Future Directions in Medical Education: Do New Education Models Really Work?

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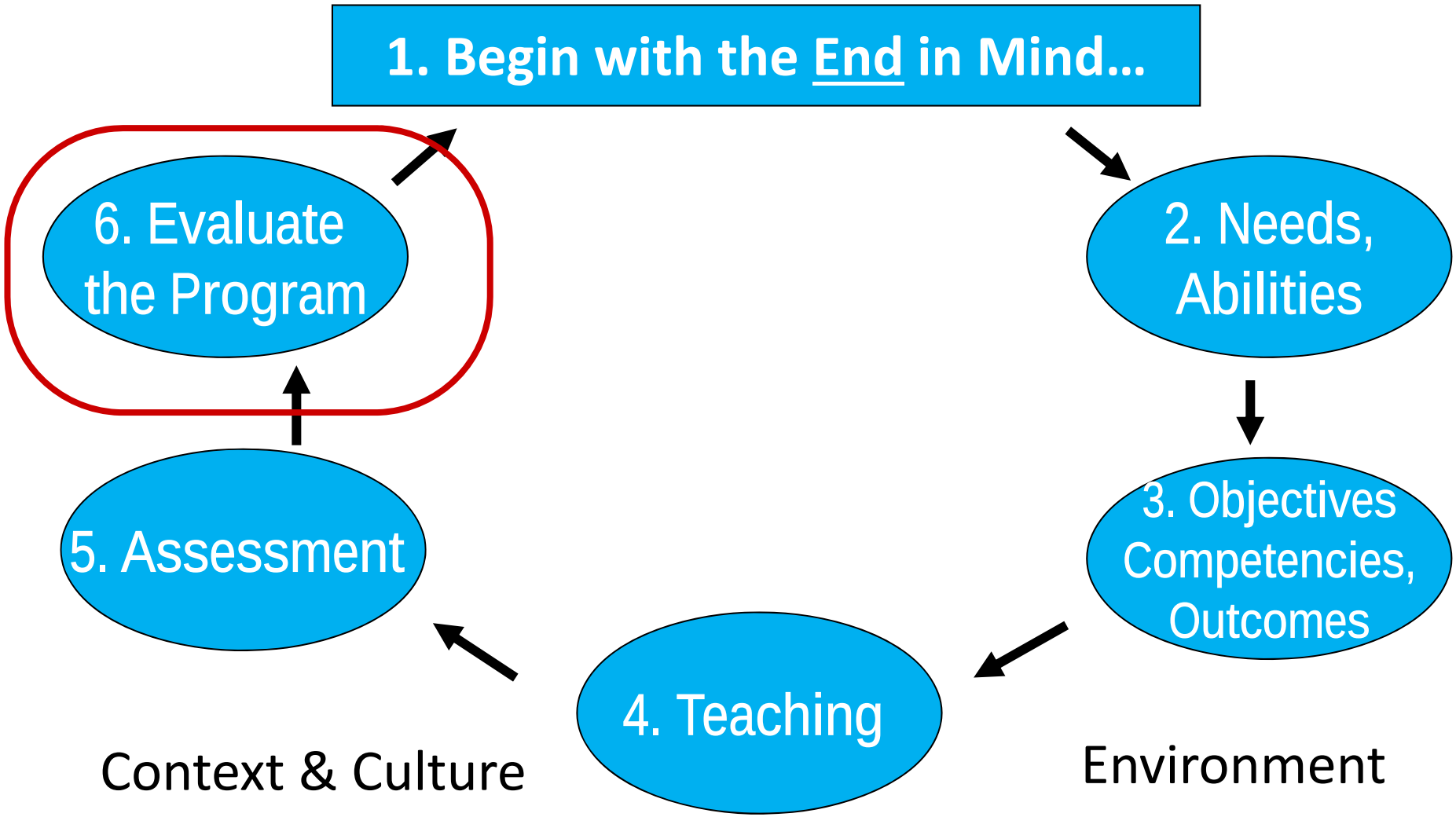
Future Directions in Medical Education

Lecture series:

1. New Models of Medical Education
2. Designing and Delivering Innovative Curricula
3. Novel Approaches to Assessment
4. **Do the New Education Models Really Work?**

Systematic Educational Planning Cycle



After Kern

Key messages from first three talks

- Current medical education models need to change as newer paradigms of education have evolved;
- CBME models & innovations are being implemented globally;
- Curriculum goals are derived from abilities needed by graduates & organized into frameworks, with milestones and EPAs providing a stepwise approach to map progression and plan curricula;
- Innovative teaching strategies likely improve competence;
- Assessment requires dedicated time and a committed relationship between learner and faculty;
- A program of assessment includes multiple methods, multiple assessors, & is embedded into an effective educational system.

