



# Competence by Design Program Evaluation Summit

ICRE2019 Pre-Conference



September 23, 2019





# WiFi Connection Details

- Network Name: Westin\_CONFERENCE
- Open your browser
- Enter the following Access Code: icre2019





# Welcome

We are glad you are here.



# CBD Program Evaluation Operations Team



Andrew Hall



Jason Frank



Elaine Van Melle



Anna Oswald



Warren Cheung



Tim Dalseg



Lara Cooke





# CBD Program Evaluation Operations Team



Alex Skutovich



Lisa Gorman



Sarah Taber



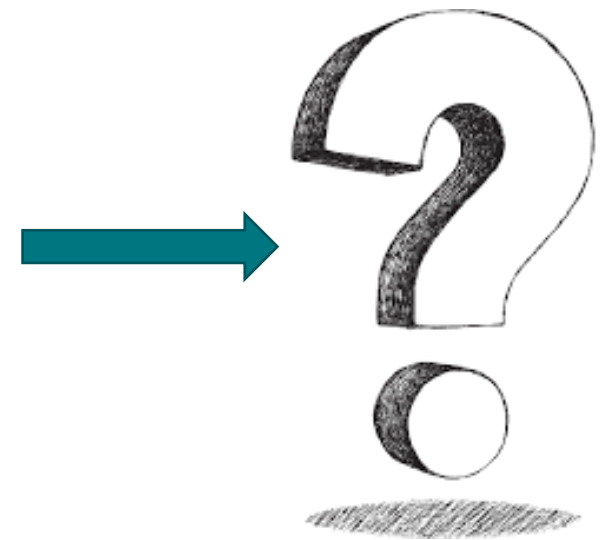
# Who are you?





# Why are we here?









# We are here because we hope to...

- discuss how to evaluate our CBME implementations
- understand the strengths and challenges of implementation efforts
- share our lessons learned – and find out about others
- improve and adapt our CBME program(s)
- find collaborators and build a community around CBME evaluation
- understand if culture change is happening within our program or institution
- figure out if CBME is worth all this effort!





# Vision

Competency-By-Design  
Program Evaluation



CBME Program  
Evaluation





# Vision

- Share and develop ideas
- Network and foster collaborations
- Refine evaluations plans
- Be inspired about evaluation



Time	Session	Speakers/Moderators
7:30am – 8:00am	Breakfast	
8:00am – 8:15am	Opening of the Summit <ul style="list-style-type: none"> <li>• Introduction and Royal College Vision</li> </ul>	Dr. Andrew Hall
8:15am – 9:15am	Small and Large Group Discussion <ul style="list-style-type: none"> <li>• Introduction to Program Evaluation</li> <li>• Priority Evaluation Questions</li> </ul>	Dr. Elaine Van Melle and Dr. Tim Dalseg
9:15 – 9:45am	Break and Networking	
9:45 – 10:00am	Introduction to <ul style="list-style-type: none"> <li>• Readiness to Implement</li> <li>• Fidelity of Implementation</li> </ul>	Dr. Andrew Hall and Dr. Warren Cheung
10:00 – 11:00am	Poster sessions (Tracks 1 – 4) <ul style="list-style-type: none"> <li>• Readiness to Implement</li> <li>• Fidelity of Implementation</li> </ul>	Dr. Warren Cheung, Dr. Anna Oswald, Dr. Tim Dalseg, Dr. Lara Cooke
11:00am – 12:00pm	Small Group Discussion and Debrief <ul style="list-style-type: none"> <li>• Fidelity and Integrity</li> </ul>	Dr. Andrew Hall
12:00 – 12:45 pm	Lunch	
12:45 – 1:00pm	Introduction to <ul style="list-style-type: none"> <li>• CBME Outcomes</li> </ul>	Dr. Lara Cooke
1:00 – 2:00pm	Poster Sessions (Tracks 5 – 8) <ul style="list-style-type: none"> <li>• Outcomes</li> </ul>	Dr. Warren Cheung, Dr. Anna Oswald, Dr. Tim Dalseg, Dr. Lara Cooke
2:00 – 3:00pm	Small Group Discussion and Debrief <ul style="list-style-type: none"> <li>• Outcomes</li> </ul>	Dr. Lara Cooke
3:00 – 3:30pm	Break and Networking	
3:30 – 4:30pm	Closing Plenary Panel <ul style="list-style-type: none"> <li>• Exemplary CBME Program Evaluation</li> </ul>	Dr. Deena Hamza, Dr. Stanley Hamstra, Dr. Tim Dalseg, Dr. Warren Cheung
4:30 – 5:00pm	Closing Remarks and Thanks <ul style="list-style-type: none"> <li>• Reflections on the current state of program evaluation for CBME</li> </ul>	Dr. Jonathan Sherbino, Dr. Andrew Hall

# Three Pillars of CBD Program Evaluation

**Readiness to  
Implement**



**Fidelity & Integrity  
of Implementation**



**Outcomes**





# Three Pillars of CBD Program Evaluation

**Readiness to  
Implement**

**Fidelity & Integrity  
of Implementation**

**Outcomes**





# Ground Rules...

- Everyone here is willing to share and present their ideas and plans
- Implied trust in each other to give credit when due, reach out to others to collaborate, and respect each other's intellectual property
- Safe to be inspired and develop evaluation strategies





# Accreditation

## Section 1 accreditation statement

This event is an Accredited Group Learning activity (Section 1) as defined by the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada, and approved by the Royal College Continuing Professional development Unit. You may claim a maximum of **6 hours and 15 minutes** (credits are automatically calculated).

All conflicts of interest disclosed can be found on the ICRE app.







# Questions?



# CBD Program Evaluation Summit

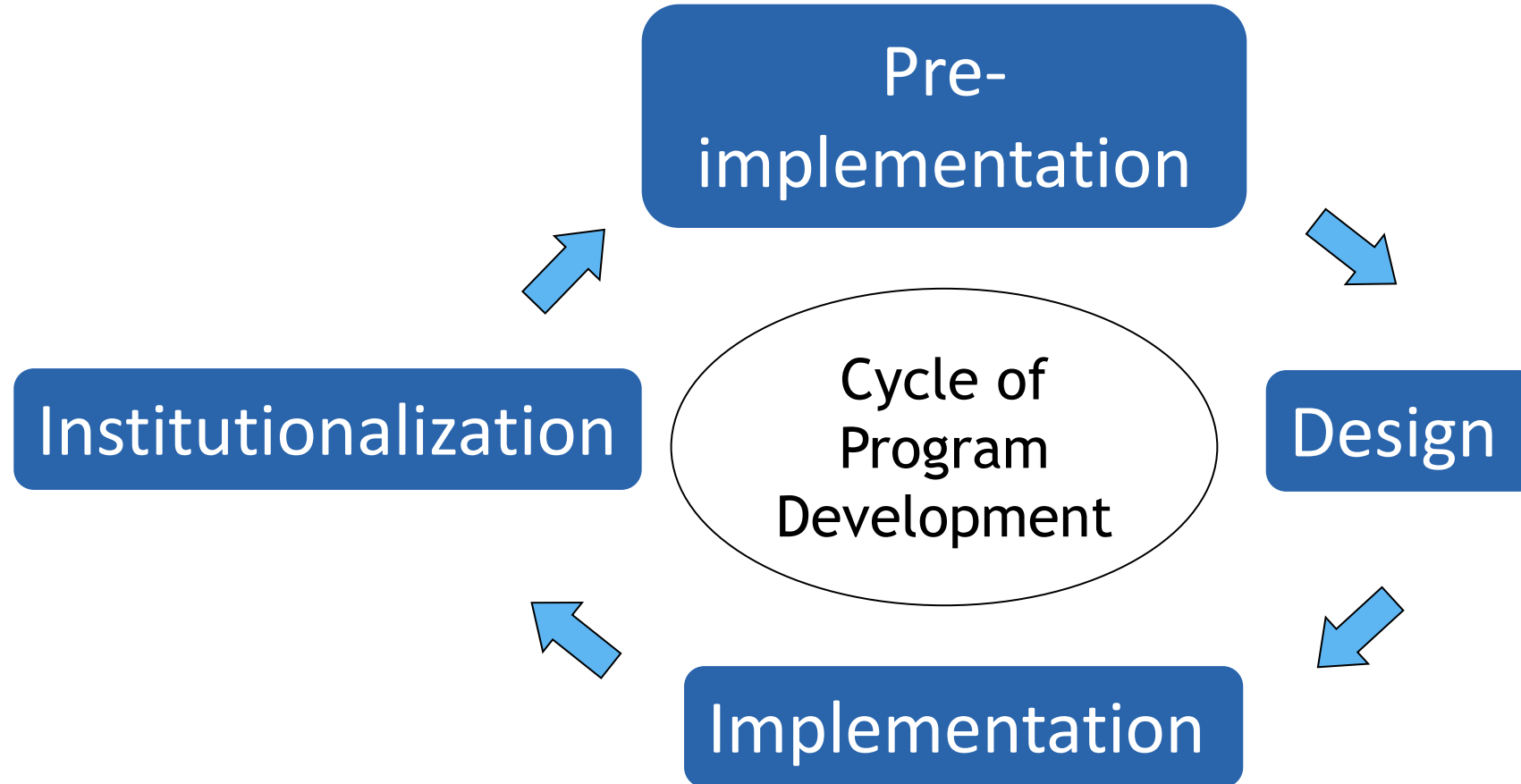
*Elaine Van Melle, PhD.*

- Program Evaluation Consultant, RCPSC.
- PE Operations and PE Steering Committee, RCPSC.
- Department of Family Medicine, Queen's University, Adjunct Faculty.

