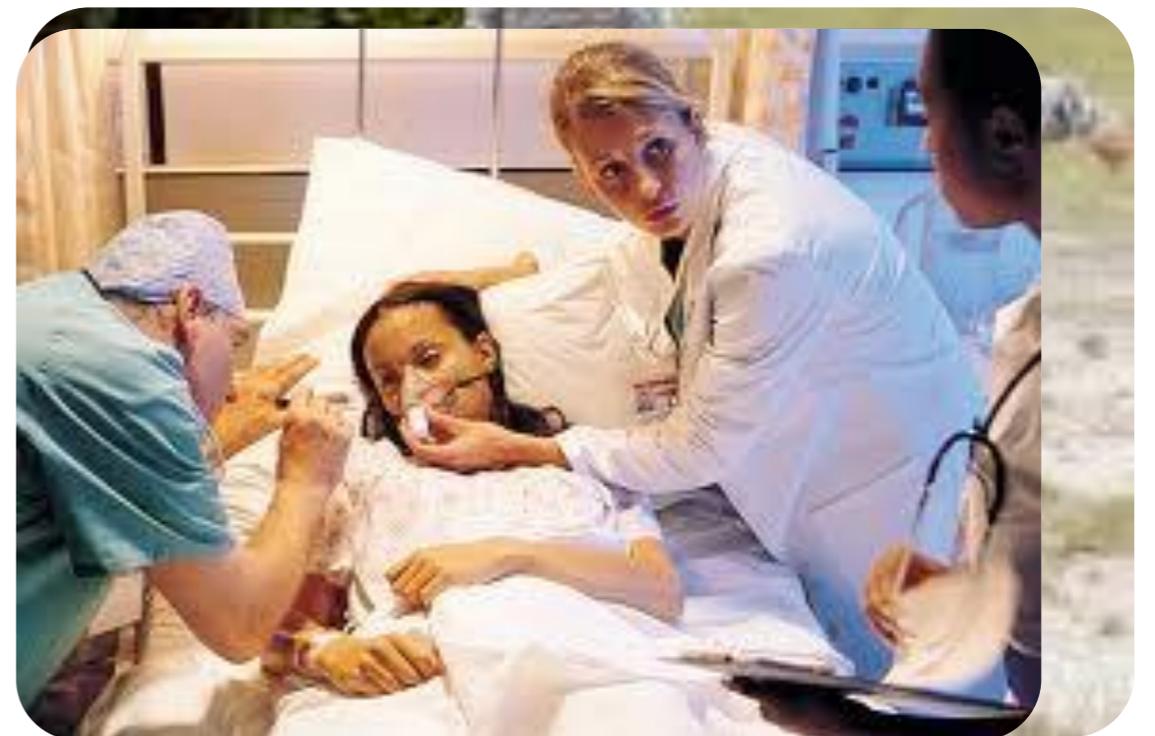
uOttawa

L'Université canadienne  
Canada's university

# Objectifs

- Présenter les différentes formes de simulation et leurs atouts
- Revoir l'évidence pour l'éducation par simulation
- L'éducation basée sur les preuves