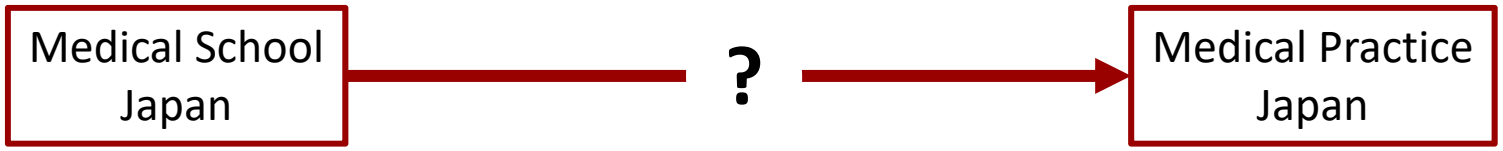
What stimulated this talk?

"I went through the current system, and I turned out all right." *(anon)*

"No one type of education has been shown to be robustly better than any other" *(Norman)*

"Where is the proof that it works?" *(Kozu)*

"What is happening at '?' to explain the difference?" *(Tamura)*



Outline: Do New Education Models Really Work?

- pros and cons of adopting an education innovation
- how can we evaluate whether new models are really effective.
- evidence for innovative curricula like CBME
- implications for the future of medical education

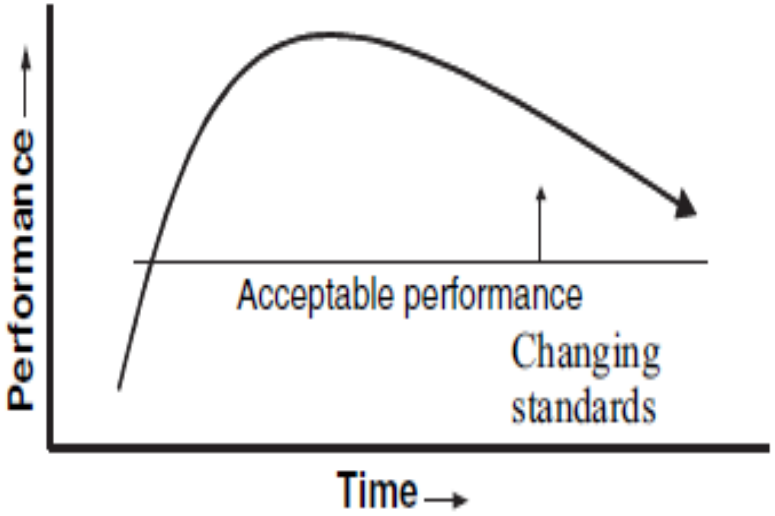
Pros & cons: Adopting an education innovation

- Traditional approaches & status quo not meeting education needs
- Escalating costs
- Quality / safety issues

In residency education:

- Not making the most of the time spent
- Negative impact of transitions

Practice outcome of current model:
Competence drops over time



Pros & **cons**: Adopting an education innovation

- Traditional approaches / status quo not meeting education needs
- Escalating costs
- Quality / safety issues

In residency education:

- Not making the most of the time spent
- Negative impact of transitions

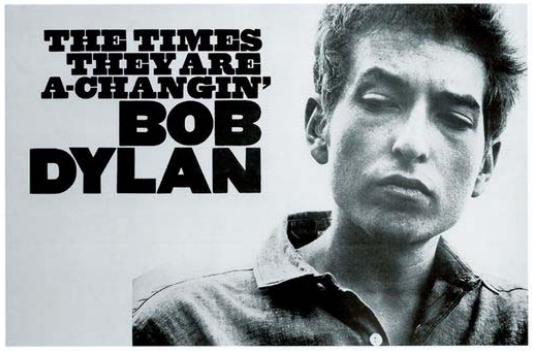
- Inertia: change is difficult:
- Current model present so long it is thought to be ‘the only way’
- ‘Implementing something new is complex’