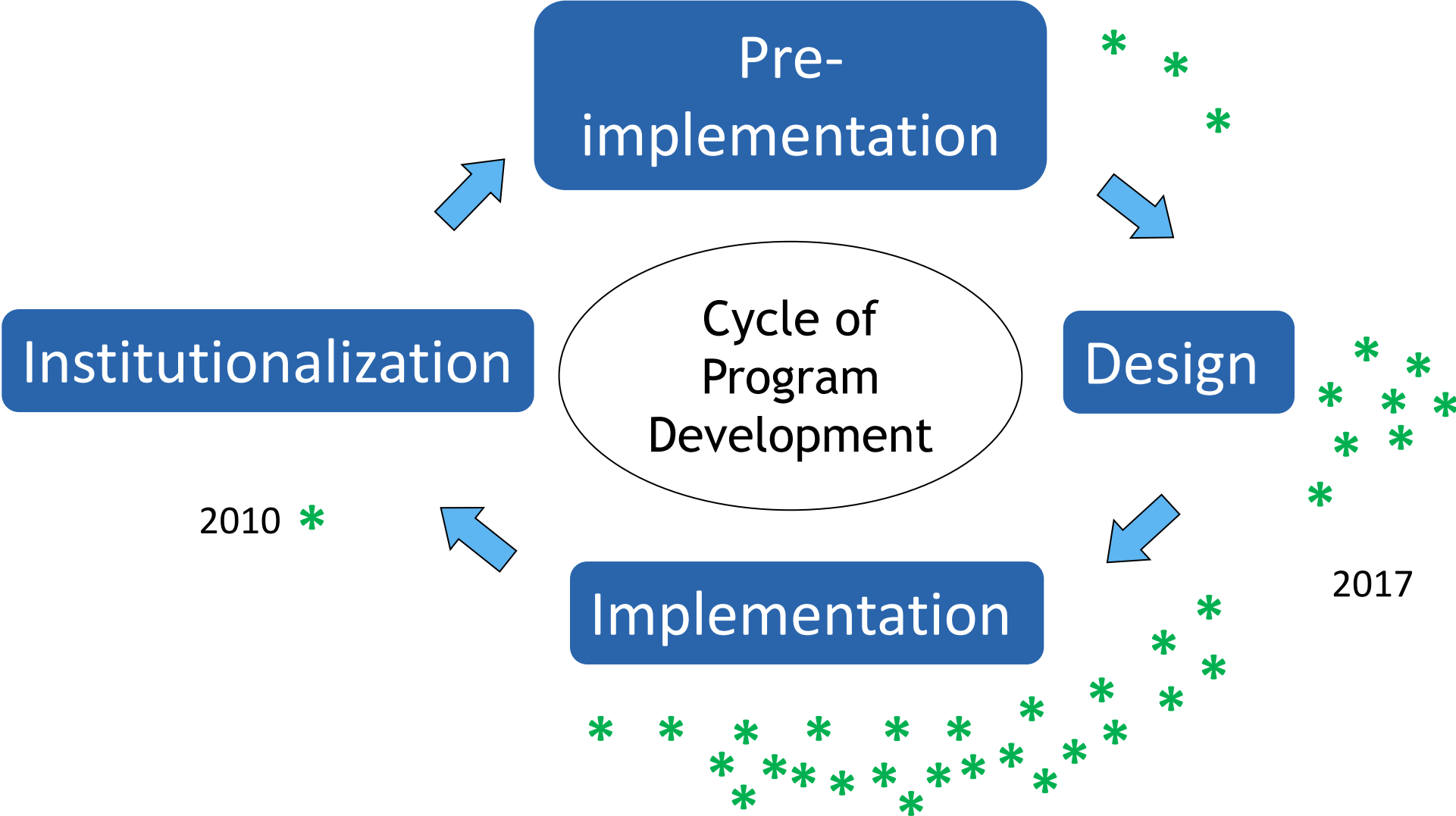
*Tim Dalseg, MD*

- Clinician Educator, RCPSC
- PE Operations Committee, RCPSC
- Accreditation Committee, RCPSC
- Division of Emergency Medicine, University Health Network, University of Toronto, Clinician-teacher.

# The Cycle of Program Development



# The Cycle of Program Development



# Priority Evaluation Questions . . .

What is your #1 program evaluation question?



# Priority Evaluation Questions . . .

What are our priority program evaluation questions?



Research

Quality  
Improvement

Accreditation

Program  
Evaluation



Prove

Improve

Approve

Move

# Research

**To what extent is competence a characteristic of the individual?**

*Gruppen et al, Medical Teacher, 2017*

↓  
**Academic Paper**

# Program Evaluation

**How do personal learning plans contribute to the development of competence?**

*Van Melle et al, Acad. Med., 2018.*

↓  
**Technical Report**





# Quality Improvement

**How can we improve our resuscitation training program?**

*Mundell et al, Resuscitation, 2013.*

**BEST Practice**

# Program Evaluation

**How do residency programs understand and operationalize Clinical Competence Committees?**

*Hauer et al, Acad Med. 2005*

**NEXT Practice**



# In Summary . . . Program Evaluation Questions

- ✓ Relevant to program stakeholders
- ✓ Connect/consider process and outcomes
- ✓ Provide timely information for decision-making:  
Technical Report
- ✓ Move a program forward: NEXT Practice

3 minutes – write on a post-it note –  
- include your name

What is your #1 program evaluation question?



# Round Table – 15 minutes

Differences & Similarities - themes?



One person per table - group and post

Rest of table discuss/list – Additional Evaluation Questions



# Large Group Debrief

What are our priority program evaluation questions?





	Program Evaluation	Research	Quality Improvement	Accreditation
Purpose	To provide information for decision-making	To develop new knowledge	To improve internal processes for a specific intervention	To determine whether institutions, institutional programs or personnel should be approved to deliver specified public programs
Focus	Questions regarding program merit, worth, improvement	Theory-based hypothesis or research question	The assessment of an existing practice	The delivery of programs & services in accordance with the standards of good practice and safety
Timeline	Bounded by organization's requirement for data to support decision-making	Based on researcher's timeline and available funding	Short timeline that supports immediate change	Ongoing timeline document initiated at regular intervals
Outcome	Improvement in program design and understanding of program outcomes	Contribution to general body of knowledge	Change to practice	Public certification of program or institutional quality
Audience	Internal and external stakeholders	Other researchers	Internal stakeholders	External (public) stakeholders and users or services





# BREAK (0915-0945)

\*Review poster tracks 1-4



# CBD Program Evaluation

## Readiness to Implement Fidelity & Integrity of Implementation



September 23, 2019

Dr. Warren Cheung and Dr. Andrew Hall

On behalf of the CBD Program Evaluation Operations Team\*

# Three Pillars of CBD Program Evaluation

**Readiness to  
Implement**



**Fidelity & Integrity  
of Implementation**



**Outcomes**



# Why should we care about Readiness?

- We know that **implementation affects outcomes** (Drzensky, Egold, & Van Dick, 2012)
- Organizational readiness for change is an **important precursor** to successful implementation
  - *“failures to implement large-scale organizational change occur because organizations fail to establish sufficient readiness” (Kotter, 1996)*
- Need to build an understanding of **factors that influence the capacity** to successfully implement CBD



# What is Readiness to Implement?

- An organization's “**resolve**” to implement an innovation
  - Beliefs
  - Attitudes
  - Intentions
- An organization's “**capacity**” to implement an innovation
  - Capabilities
  - Resources / Structures





# Framework for organizational readiness

- $R = MC^2$  (Scaccia, 2016)

## Components of readiness:

- 1) Motivation
- 2) General capacity
- 3) Innovation-specific capacity

Components are interactive, not additive

- Principles from the field of practical implementation science





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Relative advantage

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Priority

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Compatibility

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Complexity

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Observability

---

**Motivation**



# General Capacity

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Leaders are supportive

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General receptivity to change

---

Staff capacity to implement change

---

Past experiences with implementing change





# Innovation -Specific Capacity

## Knowledge / skills / abilities needed for the innovation

- Training
- Resources
- Inter-organizational relationships

## The parts:

- Foundational structures
- Foundational processes



# Modifiable vs. Non-modifiable

- Some mediators of readiness appear to be **modifiable** and others are **non-modifiable** (Weiner, 2008)
  - Different levels within the organization
  
- How can those factors that are modifiable be **optimized** to ensure successful implementation?



# Three Pillars of Program Evaluation

**Readiness to  
Implement**



**Fidelity & Integrity  
of Implementation**



**Outcomes**





# Fidelity of Implementation

- **Fidelity of implementation** is the extent to which critical components of CBD are present in a program.
- **Integrity of implementation** is the extent to which implementation embodies key qualities of CBD.





# Fidelity of Implementation

- Flexibility in implementation
- local contexts and adaptations → implementation → outcomes
- Questions:
  - *Did our implementation of CBD include the critical components of CBME?*
  - *Did our CBD program embody the key qualities of CBME?*
  - *Were outcomes measured due to implementation factors **OR** inadequacies in the program theory?*







# POSTERS (1000-1100)

Tracks 1-4





# Readiness and Fidelity Debrief







# Readiness and Fidelity Discussion Topics

- Readiness to Implement (Tables 1+2)
- Coaching and Individualized Stage-Based Learning (Tables 3+4)
- Workplace-based EPA Assessment and Direct Obs (Tables 5+6)
- Programmatic Assessment (Tables 7+8)
- Competence Committees and Progression Decisions (Table 9+10)
- Fidelity of Implementation – Where to next? (Table 11)





# Small Group Questions (30 min)

1. What specific aspects of a training program would you measure relating to this component of CBD?
2. What are strategies that can/should/are being used to evaluate your component of CBD?
3. How could you link this fidelity evaluation to subsequent outcomes?