# Simulation en santé de la santé



# Categories de savoir

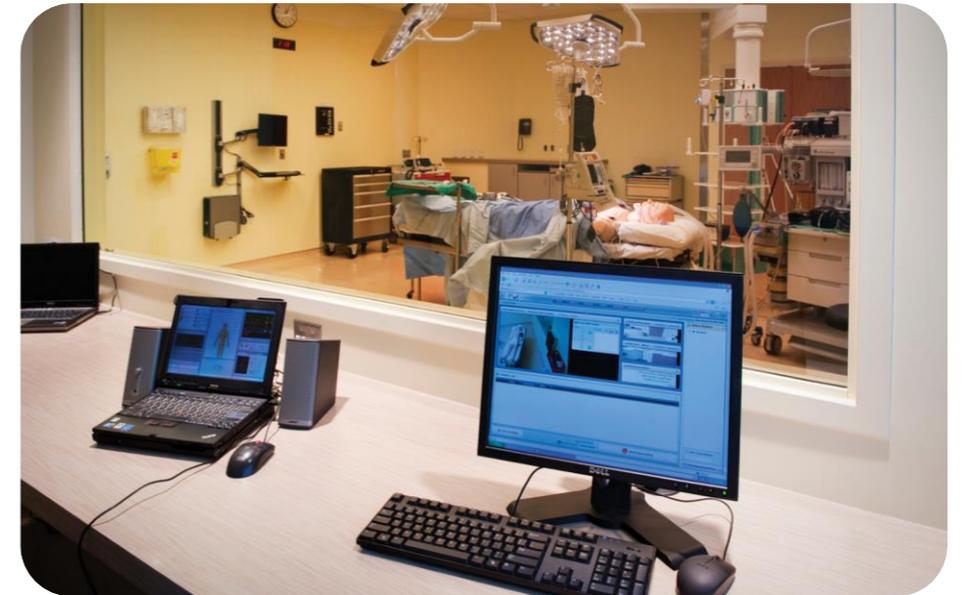


Technique - Procedural

Non-technique



# Les simulateurs

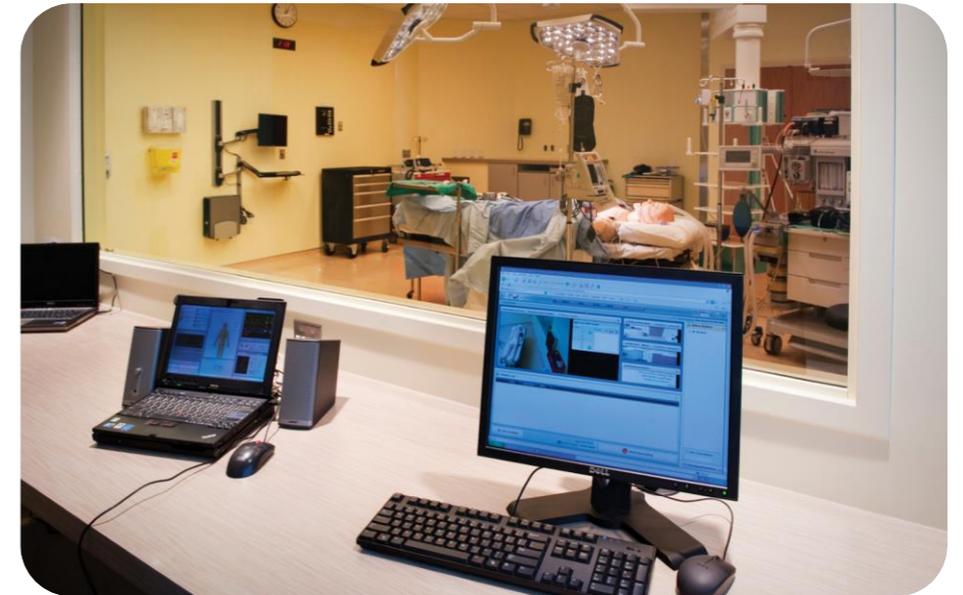
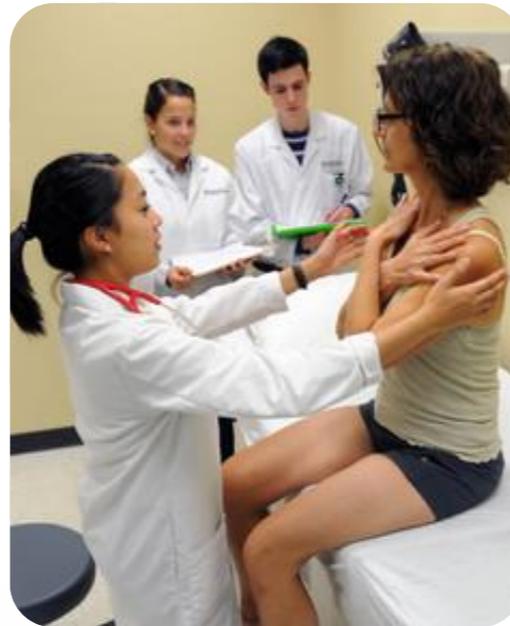


uOttawa

# Les simulateurs



# Les simulateurs



uOttawa

# Pratique simulée



# Débriefing (feedback)



uOttawa

# Comment choisir le bon simulateur?

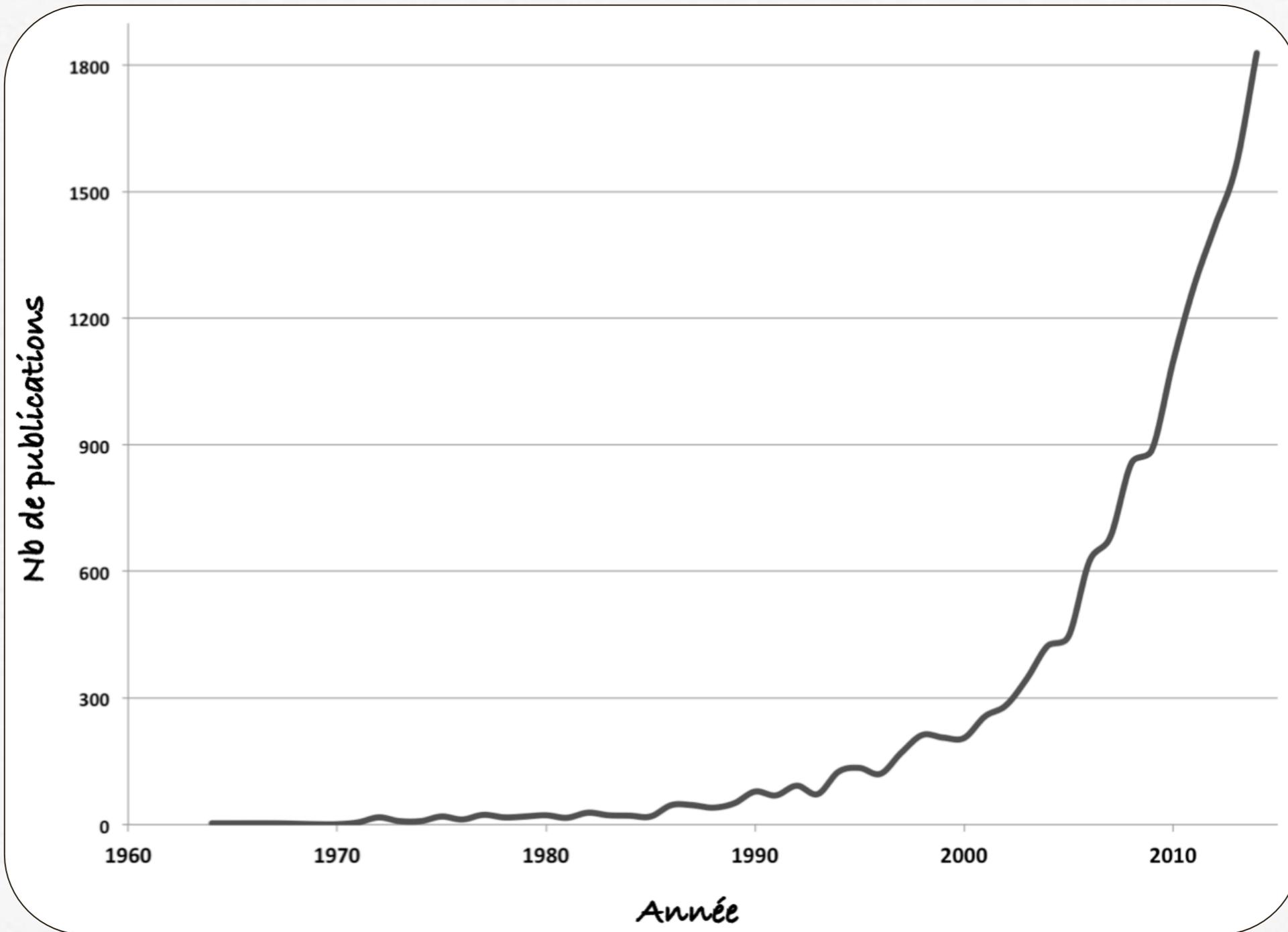


1. Choisir l'objectif pédagogique
2. Choisir l'outil qui convient pour l'objectif pédagogique

Le scénario n'est qu'une excuse  
pour le débriefing...!