In residency:

- Learners also ‘workers’
- Funding innovation difficult
- CBME: too reductionist
- Assessment not psychometrically valuable

Education innovations to address these challenges

- Med school – preclinical: decrease lectures; increase active learning, case-based, integrated
- Med school – clinical: learn in authentic settings (doing not watching); longitudinal experiences
- Residency: competency-based education, simulation



In a world of continuous change and improvement, unless you are running faster than everyone else, you are falling further behind.

Inui

"Existing paradigms can no longer provide meaningful solutions to changing conditions"

From E Holmboe

Challenge of evaluating education innovations like CBME

- Complex interventions
- Defining what we mean by ‘does it work’?
- Need to look at more than knowledge and satisfaction
  - Performance
  - Competence in authentic & varied contexts
  - Clinical outcomes
- Need to look *beyond* ‘did it work?’ to ‘why & how it works, are there other effects?’

(Haji, 2013)

Complexity

"…the explicit purpose of medical education [goes] beyond medical knowledge and … needs to include experiences [for] the range of situations in which medicine is practised and awareness of variations of [settings of] graduates."

"…medical education [must] assist [students]to learn … in ways that are safe for themselves and their patients."

S. Billett Medical Education 2014

Complexity

Chapter 19

Evaluating the Paradigm Shift from Time-Based Toward Competency-Based Medical Education: Implications for Curriculum and Assessment

Yoon Soo Park, Brian D. Hodges and Ara Tekian

In: Assessing Competence in Professional Performance across Disciplines and Professions 2016

"The promise in competency-based education is to graduate professionals who are better adapted for the needs of complex and rapidly changing systems. Yet, implementing competency-based curricula raise important questions not only in instruction, but also in the assessment of competencies and outcomes. While it is relatively easy to develop competencies in areas of knowledge and skill, it is more difficult to define in areas such as reasoning and judgment, and to assess complex professional behaviors"