# LUNCH (12:00-12:45)

\*review poster tracks 5-8



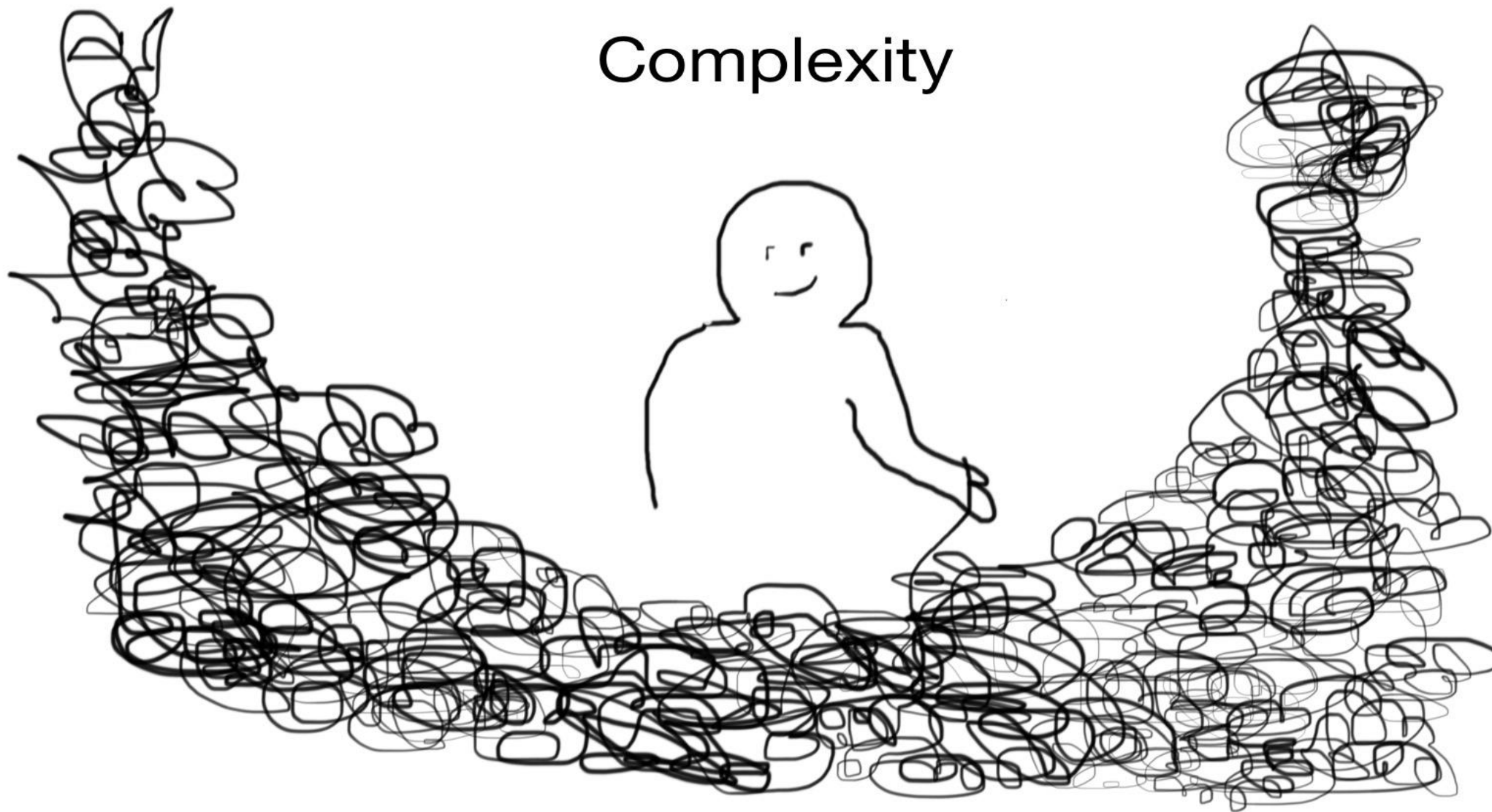


# Outcomes Measurement in CBD

CBD Evaluation Summit



# Complexity



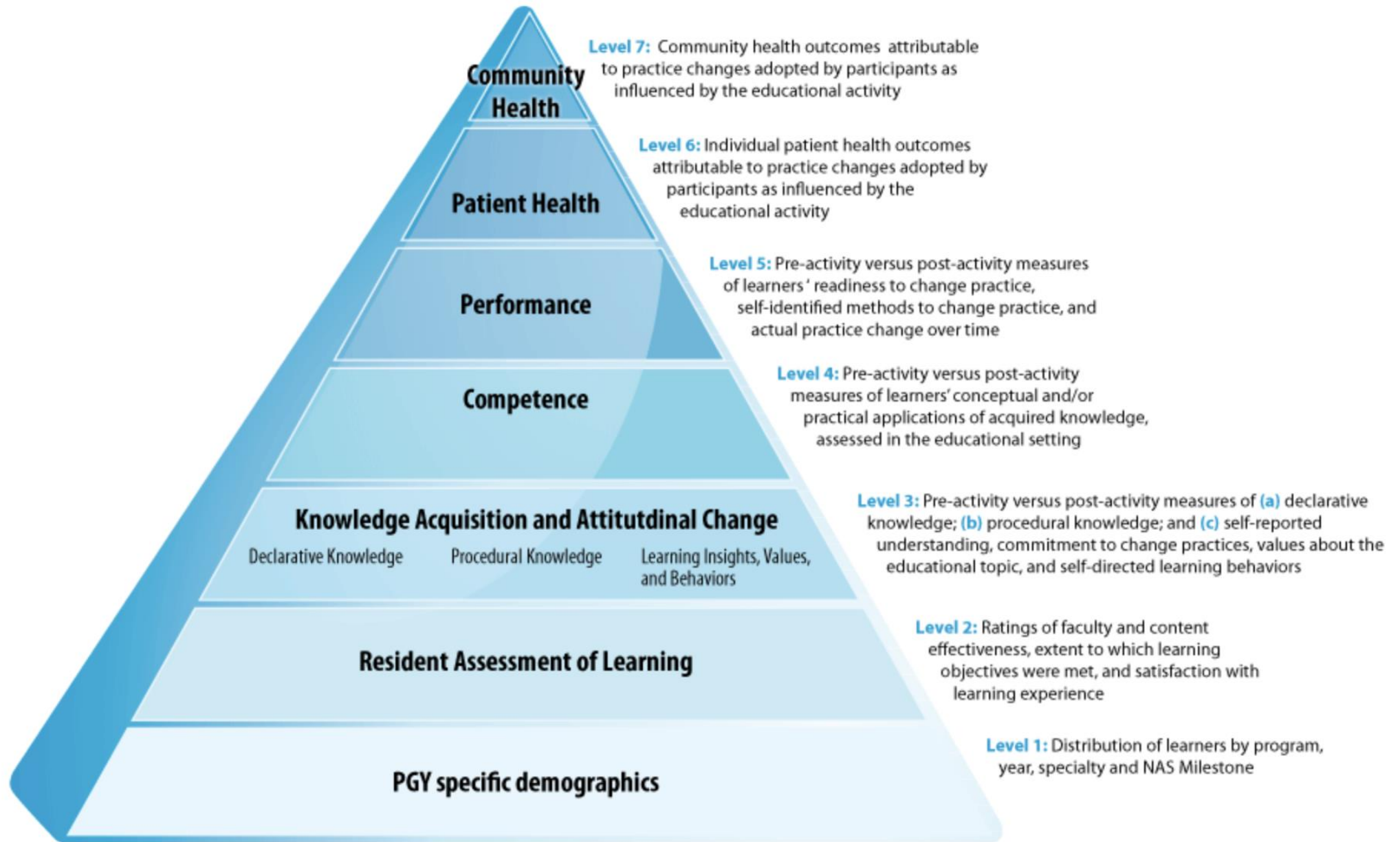
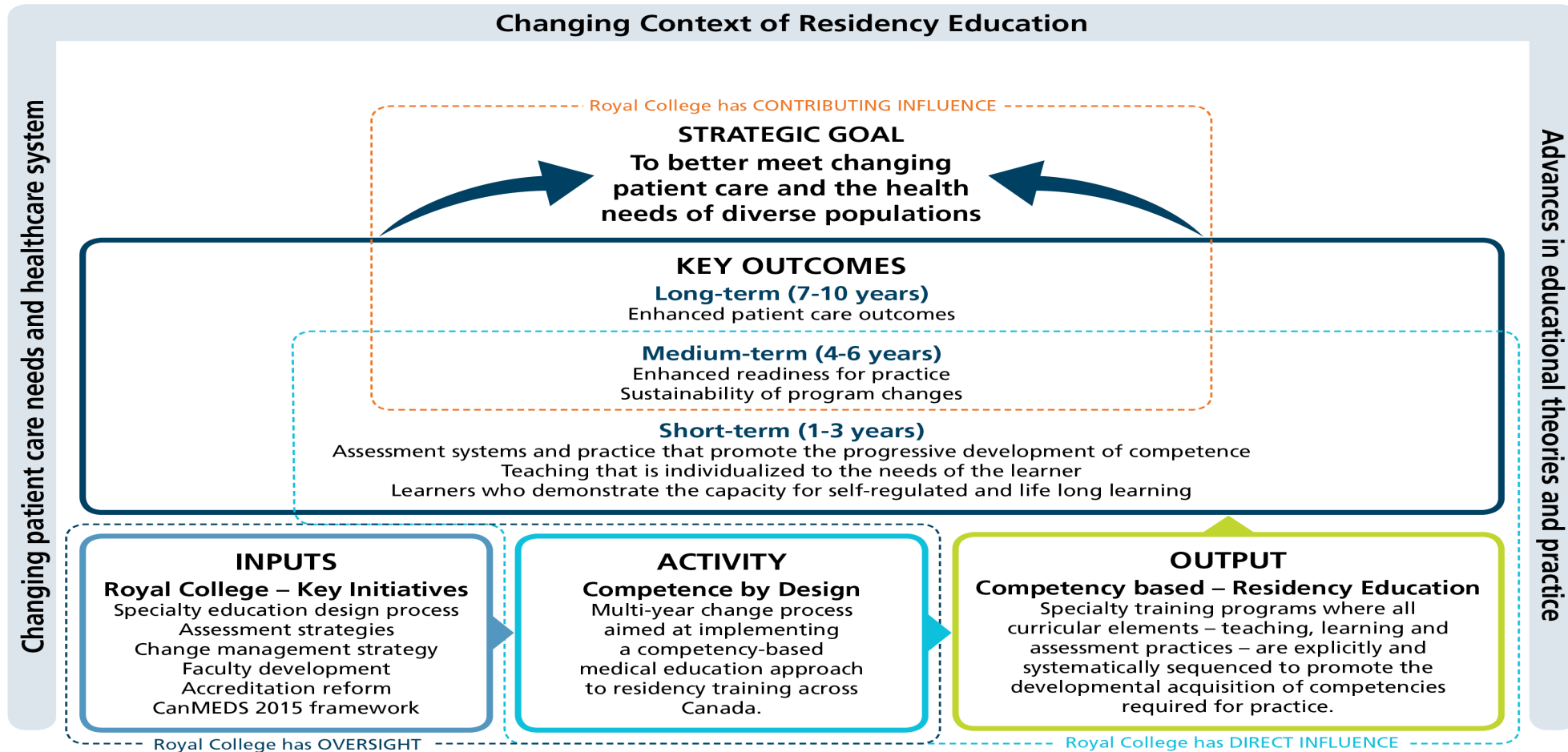


Figure 1. Adapted from PRIME Model of Learning<sup>1</sup>, Kirkpatrick<sup>2</sup>, Miller<sup>3</sup> and Moore et al<sup>4</sup>.



# Program Model





# Time-Based?



Short-term outcomes

Medium-term outcomes

Long-term outcomes





# Core Components Based?

- Outcomes competency framework
- Progressive sequencing of competencies
- Learning experiences tailored to competencies
- Teaching tailored to competencies
- Programmatic Assessment

Acad Med. 2019 Jul;94(7):1002-1009. doi: 10.1097/ACM.0000000000002743.

## A Core Components Framework for Evaluating Implementation of Competency-Based Medical Education Programs.

Van Melle E<sup>1</sup>, Frank JR, Holmboe ES, Dagnone D, Stockley D, Sherbino J; International Competency-based Medical Education Collaborators.

**CORE COMPONENTS OF CBME**  
Van Melle's Framework

This philosophy is put into practice through five core components:

- 1. An Outcomes Competency Framework**
  - + Desired outcomes of training are identified based on societal needs
  - + Outcomes are "king", meaning: graduate abilities to function as an effective health professional
- 2. Progressive Sequencing of Competencies**
  - + In CBME, competencies and their developmental markers must be explicitly sequenced to support learner progression from novice to master clinician
  - + Sequencing must take into account that some competencies form building blocks for the development of further competence
  - + Progression is not always a smooth, predictable curve
- 3. Learning Experiences Tailored to Competencies In CBME**
  - + Time is a resource, not a driver
  - + Learning experiences should be sequenced in a way that supports the progression of competence
  - + There must be flexibility in order to accommodate variation in individual learner progression
  - + Learning experiences should resemble the practice environment
  - + Learning experiences should be carefully selected to enable acquisition of one or many abilities
  - + Most learning experiences should be tied to an essential graduate ability
- 4. Teaching Tailored to Competencies**
  - + Clinical teaching emphasizes learning through experience and application, not just knowledge acquisition
  - + Teachers use coaching techniques to diagnose a learner in clinical situations and give actionable feedback
  - + Teaching is responsive to individual learner needs
  - + Learners are actively engaged in determining their learning needs
- 5. Programmatic Assessment**
  - + There are multiple points and methods for data collection
  - + Methods for data collection match the quality of the competency being assessed
  - + Emphasis is on workplace observation
  - + Emphasis is on providing personalized, timely, meaningful feedback

**FIVE CORE COMPONENTS**

1. An Outcomes Competency Framework
2. Progressive Sequencing of Competencies
3. Learning Experiences Tailored to Competencies
4. Teaching Tailored to Competencies
5. Programmatic Assessment

ICBME COLLABORATORS

would expect them to

ieve





# The Promise of CBD...

- Enhanced **flexibility** in training
- Learner-centred
- Supervisor = coach
- Assessment **for** learning; low stakes
- Issues identified early
- Opportunity for innovation
- Transparent; standards well-described
- Standardization between training sites
- Resident promotion doesn't rest with one