# Objectifs

- Présenter les différentes formes de simulation et leurs atouts
- Revoir l'évidence pour l'éducation par simulation
- L'éducation basée sur les preuves



# Beaucoup de revues systématiques

- ❑ Simulation versus autres
- ❑ Modalités d'utilisation
- ❑ Outils d'évaluation
- ❑ Au sein des disciplines
- ❑ Selon les savoir-faire

# Technology-Enhanced Simulation for Health Professions Education

## A Systematic Review and Meta-analysis



**Objectif** Synthétiser les effets de l'apprentissage par simulation en santé par rapport à l'absence d'intervention.

David A. Cook, MD

Rose Hatala, MD

Ryan Brydges, PhD

Benjamin Zendejas, MD

Jason H. Szostek, MD

Amy T. Wang, MD

Patricia J. Erwin, MLS

Stanley J. Hamstra, PhD

**Study Selection** Original research in any language evaluating simulation compared with no intervention for training practicing and student physicians, nurses, dentists, and other health care professionals.

**Data Extraction** Reviewers working in duplicate evaluated quality and abstracted information on learners, instructional design (curricular integration, distributing training over multiple days, feedback, mastery learning, and repetitive practice), and outcomes. We coded skills (performance in a test setting) separately for time, process, and product measures, and similarly classified patient care behaviors.

appeal, its ef-  
may inform the

simulation train-

C, PsychINFO,  
2011.

# Technology-Enhanced Simulation for Health Professions Education

A Systematic Review and Meta-analysis

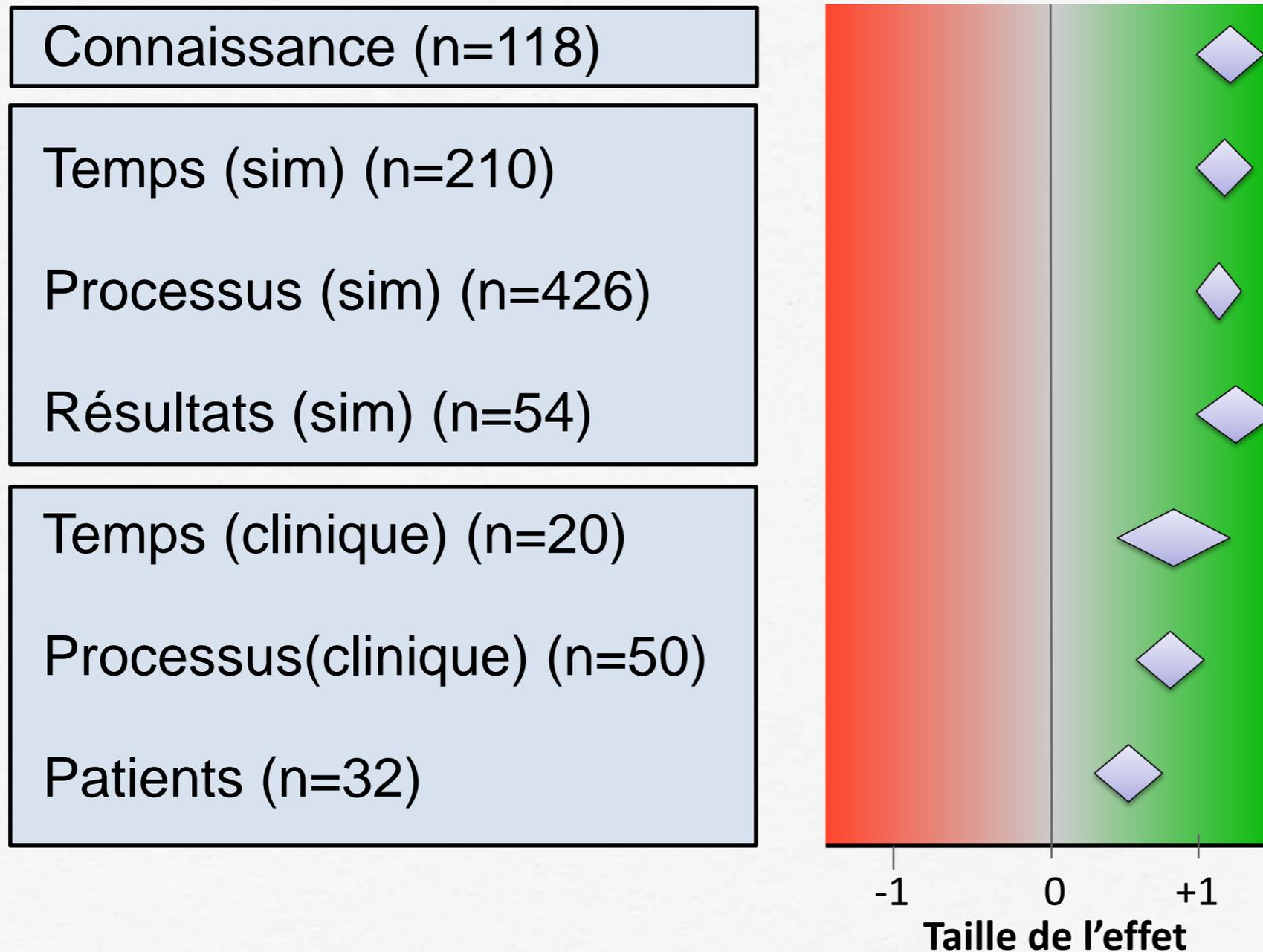
---



- Simulation / contrôle
- 10 903 références screenées
- 609 incluses – 35 226 apprenants
  - 405 pré-post groupe unique
  - 137 RCTs
  - 67 non RCTs