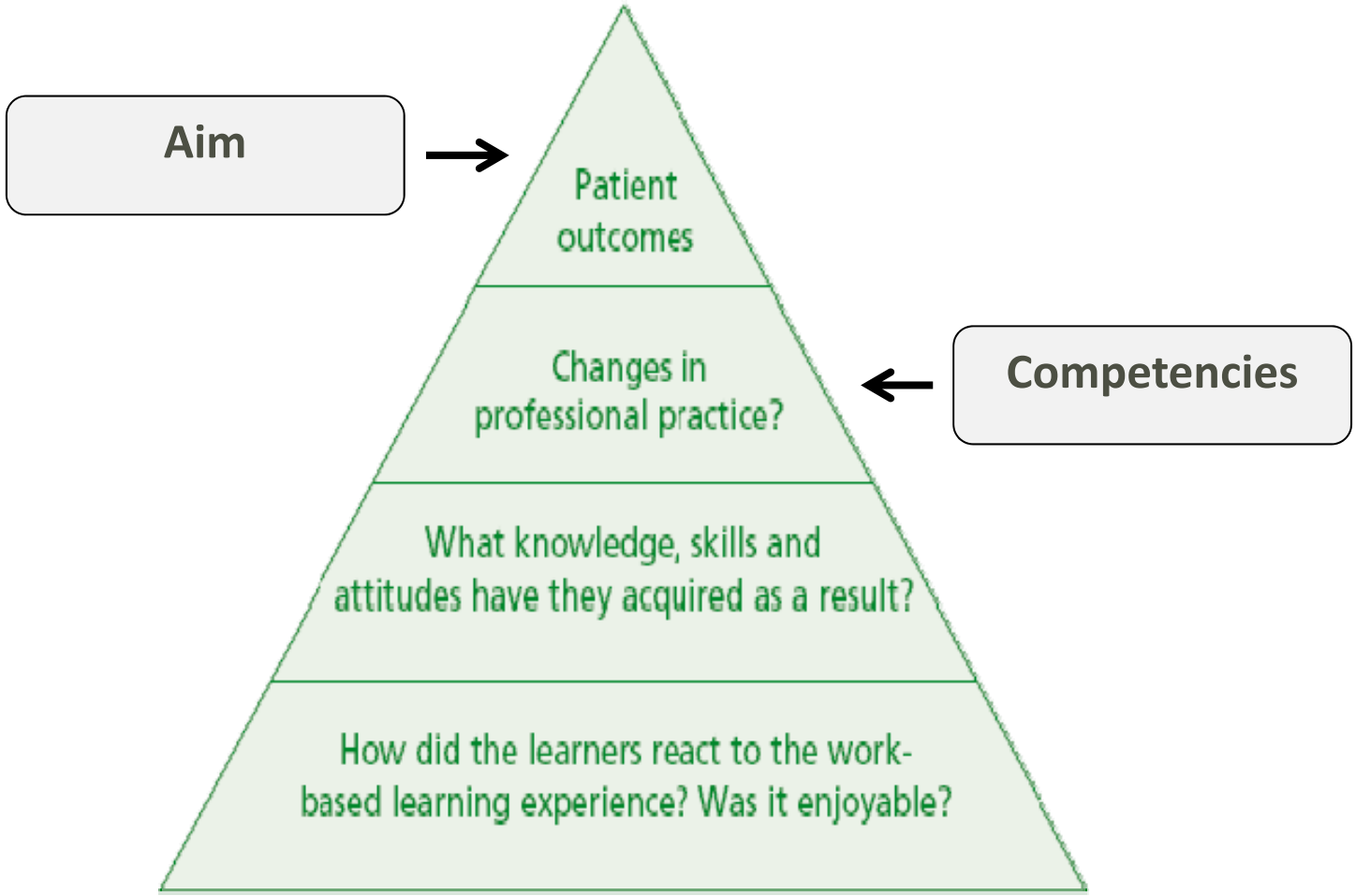
Complex Interventions e.g. CBME

- Complex interventions consist of several interacting parts or components
- Dimensions of complexity:
  - Number of and interactions between components
  - Number and difficulty of behaviors required by the those delivering and/or receiving the intervention
  - Number of groups or organizations targeted by the intervention
  - Number and variability of outcomes
  - Degree of flexibility or tailoring of the intervention permitted

Slide from E Holmboe, MRC 2008. www.mrc.ac.uk/complexinterventionsguidance

Linking Clinical and Educational outcomes

Need to look at more than change in knowledge



National Health Service – UK. http://www.wipp.nhs.uk/tools_qpn/unit6_education.php

- Kirkpatrick: reaction, learning, behavior, outcome, ROI
- CIPP: Context, Input, Process, Product
- Logic model: input, output, outcome, impact
- Contribution analysis: link education, preparation for practice and patient outcomes

Challenge:

linking intervention and outcome

“A → Z ”

A → B→ C → D … X → Y → Z

- Some have looked at “A → B” or “D → E”
- Very few have looked at “A → E” or “Y → Z
- Hardly any have looked at “ A → Z ”

  (causal link is difficult to prove)


Competent to collaborate: towards a competency-based model for interprofessional education
HUGH BARR
JOURNAL OF INTERPROFESSIONAL CARE, 12(2) 1998
Short Communication
Introducing Competency-Based Education Based on the Roles that Physiotherapists Fulfil
Vissers et al
Journal of Novel Physiotherapy and Physical Rehabilitation, 2014
COMPETENCY BY DESIGN: EFFECTIVE IMPLEMENTATION OF COMPETENCY-BASED MEDICAL EDUCATION AND PROGRAMMATIC ASSESSMENT IN A POST-GRADUATE SURGICAL PROGRAM
CJC, 2016
A.B. Fagan A et al

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

Elaine R. Cohen, BA;
Joe Feinglass, PhD;
Jeffrey H. Barsuk, MD;
Cynthia Barnard, MBA, MSJS;
Anna O'Donnell, RN, BSN;
William C. McGaghie, PhD;
Diane B. Wayne, MD

Introduction: Interventions to reduce preventable complications such as catheter-related bloodstream infections (CRBSI) can also decrease hospital costs. However, little is known about the cost-effectiveness of simulation-based education. The aim of this study was to estimate hospital cost savings related to a reduction in CRBSI after simulation training for residents.