# Patient Outcomes? Community Outcomes?

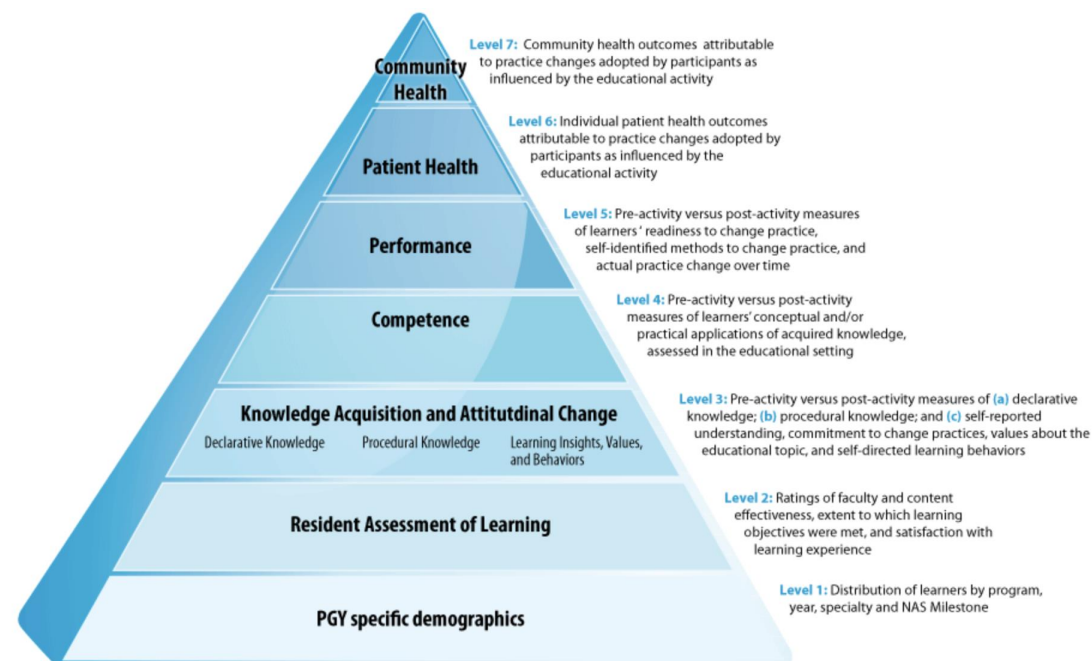


Figure 1. Adapted from PRIME Model of Learning<sup>1</sup>, Kirkpatrick<sup>2</sup>, Miller<sup>3</sup> and Moore et al<sup>4</sup>.





# POSTERS (1300-1400)

Tracks 5-8





# Where to start? A few “outcomes domains”

- Residents’ readiness to transition to practice (Table 1+2)
- Transformation of culture of assessment in residency (Table 3+4)
- Earlier identification of residents in difficulty (Table 5)
- Changing role of the preceptor/coach/educator (Table 6+7)
- Patient Outcomes (Table 8+9)
- Unanticipated outcomes (Table 10+11)





# The Big Questions (30 min)

After looking at the outcomes posters, and talking to your colleagues, for each outcome “domain”, consider the following:

1. What else do we need to know in order to clearly define this “domain”?
2. How should this domain be evaluated?
3. What is needed/what are barriers to evaluate (ing) this...
  1. Locally
  2. Provincially
  3. Nationally





**BREAK (1500-1530)**





# Closing Plenary Panel

Exemplary Program Evaluation from the CFPC, ACGME, and Royal College





# Closing Plenary Panel



**Deena M. Hamza, PhD**

Evaluation Lead  
Postgraduate Medical Education  
(PGME)  
Faculty of Medicine & Dentistry  
University of Alberta



**Stanley J. Hamstra, PhD**

VP, Milestone Research and Evaluation  
Accreditation Council for Graduate  
Medical Education, Chicago

Adjunct Professor of Medical Education,  
Northwestern University - The Feinberg  
School of Medicine



**Warren Cheung, MD,  
MMed, FRCPC**

Clinician Educator, RCPSC

Assistant Professor, Associate Director  
of Education Innovation, Director of  
Assessment, Dept of EM, University of  
Ottawa



**Timothy Dalseg, MD,  
FRCPC**

Clinician Educator, RCPSC

Clinician Teacher, Division of Emergency  
Medicine, UHN, University of Toronto

THE COLLEGE OF  
FAMILY PHYSICIANS  
OF CANADA



LE COLLÈGE DES  
MÉDECINS DE FAMILLE  
DU CANADA

# *Improvement-Oriented Evaluation of Competency-Based Medical Education (CBME)*

**Deena M. Hamza, PhD**  
CBME Evaluation Lead for PGME  
University of Alberta



# USEFUL

## Mixed Methods

## Utilization Focused Evaluation

“... how real people in the real world apply evaluation findings and experience and learn from the evaluation process” Patton, 2013

- Practical application
- Multiple methods (quantitative/qualitative) to answer questions



# Utilization Focused Evaluation



- Identify + engage primary intended users
- Follow-up with primary intended users
- Organize + present evaluation data in a report
  - dissemination to facilitate use and expand influence
- **Be accountable: learn + improve**

## Improvement-Oriented Evaluation: Methods/Approach



- Explores social processes + mechanisms during implementation
- Prospectively draws a bridge to outcomes
- Alongside implementation
- Provides information on barriers/enablers; accomplishments

# OUTCOME evaluation



- Explores the progress of CBME and desired results
- Aims to answer questions, such as:
  - unintended outcomes
  - return on investment
  - changes in knowledge, attitudes, and behaviors



# Utilization Focused Evaluation

**Be accountable: learn + improve**



# Developing a Program Theory or Theory of Change

## theory

A set of assumptions, propositions, or accepted facts that attempts to provide a plausible or rational explanation of ...

- **Clearly defines the problem(s)/challenge(s)** that CBME is anticipated to address
- **Illustrates how** the shift to CBME is anticipated to be successful
- **Defines** intended impacts\*\*
- **Systematically maps** all of the factors that contribute to the chain of short and long-term outcomes that are expected to lead to those impacts



# Original Program Theory:

## Influential Factors

- New social needs/expectations
- Regulatory environment

## Problem or Challenge

- Competent physicians ready for unsupervised practice

## Community Needs/Assets

- Improvement in patient care outcomes → interprofessional collaboration

## Strategies

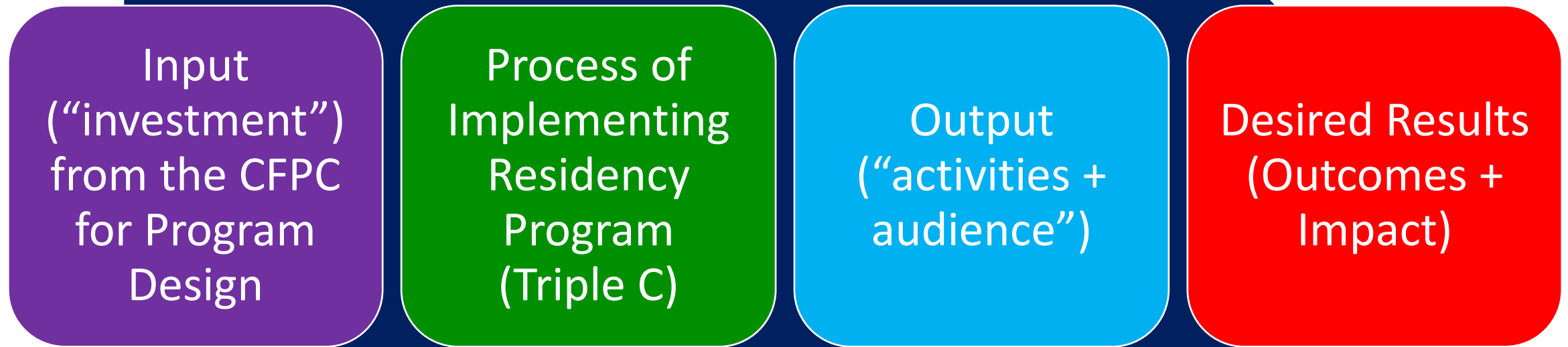
Canadian Family Medicine Curriculum  Le cursus en médecine familiale au Canada

## Assumptions/Hypotheses

## Desired Results (Outputs, Outcomes, and Impacts)

Graduates ready to begin the practice of Comprehensive Family Medicine in any community in Canada

# Logic Model: Illustration of the Program Theory





Assumption  
#1

- The CFPC's policies (accreditation and certification standards) and support offered to residency programs will enable successful adoption of Triple C across Canada

Assumption  
#2

- Uptake will vary depending upon external factors (e.g. provincial policies; medical education culture) and internal factors (e.g. faculty engagement, learner demographics, leadership and infrastructure support)

Assumption  
#3

- If family medicine trainees experience Triple C, graduates will choose to practice comprehensive family medicine; will choose to work in diverse communities that may be traditionally underserved; and will be able to self-assess and address ongoing learning needs

Assumption  
#1

- The CFPC's policies (accreditation and certification standards) and support offered to residency programs will enable successful adoption of Triple C across Canada

## Data Sources

Residency Program  
Implementation Profile (RPIP)

Qualitative Understanding and  
Evaluation Study of Triple C  
(QUEST) Study



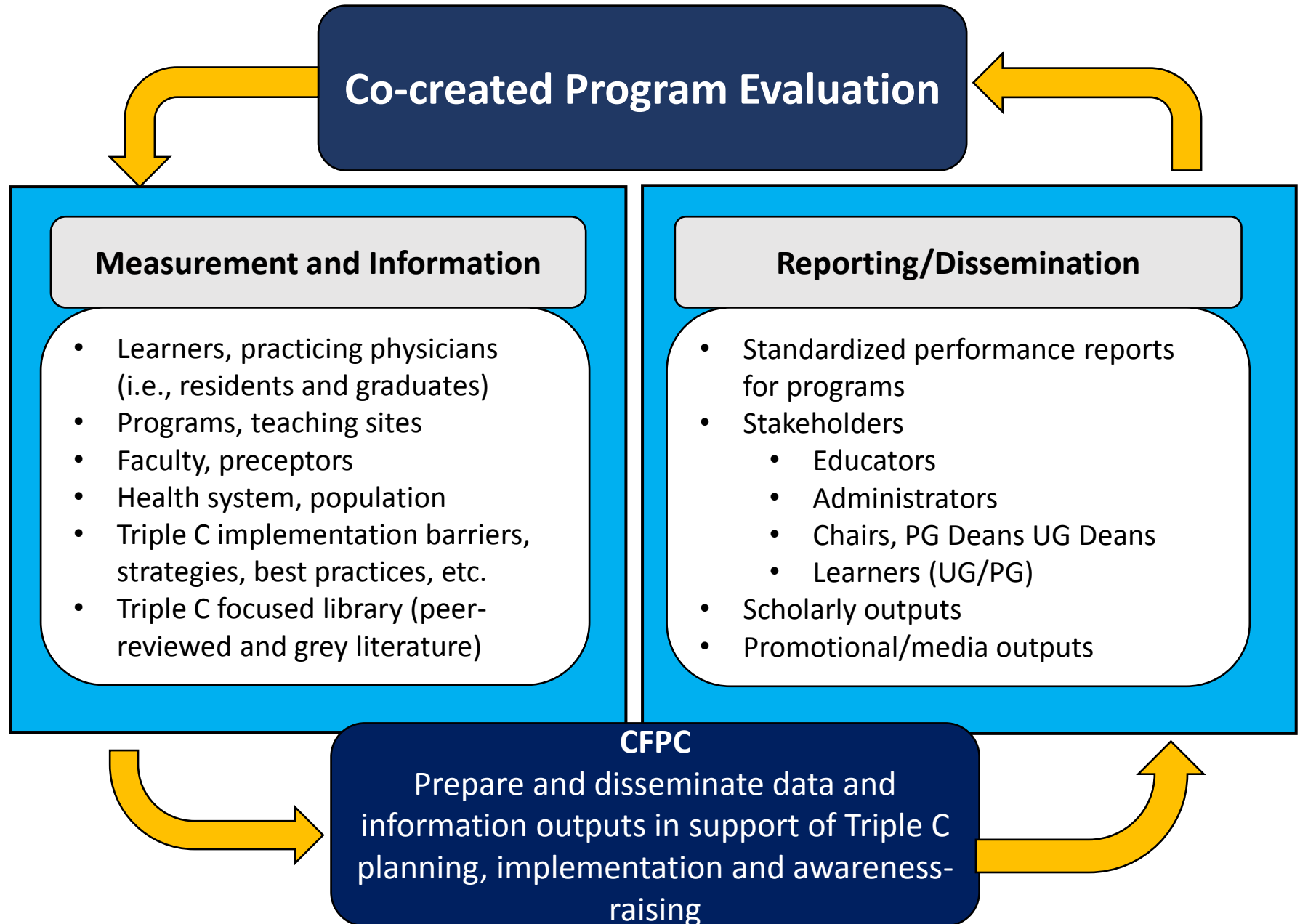
- Advancement of Triple C → **non-directive guidance** from the CFPC
  - encouraged uptake from early adopters even before accreditation standards were implemented specifically for Triple C