# Technology-Enhanced Simulation for Health Professions Education

A Systematic Review and Meta-analysis



# Transfer of learning resource management Transfert de l'apprentissage gestion de crise des ressources

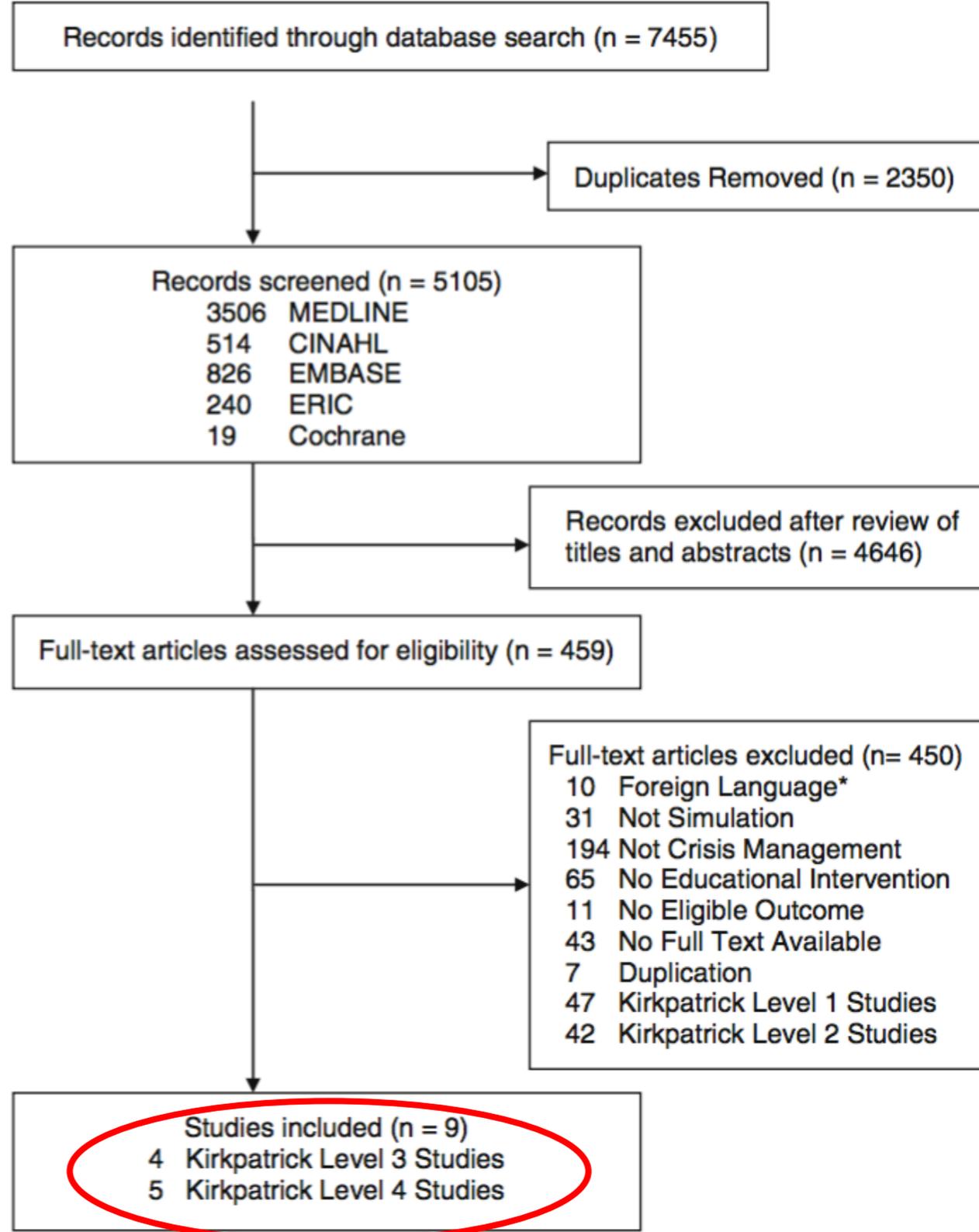
Sylvain Boet, MD · M. Dylan Boet  
Haytham Qosa, MD · Laure Perreault  
Scott Reeves, PhD · Andrea C. T. ...