Methods: This was an intervention evaluation study estimating cost savings related to a simulation-based intervention in central venous catheter (CVC) insertion in the Medical Intensive Care Unit (MICU) at an urban teaching hospital. After residents completed a simulation-based mastery learning program in CVC insertion, CRBSI rates declined sharply. Case-control and regression analysis methods were used to estimate savings by comparing CRBSI rates in the year before and after the intervention. Annual savings from reduced CRBSIs were compared with the annual cost of simulation training.

Results: Approximately 9.95 CRBSIs were prevented among MICU patients with CVCs in the year after the intervention. Incremental costs attributed to each CRBSI were approximately $82,000 in 2008 dollars and 14 additional hospital days (including 12 MICU days). The annual cost of the simulation-based education was approximately $112,000. Net annual savings were thus greater than $700,000, a 7 to 1 rate of return on the simulation training intervention.

Conclusions: A simulation-based educational intervention in CVC insertion was highly cost-effective. These results suggest that investment in simulation training can produce significant medical care cost savings.

(Sim Healthcare 5:98–102, 2010)

Key Words: Simulation, Education, Cost-effectiveness, Infection, Intensive care unit.

A → Y

One competency

The effect of implementing undergraduate competency-based medical education on students' knowledge acquisition, clinical performance and perceived preparedness for practice: a comparative study

Kerdijk W et al.

BMC Medical Education 2013 **13**:76

SYMPOSIUM: NEW DIRECTIONS IN ORTHOPAEDIC EDUCATION

Simulation for Teaching Orthopaedic Residents in a Competency-based Curriculum: Do the Benefits Justify the Increased Costs?

Clin Orthop Relat Res (2016) 474:935–944

Nousiainen M et al

Commentary

How Do You Deliver a Good Obstetrician? Outcome-Based Evaluation of Medical Education

David A. Asch, MD, Sean Nicholson, PhD, Sindhu K. Srinivas, MD, MSCE, Jeph Herrin, PhD, and Andrew J. Epstein, PhD, MPP

Abstract

The goal of medical education is the production of a workforce capable of improving the health and health care of patients and populations, but it is hard to use a goal that lofty, that broad, and that distant as a standard against which to judge the success of schools or training programs or particular elements within them. For that reason, the evaluation of medical education often focuses on elements of its structure and process, or on the assessment of competencies that could be considered intermediate outcomes. These measures are more practical because they are easier to collect, and they are valuable when they reflect activities in important positions along the pathway to clinical outcomes. But they are all substitutes for measuring whether educational efforts produce doctors who take good care of patients.

The authors argue that the evaluation of medical education can become more closely tethered to the clinical outcomes medical education aims to achieve. They focus on a specific clinical outcome—maternal complications of obstetrical delivery—and show how examining various observable elements of physicians' training and experience helps reveal which of those elements lead to better outcomes. Does it matter where obstetricians trained? Does it matter how much experience they have? Does it matter how good they were to start? Each of these questions reflects a component of the production of a good obstetrician and, most important, defines a good obstetrician as one whose patients in the end do well.

Surgical Skill and Complication Rates after Bariatric Surgery

John D. Birkmeyer, M.D., Jonathan F. Finks, M.D., Amanda O'Reilly, R.N., M.S., Mary Oerline, M.S., Arthur M. Carlin, M.D., Andre R. Nunn, M.D., Justin Dimick, M.D., M.P.H., Mousumi Banerjee, Ph.D., and Nancy J.O. Birkmeyer, Ph.D., for the Michigan Bariatric Surgery Collaborative

ABSTRACT

BACKGROUND

Clinical outcomes after many complex surgical procedures vary widely across hospitals and surgeons. Although it has been assumed that the proficiency of the operating surgeon is an important factor underlying such variation, empirical data are lacking on the relationships between technical skill and postoperative outcomes.

METHODS

We conducted a study involving 20 bariatric surgeons in Michigan who participated in a statewide collaborative improvement program. Each surgeon submitted a single representative videotape of himself or herself performing a laparoscopic gastric bypass. Each videotape was rated in various domains of technical skill on a scale of 1 to 5 (with higher scores indicating more advanced skill) by at least 10 peer surgeons who were unaware of the identity of the operating surgeon. We then assessed relationships between these skill ratings and risk-adjusted complication rates, using data from a prospective, externally audited, clinical-outcomes registry involving 10,343 patients.