- **Collaborative co-creation** with stakeholders supports adoption

Content to Update Program Theory

- **Effective communication** with all program leaders is imperative
- **Longitudinal support** needed for late adopters

# Triple C Evaluation Dissemination Framework (~2012)



# Guiding Principle #1

## Collective Action

- Collaborative and professional co-creation of change strategies
- An agreed upon collective goal and understood the “why” for change
- Decentralized authority (non-directive guidance from the CFPC) and program ownership



## Guiding Principle #2

### Accountable: Learn + Improve

- Data from evaluation rapidly used to inform upcoming processes (normalizing CQI processes)
- Encouraged engagement in evaluation and research
- Participants had tangible evidence that their efforts supported the growth of CBME

**TIME**

**TO IMPROVE**



## Guiding Principle #2

### Accountable: Learn + Improve

**TIME**

**TO IMPROVE**

1. Working toward the co-creation of the Family medicine Professional Profile (FMPP)
2. Workbook for Improvement-Oriented Residency Education in Family Medicine (WIRE-FM; Section #9 Red Book)



# USEFUL

- Findings “from the field” provide valuable insight on social processes and mechanisms that influence implementation, and subsequently outcomes
- Development of an updated program theory → new changes and new theories that facilitate the advancement of CBME and contribute to cumulative science





Dr. Ivy Oandasan, CFPC ([ivy@cfpc.ca](mailto:ivy@cfpc.ca))

Dr. Shelley Ross, UofA

Collaboration → Leveraging Researchers



**Ellaway, RH., Palacios Mackay, M., Lee, S., Hofmeister, M., Malin, G., Archibald, D., Lawrence, K., Dogba, J., Côté, L., Ross, S.** The impact of a national competency-based medical education initiative in family medicine. *Acad Med.* 2018 Dec;93(12):1850-1857. doi: 10.1097/ACM.0000000000002387

**Ross S, Binczyk NM, Hamza DM,** et al. Association of a Competency-Based Assessment System With Identification of and Support for Medical Residents in Difficulty. *JAMA Netw Open.* Published online November 09, 2018;1(7):e184581. doi:10.1001/jamanetworkopen.2018.4581

**Hamza, DM., Oandasan, I., on behalf of the Program Evaluation Advisory Group.** Triple C Competency-Based Curriculum: Findings Five Years Post-Implementation. (Mississauga, ON, 2018).

**Hamza, DM., Ross, S., Oandasan, I.** Perceptions of Family Medicine in Canada through the Eyes of Learners. *Can Fam Physician* In Press (2019).

**Zhang, PZ, Hamza, DM, Ross, S, Oandasan, I.** Exploring Change After Implementation of Family Medicine Residency Curriculum Reform. *Fam Med* 2019 Apr;51(4):331-337. doi: 10.22454/FamMed.2019.427722.

**Oandasan, I., Saucier, D., eds.** Triple C Competency-based Curriculum Report - Part 2: Advancing Implementation. (College of Family Physicians of Canada, Mississauga, ON, 2013).

**Oandasan, I., Martin, L., McGuire, M., & Zorzi, R.** Twelve tips for improvement-oriented evaluation of competency-based medical education. *Med Teach,* 1-6 (2019).

**Hamza, DM, Ross, S, Oandasan, I.** Continuous quality improvement of a competency-based medical education intervention using process and outcome evaluation guided by program theory (submitted to *Journal of Evaluation in Clinical Practice*, August 2019)

# Realizing the Promise of CBME with Milestones

Stanley J. Hamstra, PhD  
VP, Milestones Research and Evaluation  
Accreditation Council for Graduate Medical Education  
Chicago, Illinois

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shamstra@acgme.org

# Relevant Disclosures

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Paid employee of ACGME

# CBME Frameworks

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CanMEDS



ACGME



GMC

- Medical expert
- Communicator
- Collaborator
- Leader
- Health advocate
- Scholar
- Professional

- Patient care
- Medical knowledge
- Systems-based practice
- Practice-based learning & improvement
- Professionalism
- Interpersonal and communication skills

- Good clinical care
- Relationships with patients and families
- Working with colleagues
- Managing the workplace
- Social responsibility and accountability
- Professionalism

SPECIAL REPORT

## The Next GME Accreditation System — Rationale and Benefits

Thomas J. Nasca, M.D., M.A.C.P., Ingrid Philibert, Ph.D., M.B.A., Timothy Brigham, Ph.D., M.Div.,  
and Timothy C. Flynn, M.D.

In 1999, the Accreditation Council for Graduate Medical Education (ACGME) introduced the six domains of clinical competency to the profession,<sup>1</sup> and in 2009, it began a multiyear process of restructuring its accreditation system to be based on educational outcomes in these competencies. The result of this effort is the Next Accreditation System (NAS), scheduled for phased implementation beginning in July 2013. The aims of the NAS are threefold: to enhance the ability of the peer-review system to prepare physicians for practice in the 21st century, to accelerate the ACGME's movement toward accreditation on the basis of educational outcomes, and to reduce the burden associated with the current structure

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### LIMITATIONS OF THE CURRENT SYSTEM

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When the ACGME was established in 1981, the GME environment was facing two major stresses: variability in the quality of resident education<sup>8</sup> and the emerging formalization of subspecialty education. In response, the ACGME's approach emphasized program structure, increased the amount and quality of formal teaching, fostered a balance between service and education, promoted resident evaluation and feedback, and required financial and benefit support for trainees. These dimensions were incorporated into program requirements that became increasingly more specific during the next 30 years.



# IOM – To Err is Human (1999)

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## IOM Report

### Released September 2015

- At least 5 percent of U.S. adults who seek outpatient care each year experience a diagnostic error.
- Postmortem examination research shows diagnostic errors consistently contribute to ~ 10 percent of patient deaths.
- Diagnostic errors account for 6 to 17 percent of hospital adverse events.

# Milestones Data as part of CQI

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- *Milestones data represents an opportunity to engage in an ongoing CQI process;*
- *NAS = moving ACGME “from regulation to collaboration”;*
  - *it’s about feeding data back into the Milestones process for CQI, and ultimately **improve training** and respond to public accountability.*

*Nasca et al. 2012 NEJM*

# Exemplary CBME Program Evaluation

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- ACGME NAS/Milestones: No formal program evaluation per se...

But...

- Plenty of indirect indicators of **impact**

# Accountability / Indicators of Impact

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- Milestones Bibliography (semi-annual update)
- Annual Milestones National Data Report
- Analytics – e.g. “straight-lining”, PPV
- CLER
- Pursuing Excellence Initiative
- Back to Bedside
- Physician Well-Being
- AIRE

*<https://www.acgme.org/What-We-Do/Initiatives>*

*<https://www.acgme.org/What-We-Do/Accreditation/Advancing-Innovation-in-Residency-Education-AIRE>*

# Other Indicators of Impact / “Consequential Validity”

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- Use of Milestones data by State Medical Boards
- Program-level innovations: e.g. Eric Warm at Univ Cincinnati
- Eric Holmboe – Faculty Development Hubs
  - Central resources, guidebooks:
    - CCC
    - Faculty, PDs
    - Residents and Fellows
- Collaborative research with the Boards (ABMS), NBME, etc.
- **“Milestones 2.0”**

# Measuring **Impact** – (after Kirkpatrick)

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1. Patient Outcomes
2. Change in Clinical Practice
3. Change in Educational Practice
4. Change in Knowledge
5. Change in Attitude (Engagement)
6. Participation

# Measuring **Impact** – (after Kirkpatrick)

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1. Patient Outcomes
2. Change in Clinical Practice
- 3. Change in Educational Practice – “The Neurosurgery Story”**
4. Change in Knowledge
5. Change in Attitude (Engagement)
6. Participation

# ACGME - Mandate

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- 11,200 residency and fellowship programs in US
- >135,000 residents and fellows
- 180 specialties and subspecialties
  - 24 Core Specialties (for “Residents”) (82% of total):
    - e.g. Surgery, Internal Medicine, Anesthesiology, Pediatrics, etc.
  - 156 Sub-Specialties (for “Fellows”) (18% of total):
    - e.g. Medical Toxicology, Sports Medicine, Geriatric Medicine, Hand Surgery, etc.



# Background: Milestones

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- We monitor progression of Milestone achievement in multiple competency categories within each specialty:

Specialty	Total # Sub-comp	PC	MK	SBP	PBLI	PROF	ICS
NS	24	8	8	2	2	2	2
OS	41	16	16	3	2	2	2
EM	23	14	1	3	1	2	2
DR	12	2	2	2	3	1	2
URO	32	9	1	4	7	6	5
IM	22	5	2	4	4	4	3
etc...							

# Generic Milestones Template

Milestone Description: Template				
Level 1	Level 2	Level 3	Level 4	Level 5
What are the expectations for a beginning resident?	What are the milestones for a resident who has advanced over entry, but is performing at a lower level than expected at mid-residency?	<p>What are the key developmental milestones mid-residency?</p> <p>What should they be able to do well in the realm of the specialty at this point?</p>	<p>What does a graduating resident look like?</p> <p>What additional knowledge, skills &amp; attitudes have they obtained?</p> <p>Are they ready for certification?</p>	Stretch Goals – Exceeds expectations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				