Identification

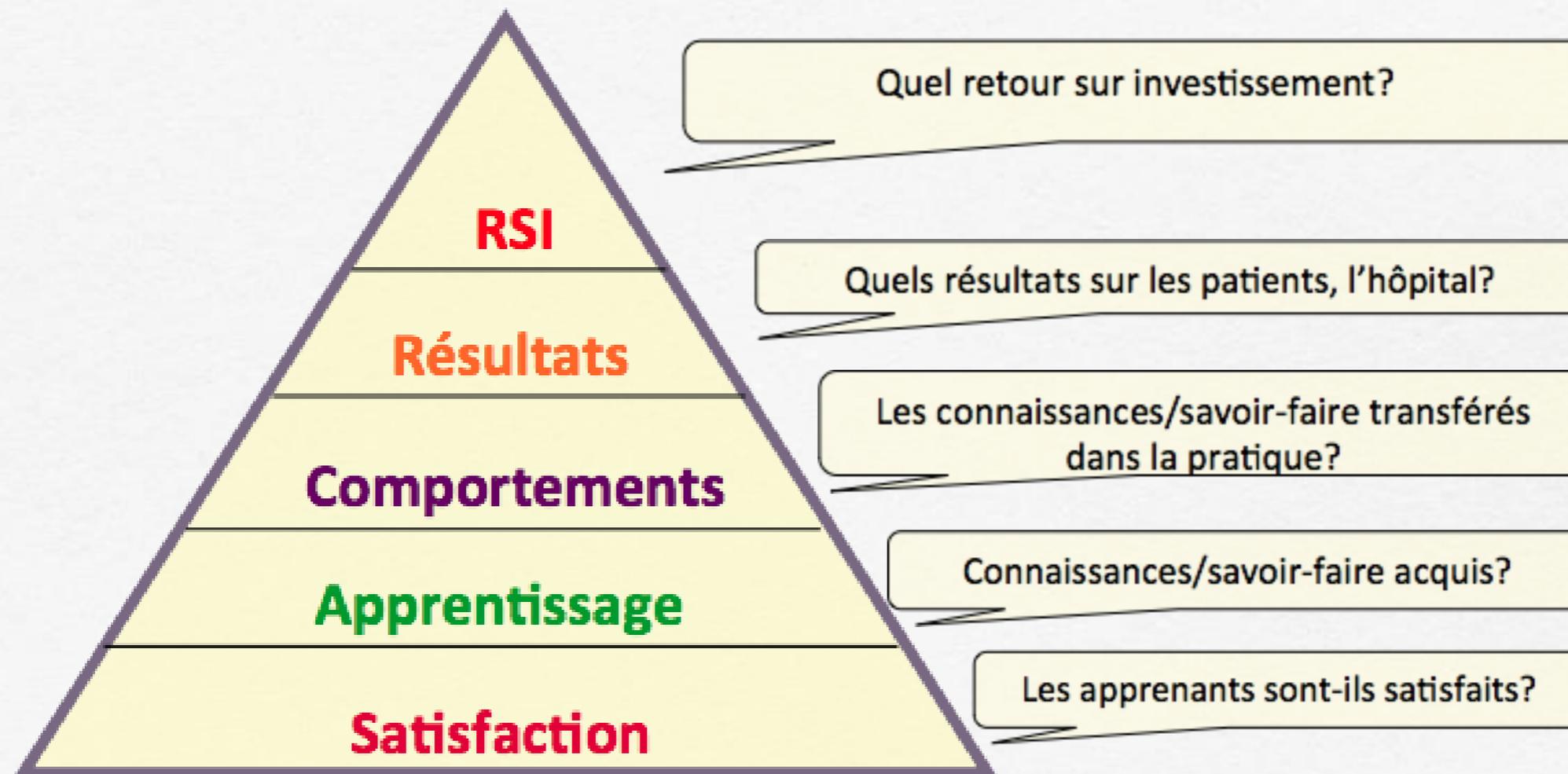
Screening

Eligibility

Included



# Classification de Kirkpatrick



# Transfer of learning resource management Transfert de l'apprentissage gestion de crise des ressources

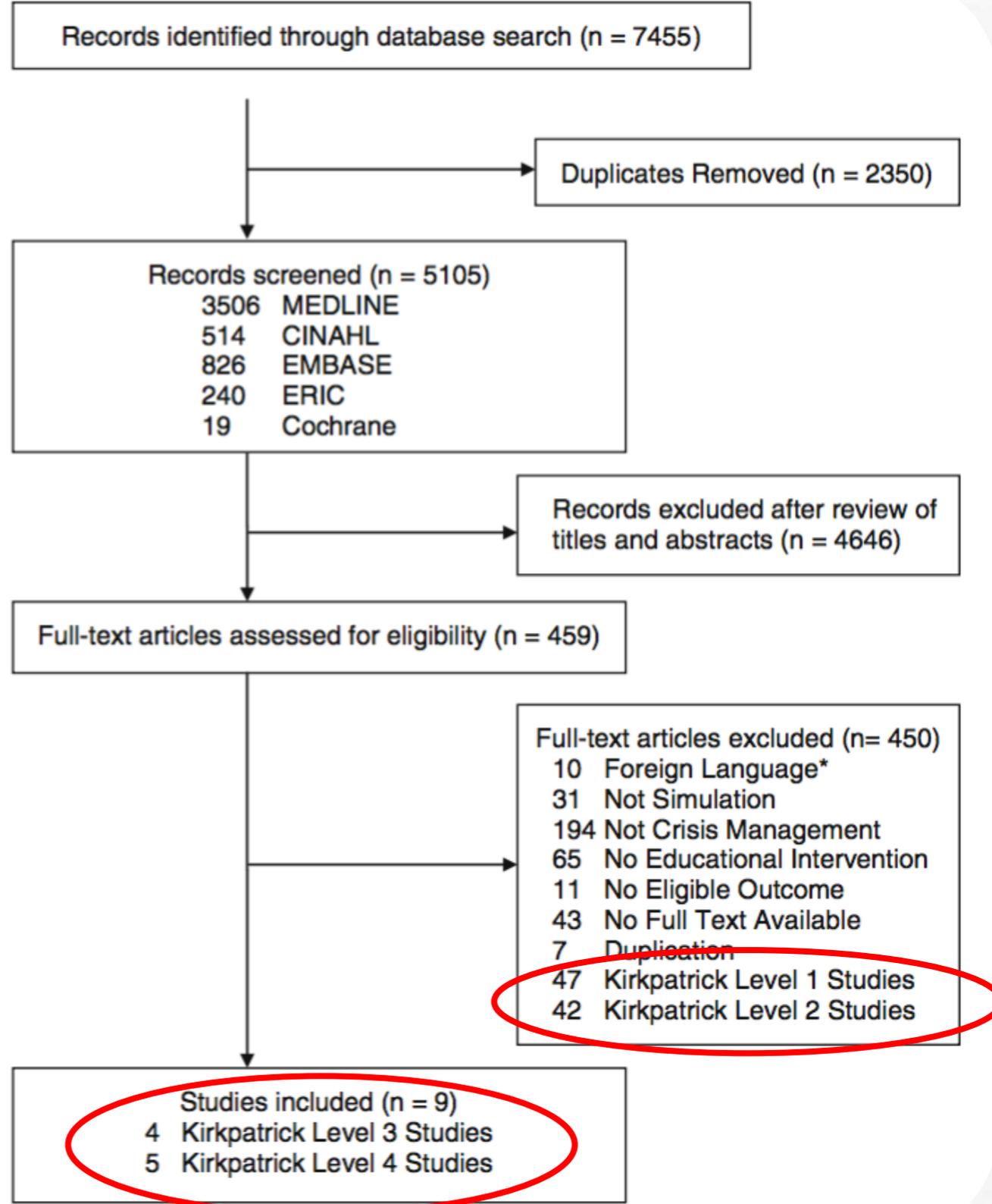
Sylvain Boet, MD · M. Dylan Boet  
Haytham Qosa, MD · Laure Perreault  
Scott Reeves, PhD · Andrea C. T. ...