RESULTS

Mean summary ratings of technical skill ranged from 2.6 to 4.8 across the 20 surgeons. The bottom quartile of surgical skill, as compared with the top quartile, was associated with higher complication rates (14.5% vs. 5.2%, $P<0.001$) and higher mortality (0.26% vs. 0.05%, $P=0.01$). The lowest quartile of skill was also associated with longer operations (137 minutes vs. 98 minutes, $P<0.001$) and higher rates of reoperation (3.4% vs. 1.6%, $P=0.01$) and readmission (6.3% vs. 2.7%) ($P<0.001$).

CONCLUSIONS

The technical skill of practicing bariatric surgeons varied widely, and greater skill was associated with fewer postoperative complications and lower rates of reoperation, readmission, and visits to the emergency department. Although these findings are preliminary, they suggest that peer rating of operative skill may be an effective strategy for assessing a surgeon's proficiency.

Implementing Competency-Based Medical Education in a Postgraduate Family Medicine Residency Program

Schultz, K, Griffiths J

ACADEMIC MEDICINE 91(5), 2016

Canadian family medicine residency introduced a competency-based curriculum. The authors describe implementation approach, costs, and overarching processes, facilitating factors and processes or steps that would have been helpful

Early outcomes

-Residents are being directly observed more often with increased feedback

-Multiple observations allow documentation of competency development trajectory.

-Outliers are being identified and addressed earlier.

-Not yet known whether residents are better trained as a result of CBME implementation.

Proximal outcomes

Three-Year Experience with an Innovative, Modular Competency-Based Curriculum for Orthopaedic Training

Ferguson P et al

2013 THE JOURNAL OF BONE AND JOINT SURGERY

- Technical skills better
- Knowledge better
- A few finish training in a shorter time
- Satisfaction (resident and staff) better
- Complex implementation
- Costly

Little evidence,
many process oriented
or proximal outcomes only

How does this compare with other innovations?

PBL - Problem-Based Learning outcomes

1970's

- Learners sees relevance
- More fun
- Similar problem solving skills
- Similar subsequent clinical performance
- ± better knowledge and application
- More resources

1990 - 2016

Longitudinal clerkship outcomes

- Better satisfaction: learner, teacher, ?patient
- Student more confident
- Positive attitude to primary care

Proximal outcomes

- Improved delivery of preventive care
- ? Career choice

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- **implications for the future of medical education**

"…a remarkable difference in attitude between university staff as teachers and as researchers."

Researchers use a scientific approach, look for underlying theory and supporting evidence and rigorously train new scholars.

In education, "as teachers we seem to have a different attitude. We do the things we do, because that is … the way it has been done for many years, even centuries." We are convinced what we do as teachers is correct, do not use evidence in education, & feel that a professional qualification (e.g. as a physician or scientist) has adequately prepared us to teach. [or implement innovative curricula]

van der Vleuten (2004)

Transforming Medical Education: Is Competency-Based Medical Education the Right Approach?

M Whitcomb

ACADEMIC MEDICINE, 91(5),2016

"more evidence about the effectiveness of CBME is needed before a global shift to this approach is undertaken.

"organizations …committed to improving medical education and the medical education community need to conduct a critical evaluation of CBME.

"continuing medical education programs should be evaluated for their effectiveness in ensuring that physicians are clinically competent not only at the beginning of their career but also until the end."