# Implementation – Early Signals

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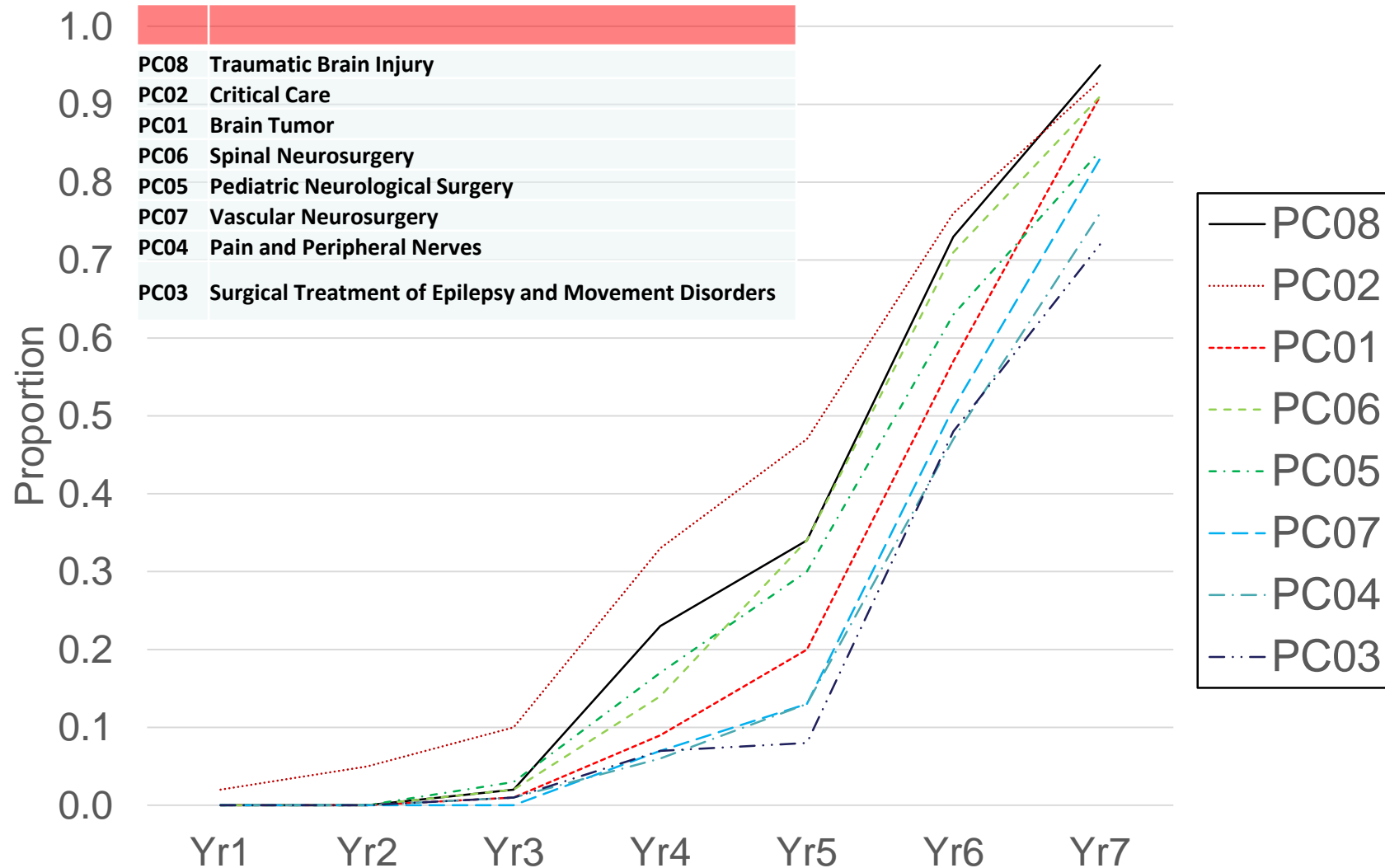
- “bureaucratic BS”
- “we’re sending you what we think you want”
- “too many Milestones”
- “we were doing a fine job before you mandated this”
  
- Etc...

# What Outcome Measure?

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- Natural starting point:
  - Level 4 at graduation as a primary target for analysis;
  - e.g. number of residents not at Level 4 in ALL subcompetencies, etc...
- NB: Level 4 as a recommended graduation target... not a requirement
- Allows for CQI approach... low stakes(?)

# Residents Attaining Level 4 or Higher for PC Sub-Competencies (June 2015) – Neurological Surgery



# Interpretation

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- Variations in competence:
  - Due to differences in clinical experience for selected sub-competencies ??
  - (e.g. some training programs may not offer a full range of experience in *Epilepsy and Movement Disorders*);
- thus, the full achievement of Level 4 in all Patient Care competencies may be impossible for those residents.
- Is this OK?

# The Community's Response

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- National Discussion, Several national meetings
  - Re-define what competencies are “core” to all neurosurgeons and which are “subspecialty” competencies for neurosurgery
- Revised Milestones language → “Milestones 2.0”
  - Content and structure

# Milestones 2.0

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- More succinct language – less “eduspeak”
- Reduced the number of trajectories (rows)

<b>Neurosurgery</b>	<b>“Milestones 1.0”</b>	<b>“Milestones 2.0”</b>
No. Subcompetencies	24	20
No. Milestones	436	190



# Content and Structure

Critical Care – Patient Care				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> <li>Performs a history and physical examination in critically-ill patients</li> <li>Orders positioning, analgesics, sedation, neuromuscular blockade, intravenous (IV) fluids and nutrition in critically-ill patients</li> <li>Diagnoses and formulates treatment plans for common pulmonary diseases</li> <li>Use electrocardiogram (EKG) to diagnose cardiac arrhythmia; initiates hemodynamic monitoring</li> <li>Performs a brain death examination</li> </ul>	<ul style="list-style-type: none"> <li>Explains risks and benefits of ventilatory support</li> <li>Interprets diagnostic studies (e.g., chest x-ray [CXR], brain computed tomography [CT], echocardiogram)</li> <li>Manages intra-cranial hypertension (e.g., hyperosmolar agents, cerebral spinal fluid [CSF] drainage)</li> <li>Manages airway and performs endotracheal intubation</li> <li>Inserts arterial and central venous catheters</li> <li>Diagnoses and manages spinal or hypovolemic shock</li> </ul>	<ul style="list-style-type: none"> <li>Formulates work-up and treatment plan for a comatose patient</li> <li>Manages refractory intra-cranial hypertension (e.g., blood pressure, cerebral perfusion pressure [CPP])</li> <li>Obtains confirmatory tests and make an accurate diagnosis of brain death</li> <li>Initiates management of pneumonia or systemic infection</li> </ul>	<ul style="list-style-type: none"> <li>Independently formulates a treatment plan for complex patients (e.g., failure of cerebral autoregulation, multi-organ failure, non-recoverable central nervous system [CNS] injury)</li> <li>Diagnoses and initiates management of adult respiratory distress syndrome</li> <li>Manages difficult and emergency airways</li> <li>Diagnose and manages CSF leak</li> <li>Initiates management of cardiac rhythm disturbances</li> </ul>	<ul style="list-style-type: none"> <li>Systematically reviews outcomes for neurocritical care patients</li> <li>Participates in quality improvement for a neurocritical care unit</li> <li>Develops a standard neurocritical care unit management protocol</li> <li>Leads multidisciplinary neurocritical care team</li> <li>Manages respiratory failure (e.g., mechanical ventilation, bronchoscopy)</li> <li>Manages cardiac rhythm disturbances</li> </ul>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				Not yet rotated <input type="checkbox"/>

Patient Care 8: Critical Care				
Level 1	Level 2	Level 3	Level 4	Level 5
Performs a history and physical examination in critically-ill patients	Manages transient intracranial hypertension (e.g., hyperosmolar agents, CSF drainage)	Manages refractory intracranial hypertension (e.g., cerebral perfusion pressure directed therapy, advanced monitoring, decompressive craniectomy)	Diagnoses and initiates management of acute respiratory distress syndrome	Leads a multidisciplinary neurocritical care team
Inserts arterial and central venous catheters	Assists with routine neurocritical care unit procedures; manages airway and performs endotracheal intubation	Performs routine and assists with complex neurocritical care unit procedures; manages difficult and emergency airways	Performs complex and assists with advanced neurocritical care unit procedures; manages or initiates management of surgical airways	Performs advanced neurocritical care unit procedures; performs bronchoscopy
Manages neurocritical care unit admissions and discharges	Recognizes and initiates work-up of routine systemic complications (e.g., pneumonia, infection, pulmonary embolus, cardiac dysrhythmia, myocardial infarction)	Manages routine systemic complications and prioritizes simultaneous critical clinical events	Manages metabolic and nutritional support for critically-ill patients	Manages complex critically-ill patients (e.g., septic shock, organ failure); designs care pathways for critically-ill patients
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				Not Yet Achieved Level 1 <input type="checkbox"/>

# Interpretation

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- Co-creation of meaning from the data (shared mental model)
- Why they might expect PPN and EMD to be at the bottom of the list
- we had a conversation about what it means to be a neurosurgeon;
  - i.e. maybe we shouldn't expect every neurosurgery trainee to be competent in PPN or EMD in every program across the country;
  - but this is the very first time, with data like this, that we've been able to have this discussion in any specialty.
  - The NS community has to reconsider what is “core” for their trainees

# Conclusions

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- Big response in a specialty at the national level
- Partly in response to these data, the neurosurgery community significantly revised their Milestones, which amounts to changes in national curricular expectations
- Working in partnership with specialty stakeholders, we were able to assist in creating meaningful educational change at the national level regarding standards of training.
-

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# WHAT DID THE NEUROSURGERY STORY TELL US?

# Differential Expectations for Level 4 Graduation Target

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- Level 4 graduation target applies to all residents for key areas common to general practice:
  - Trauma, Tumor, Spine, Critical Care
- Reasons to target level 4 in other areas:
  - Plan to pursue a fellowship in that area
  - Plan to include that area in practice

# The Effect and Use of Milestones in the Assessment of Neurological Surgery Residents and Residency Programs



*Lisa N. Conforti, MPH,<sup>\*</sup> Nicholas A. Yaghmour, MPP,<sup>\*</sup> Stanley J. Hamstra, PhD,<sup>\*</sup> Eric S. Holmboe, MD,<sup>\*</sup> Benjamin Kennedy, MD,<sup>†</sup> Jesse J. Liu, MD,<sup>‡</sup> Heidi Waldo, BA,<sup>‡</sup> and Nathan R. Selden, MD, PhD<sup>‡</sup>*

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# Questions?

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 @stanhamstra

- 1) The “Mandate”
- 2) Challenges to Implementation
- 3) The Response
- 4) Is it Program Evaluation?
  - 1) “impact” vs formal Program Evaluation
  - 2) was it a consequence of NAS/Milestones?
  - 3) what “Program” is being evaluated?

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# ARE THE ACGME MILESTONES “CBME”?



# Take-Home Message

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- National Accreditation System:
  - mandate - to collect data from all programs
  
- Levels of Impact:
  - Individual (learner/patient/faculty)
  - Program
  - Specialty (nation)

# Rate of Medical Errors

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## Raw Data

Indicator	Source	AUS	CAN	FRA	GER	NETH	NZ	NOR	SWE	SWIZ	UK	US
Experienced a medical, medication, or lab mistake in the past two years	2016 CMWF Survey	11%	15%	8%	7%	10%	16%	21%	17%	14%	11%	19%

# CBD-RE Program Evaluation

A review of the Readiness to Implement (RTI) and  
Pulse Check studies



September 23<sup>rd</sup>, 2019

Dr. Warren Cheung and Dr. Tim Dalseg

On behalf of the CBD Program Evaluation Operations Team\*



# Royal College Program Evaluation

## Operations Team





# CBD-RE Program Evaluations Goals

1. To foster successful implementation of CBD-RE
2. To understand the influence of local contexts, adaptations and innovations
3. To build an evidence-base of the impact of CBD-RE over time