Identification

Screening

Eligibility

Included





## Transfer of learning and patient outcome in simulated crisis resource management: a systematic review

## Transfert de l'apprentissage et évolution des patients dans une gestion de crise des ressources simulée: une revue systématique

Sylvain Boet, MD • M. Dylan Bould, MBChB • Lillia Fung, MD •  
Haytham Qosa, MD • Laure Perrier, MLIS • Walter Tavares, PhD(c) •  
Scott Reeves, PhD • Andrea C. Tricco, PhD



**Principal findings** *Nine articles were identified as meeting the inclusion criteria. Four studies measured transfer of simulation-based CRM learning into the clinical setting (Kirkpatrick Level 3). In three of these studies, simulation-enhanced CRM training was found significantly more effective than no intervention or didactic teaching. Five studies measured patient outcomes (Kirkpatrick Level 4). Only one of these studies found that simulation-based CRM training made a clearly significant impact on patient mortality.*

**Conclusions** *Based on a small number of studies, this systematic review found that CRM skills learned at the simulation centre are transferred to clinical settings, and the acquired CRM skills may translate to improved patient outcomes, including a decrease in mortality.*

---

RESEARCH ARTICLE

**Impact of crisis resource management simulation-based training for interprofessional and interdisciplinary teams: A systematic review**

Lillia Fung<sup>1</sup>, Sylvain Boet<sup>2</sup>, M. Dylan Bould<sup>3</sup>, Haytham Qosa<sup>1</sup>, Laure Perrier<sup>4</sup>, Andrea Tricco<sup>5,6</sup>, Walter Tavares<sup>7</sup>, and Scott Reeves<sup>8</sup>

- 12 études Kirkpatrick 2 à 4
- > 1000 apprenants et >200 équipes
- 10 RCTs
- 10/12 : effet positif de la simulation de CRM



ELSEVIER

Contents lists available at ScienceDirect

# Resuscitation

journal homepage: [www.elsevier.com/locate/resuscitation](http://www.elsevier.com/locate/resuscitation)



## Simulation and education

### Hospitals with more-active participation in conducting standardized in-situ mock codes have improved survival after in-hospital cardiopulmonary arrest<sup>☆</sup>



Karen Josey<sup>a</sup>, Marshall L. Smith<sup>a</sup>, Arooj S. Kayani<sup>b</sup>, Geoff Young<sup>a</sup>, Michael D. Kasperski<sup>a</sup>, Patrick Farrer<sup>a</sup>, Richard Gerkin<sup>a</sup>, Andreas Theodorou<sup>a</sup>, Robert A. Raschke<sup>a,c,\*</sup>

<sup>a</sup> *Game Simulation System, Banner Health, United States*  
<sup>b</sup> *Pulmonary Critical Care Fellowship, Banner University Medical Center-Phoenix, United States*  
<sup>c</sup> *Division of Clinical Data Analytics and Decision Support, University of Arizona College of Medicine-Phoenix, United States*



## Sortis vivant de l'hôpital :

- **Plus actifs (n=12) 17.6 sim/100 lits/an: 42.8%**

**ARTICLE INFO**  
**KEYWORDS**  
Simulation  
In-situ mock code  
In-hospital cardiopulmonary arrest  
Mortality  
Basic life support  
Cardiopulmonary resuscitation  
Ecological study design

**AIM:** The American Heart Association (AHA) and the Institute of Medicine have published a national “call-to-action” to improve survival from in-hospital cardiopulmonary arrest (IHCA). Our aim was to determine if more-active hospital participation in standardized in-situ mock code (ISMC) training is associated with increased IHCA survival.

- **Moins actifs (n=14) 3.2 sim/100 lits/an: 36.2%**

**METHODS:** We performed an ecological study across a multi-state healthcare system comprising 26 hospitals. Hospital-level ISMC performance was measured during 2016–2017 and IHCA hospital discharge survival rates in 2017. We performed univariate and multivariate analysis of the hospital-level association between more-active ISMC participation and IHCA survival, with adjustment for hospital expected mortality as determined by a commercial severity scoring system. Other potential confounders were analyzed using univariate statistics.