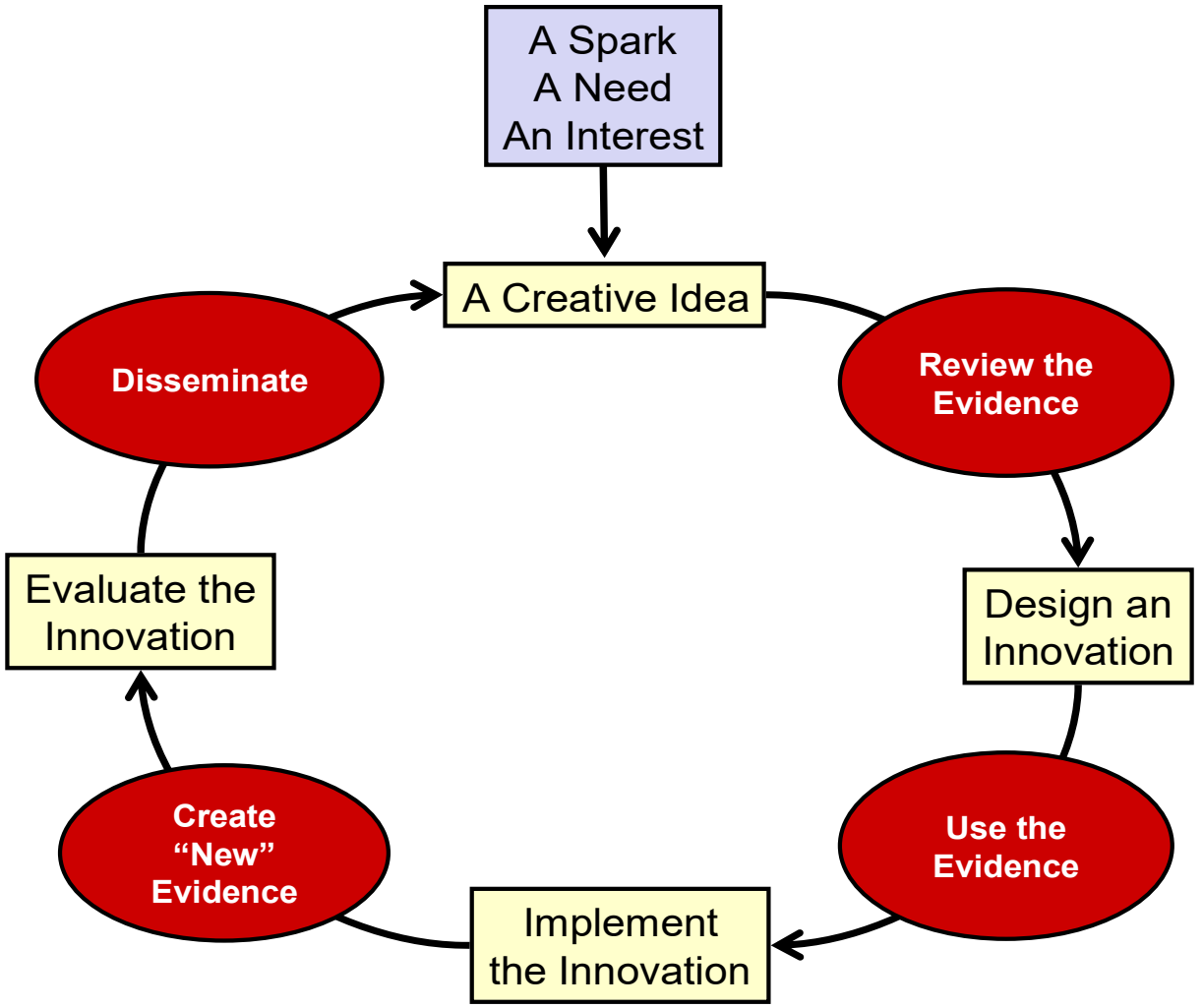
"Research designs answering the question "does OBE work?" will be of little use because the field is just too complicated for that.

Rather, "clarification" studies answering the question "how does OBE work, for whom, and in what circumstances?" are sorely needed and lend themselves to action or design based research conducted within curriculum implementations.

We know little about what OBE is good for; what the connections are between learning outcomes and teaching; when outcomes are helpful for teachers and when not; when and how they are useful for self-directed learning."

Morcke et al, 2013

The education innovation cycle



Steinert 2011; Steinert & Snell 2012

- Innovation of necessity involves change …
- Change is not only about doing something new but about the loss of something familiar

- For education innovations (e.g. CBME) change ‘must be implement wisely, with attention to context’

(Holmboe)

- Hybrid models, education ‘experiments’ or a gradual stepwise implementation with iterative learning may be the best approach

- Education innovation is essential:
  - it allows us to address changing societal needs and education advances
- We need to use – and develop – education evidence
  - innovation should inform our research
  - research should enlighten our education practice
- Education evidence can support and drive adoption of innovation and change