# Three Pillars of Program Evaluation

**Readiness to  
Implement**



**Fidelity & Integrity  
of Implementation**



**Outcomes**





# Competence by Design (CBD) Readiness to Implement Checklist

CBD Program Evaluation Operations Team

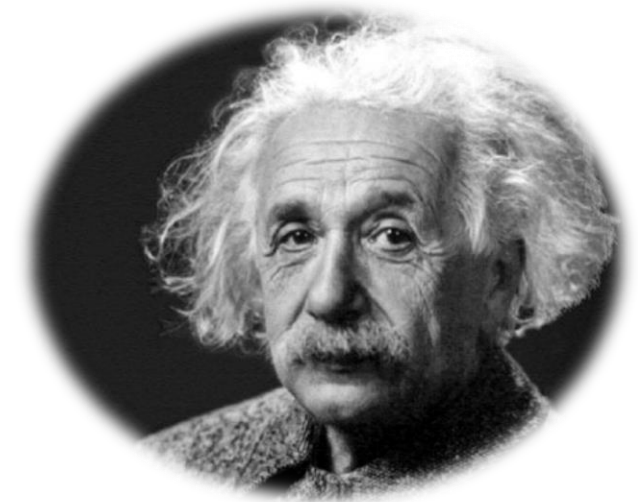


# Readiness to Implement

- Readiness framework

$$R=MC^2$$

- Interactive Components:
  - Motivation
  - General capacity
  - Innovation-specific capacity



(Scaccia, 2016)







# Study Aims

1. Assess readiness to implement CBD (2019 cohort)
2. Identify challenges and areas of success in the lead up to implementation
3. Provide programs with a resource checklist to guide their preparation



# Methods

- **Design:** electronic survey
- **Participants:**
  - 2019 launch programs
  - program director, program CBME lead
- **Survey:**
  - Motivation (3)
  - General capacity (4)
  - Key readiness tasks (26)





# Results

Program Directors/CBME Leads of 2019 Launch Disciplines	
Discipline	Survey response rate
Critical Care Medicine	69% (n = 9)
Gastroenterology	57% (n = 8)
General Internal Medicine	38% (n = 6)
Rheumatology	47% (n = 7)
Internal Medicine	41% (n = 7)
Geriatric Medicine	55% (n = 6)
Radiation Oncology	31% (n = 4)
Cardiac Surgery	33% (n = 4)
Neurosurgery	71% (n = 10)
Obstetrics and Gynecology	44% (n = 7)
Anatomical Pathology	60% (n = 9)
General Pathology	33% (n = 2)

Response rate: 42% (n=79)

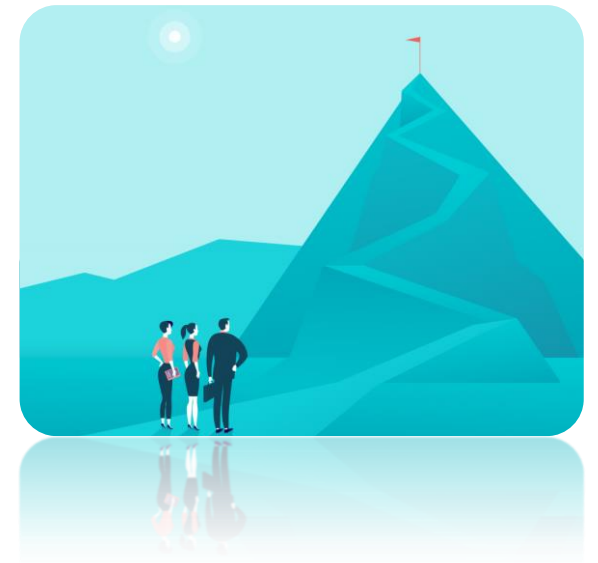
Positive correlations between all 3 components of  $R=MC^2$  ( $p<0.001$ )



# Results

## Motivation:

- Successful implementation of CBD is a priority
- Question if:
  - CBD is a move in the right direction
  - CBD implementation viewed as a manageable task





# Results

## Innovation-specific capacity

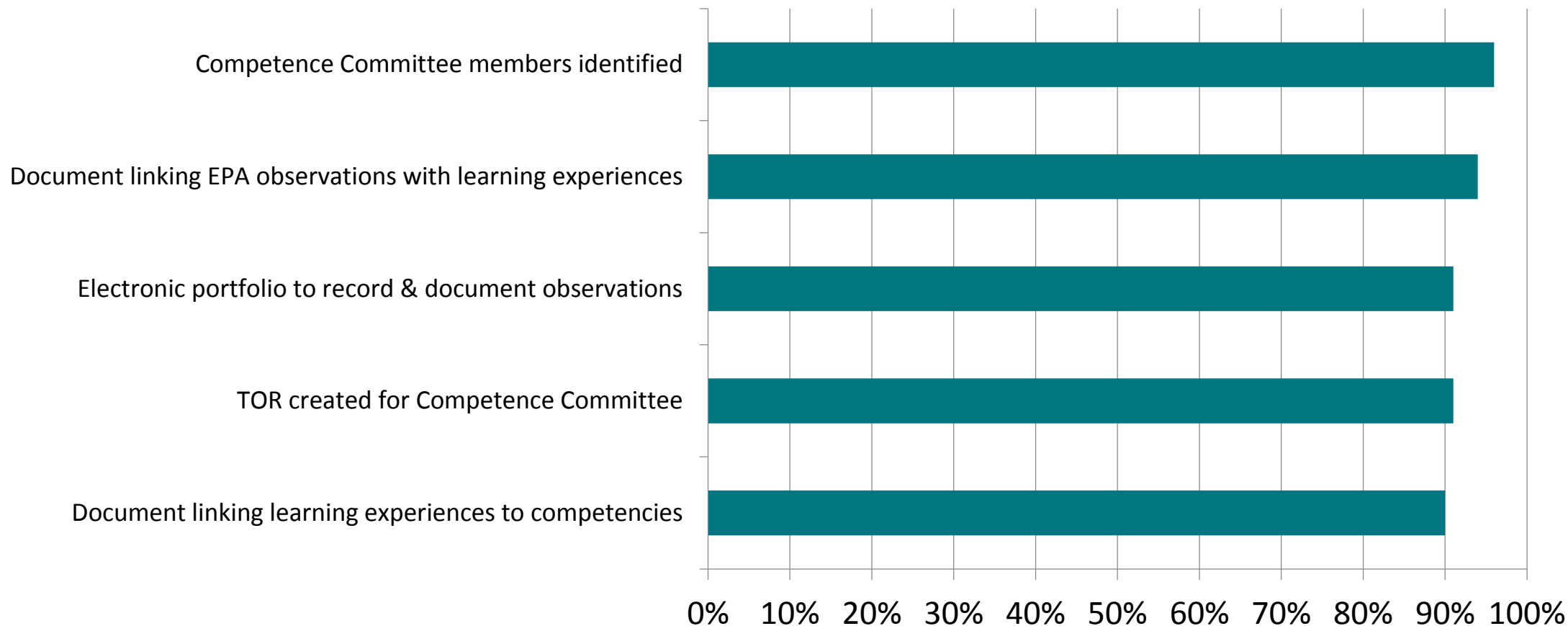
- No difference found between disciplines in terms of mean number of pre-implementation tasks completed
- On average, programs had completed 72% of pre-implementation tasks