- **1 vie sauvée pour chaque 1.1 sim/100 lits/an**

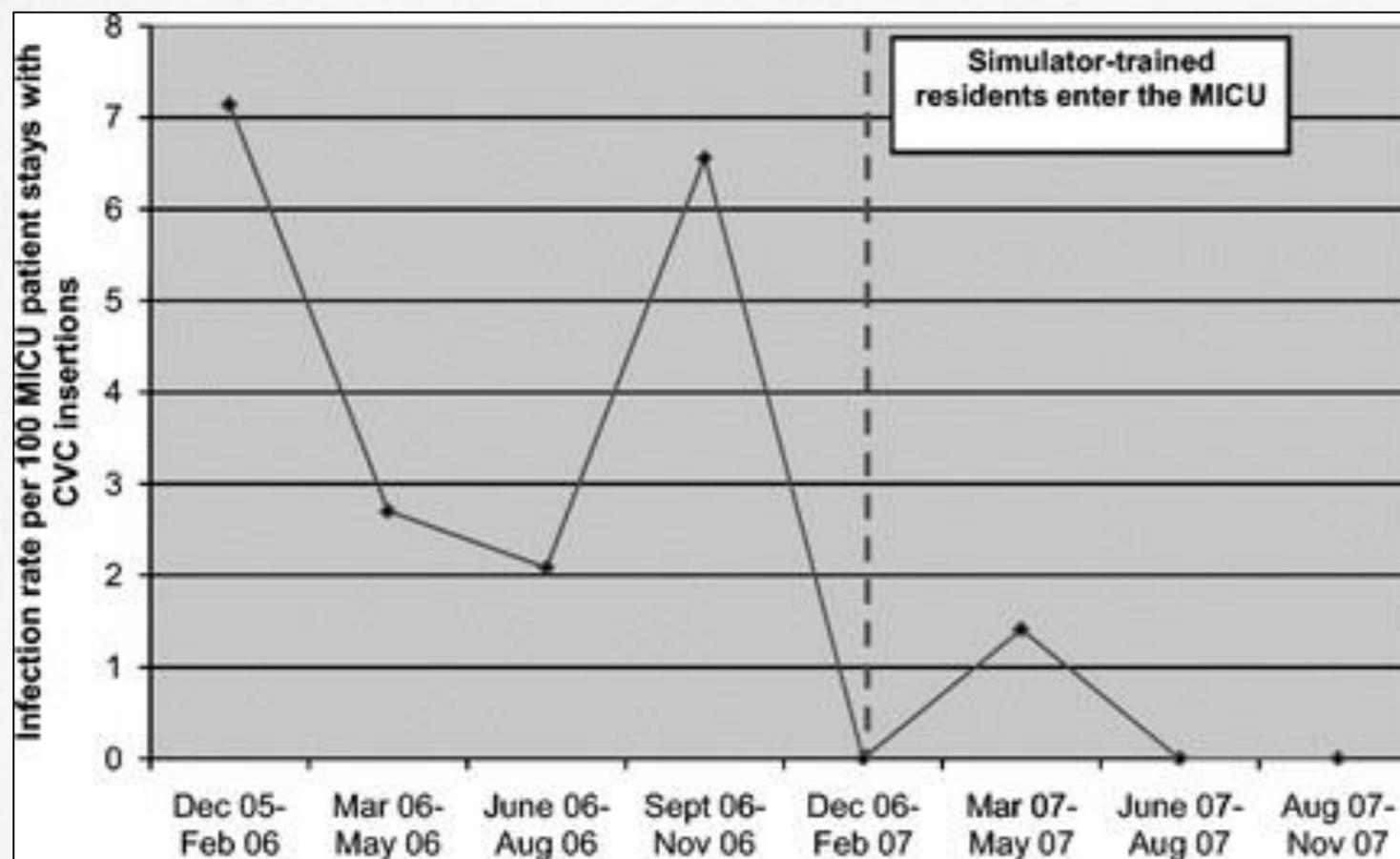
**RESULTS:** Hospitals with *more-active* ISMC participation conducted a median of 17.6 ISMCs/100 beds/year (vs 3.2/100 beds/year in *less-active* hospitals,  $p = 0.001$ ) in 2016–2017. 220,379 patients were admitted and 3289 experienced IHCA in study hospitals in 2017, with an overall survival rate of 37.4%. Hospitals with more-active ISMC participation had a mean IHCA survival rate of 42.8% vs. 31.8% in hospitals with less-active ISMC participation ( $p < 0.001$ ), and a significantly reduced odds ratio (OR) of 0.62 for IHCA mortality (95% CI: 0.54–0.72;  $p < 0.0001$ ) which was unchanged after adjustment for hospital-level *expected* mortality (adjusted OR: 0.62; 95% CI: 0.54–0.71;  $p < 0.001$ ).



- **Notion de “dose” de simulation**

**CONCLUSIONS:** Hospitals in our healthcare system with more-active ISMC participation have higher IHCA survival. Prospective trials are needed to establish the efficacy of standardized ISMC training programs in improving patient survival after cardiac arrest.

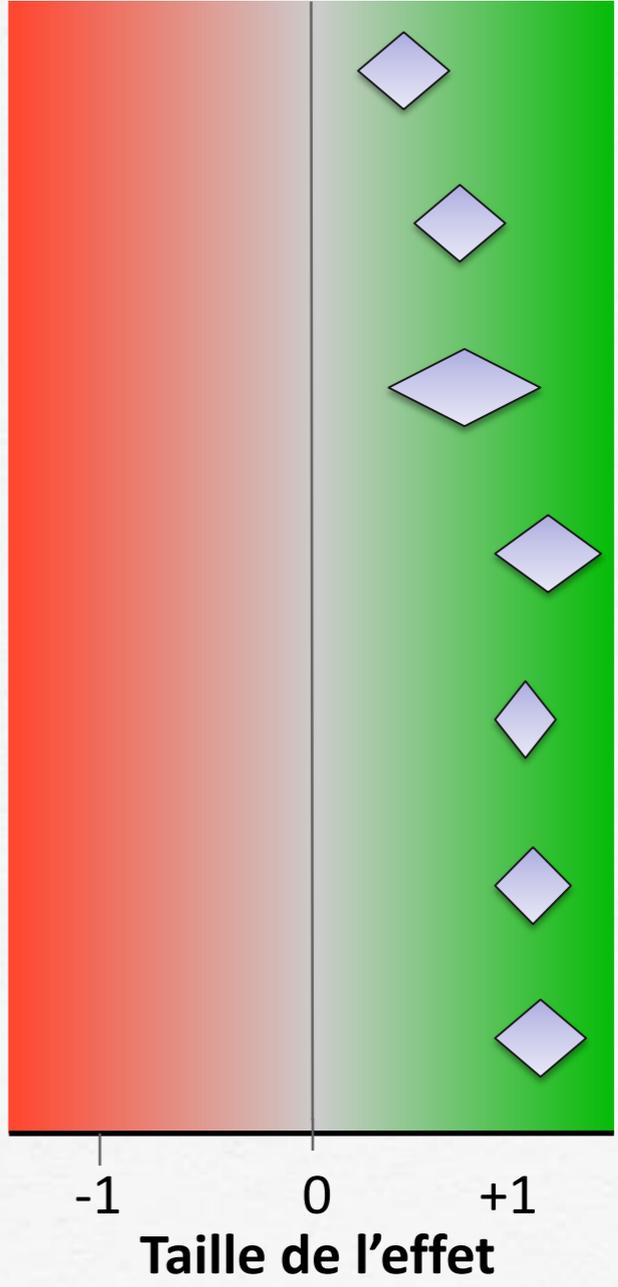
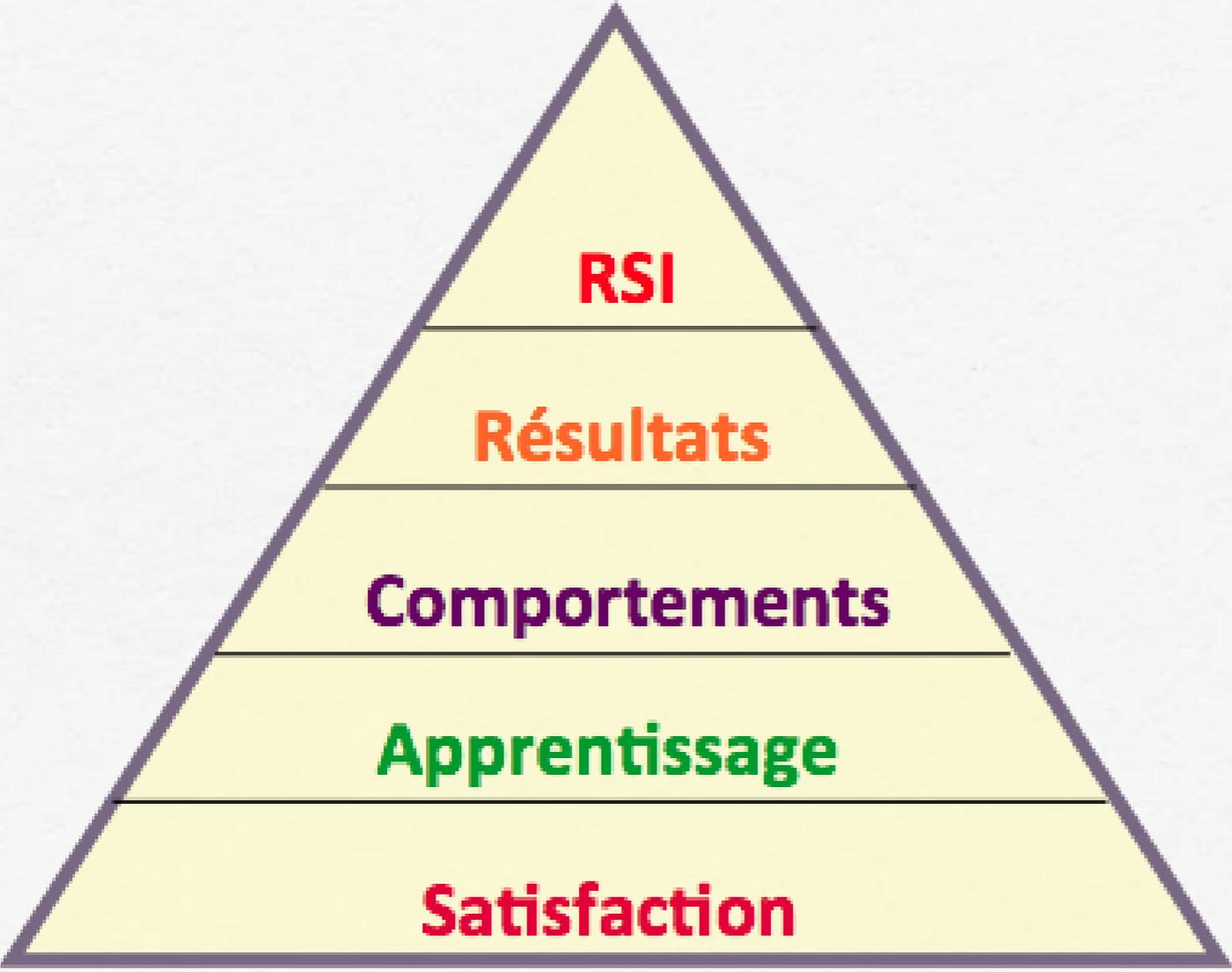
## Cost Savings From Reduced Catheter-Related Bloodstream Infection After Simulation-Based Education for Residents in a Medical Intensive Care Unit



\$1 investi  
=  
\$7  
économisés

*Cohen, SIH, 2010*

# Messages clés



# Objectifs

- Présenter les différentes formes de simulation et leurs atouts
- Revoir l'évidence pour l'éducation par simulation
- **L'éducation basée sur les preuves**

# Théories de référence

- Expertise et pratique délibérée

*Ericsson*

*KA*

- Apprentissage expérientiel

*Kolb DA*

- Pratique réflexive

*Schön DA*

- Et plus encore....

L'éducation est une science!

Evidence-based medicine  
= Médecine basée sur les preuves

Evidence-based education  
= Education basée sur les preuves

# Messages clés

- Publications exponentielles, domaines variés
- Excellente série de revues systématiques
- Efficacité prouvée par rapport à aucune intervention et didactique
- Efficace pour Kirkpatrick 3 et 4, à long terme et pour équipes
- Éducation basée sur les preuves

Questions?