# Results

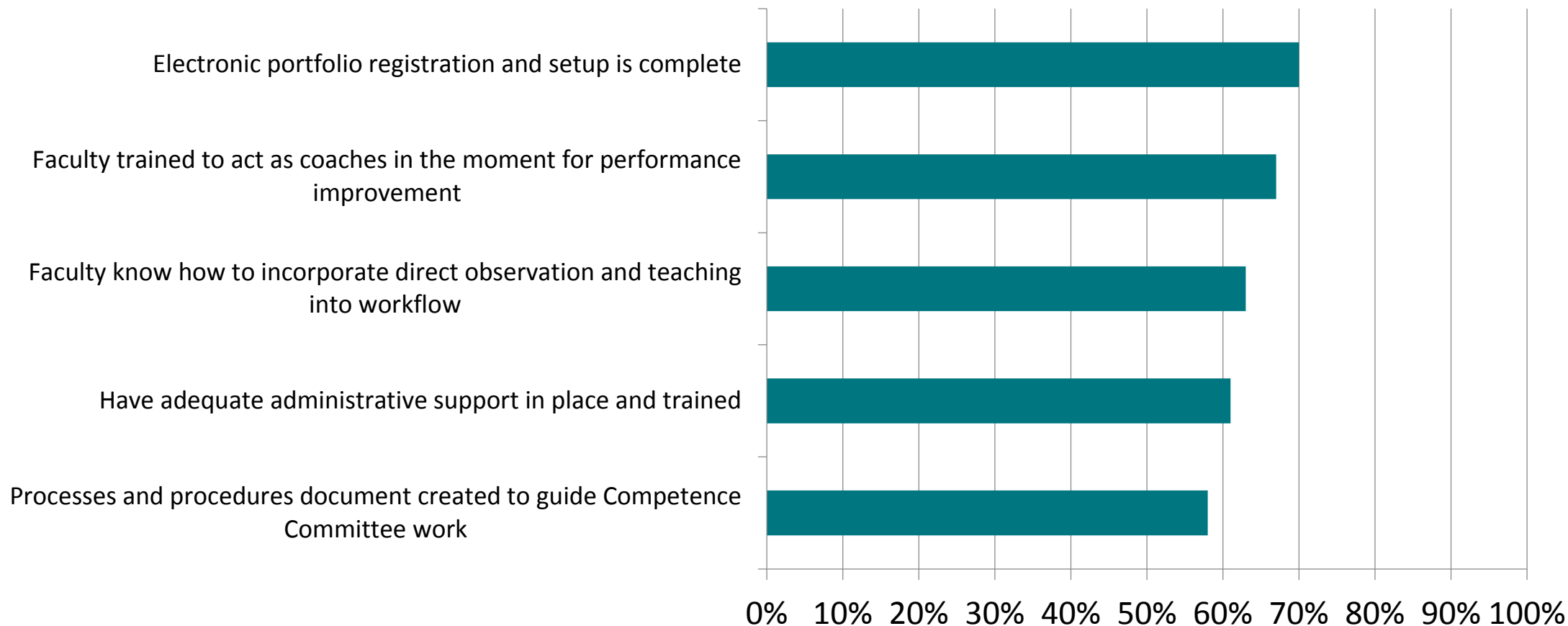
## Sample of pre-implementation tasks





# Results

## Sample of pre-implementation tasks

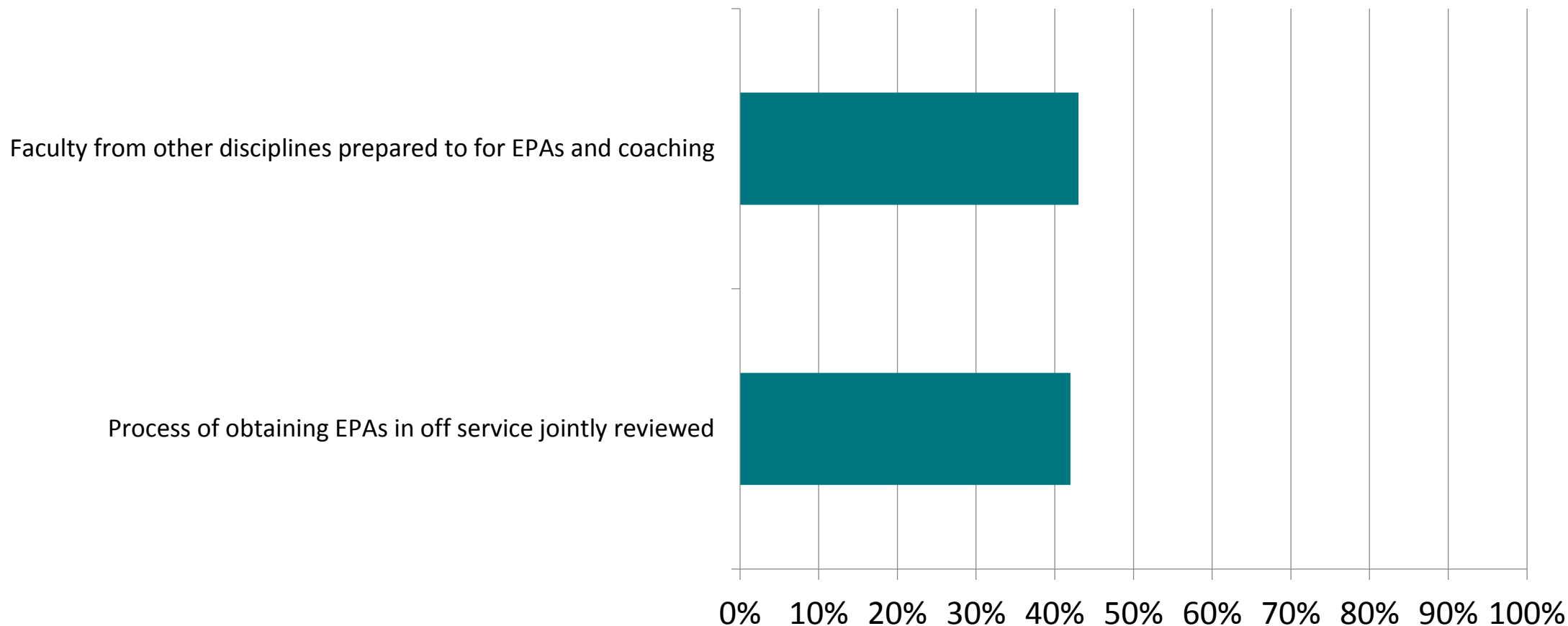






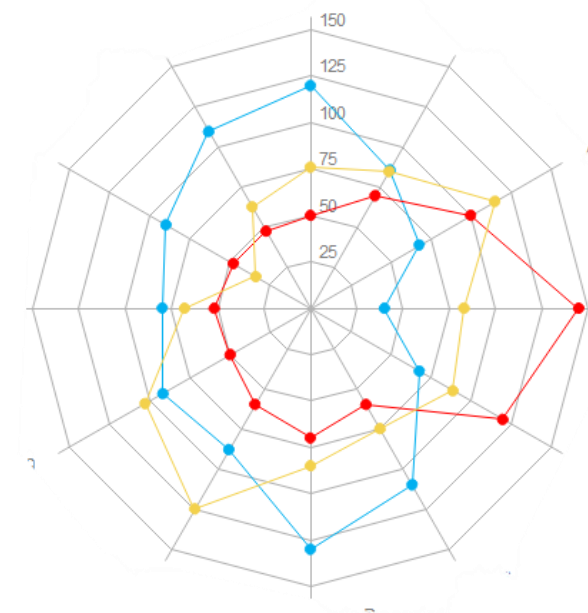
# Results

## Sample of pre-implementation tasks



# Moving forward

- Identify ways of addressing readiness gaps
- What factors are associated with successful implementation?
  - “Patterns” of readiness
- Correlate with Pulse Check and outcome studies





# Competence by Design (CBD) Implementation Pulse Check

CBD Program Evaluation Operations Team



# Purpose

- Monitor the status of implementation of CBD across the system
  - Gain an understanding of the challenges and opportunities to improve implementation
  - Examine early outcomes
  - Collect advice for moving forward
- A focus primarily on the second pillar of program evaluation
- Examination of the fidelity and integrity of implementation

# Methods

- Participants - program directors/CBD leads of the 2017, 2018 launch disciplines
- Two-part data collection:

- Survey:
- Follow-up Interview:

Discipline	Survey response rate	Programs interviewed
Anesthesiology	59% (n = 10)	6% (n = 1)
Otolaryngology – Head and Neck Surgery	23% (n = 3)	15% (n = 2)
Emergency Medicine	36% (n = 5)	21% (n = 3)
Forensic Pathology	33% (n = 1)	33% (n = 1)
Medical Oncology	27% (n = 4)	13% (n = 2)
Nephrology	38% (n = 6)	0% (n = 0)
Surgical Foundations	24% (n = 4)	6% (n = 1)
Urology	0% (n = 0)	0% (n = 0)





# Results: CBD Implementation

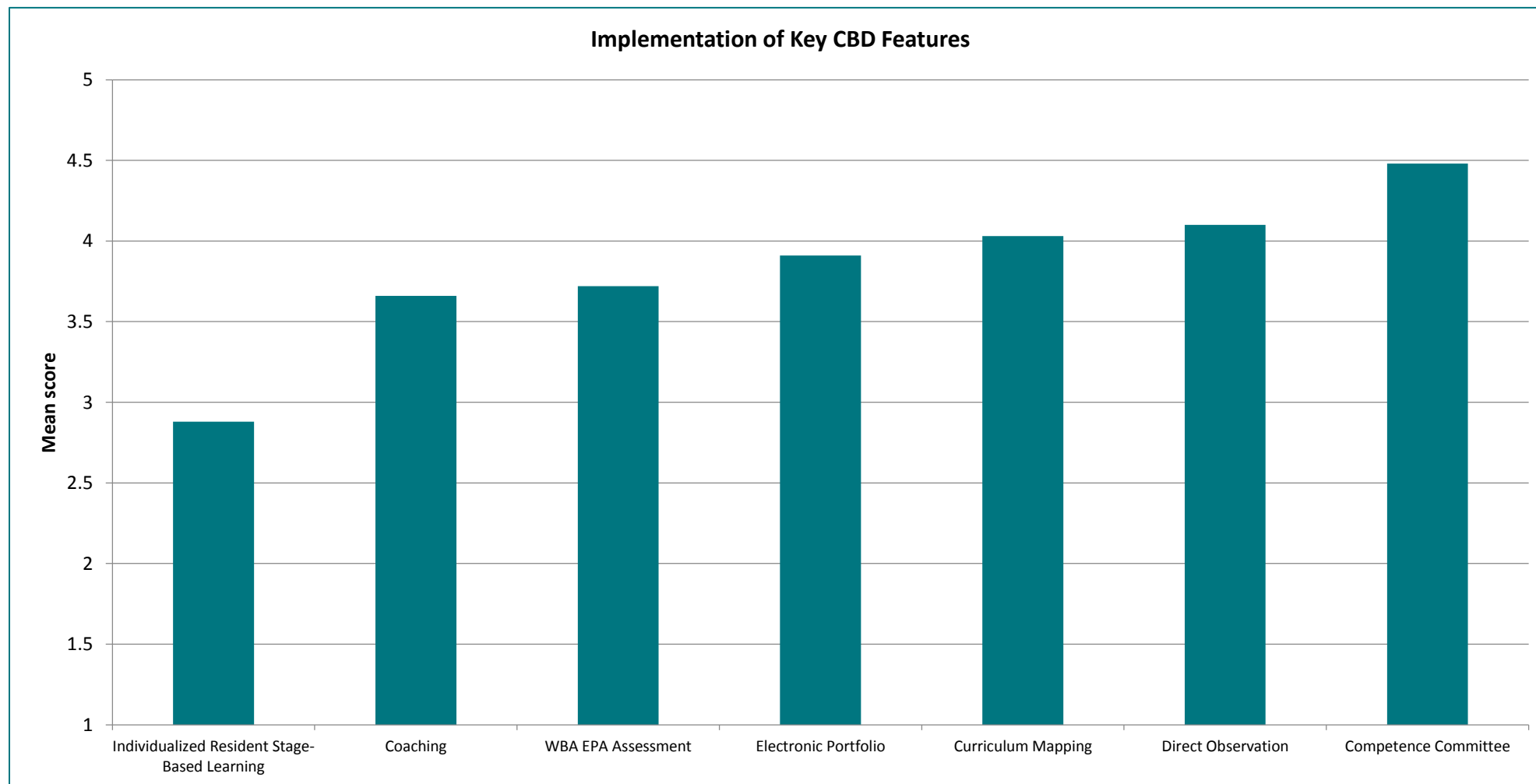
**“Overall, CBD implementation in my local program is going well”**

- Respondents rated their overall CBD implementation = 3.31 (5 point scale) (1 = Strongly Disagree....5 = Strongly agree)



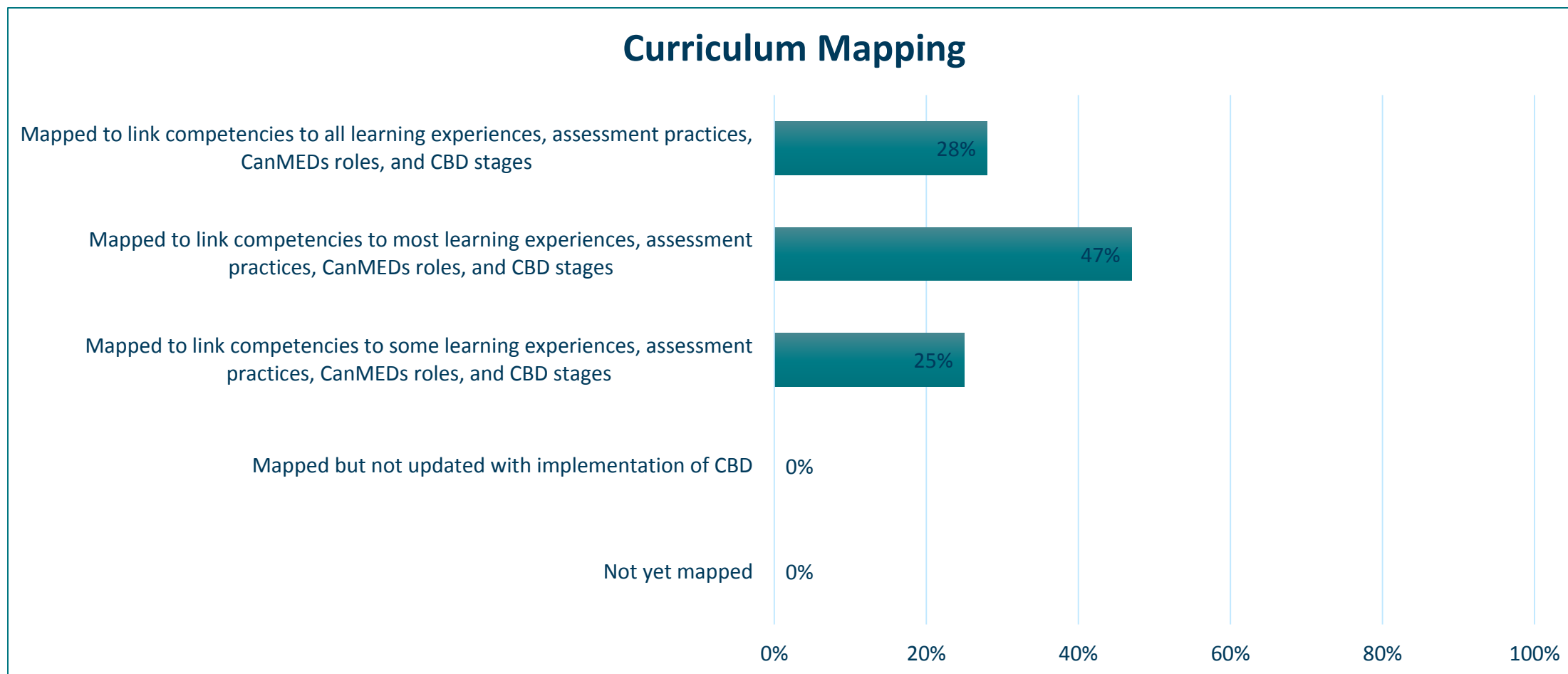


# Results: CBD Implementation





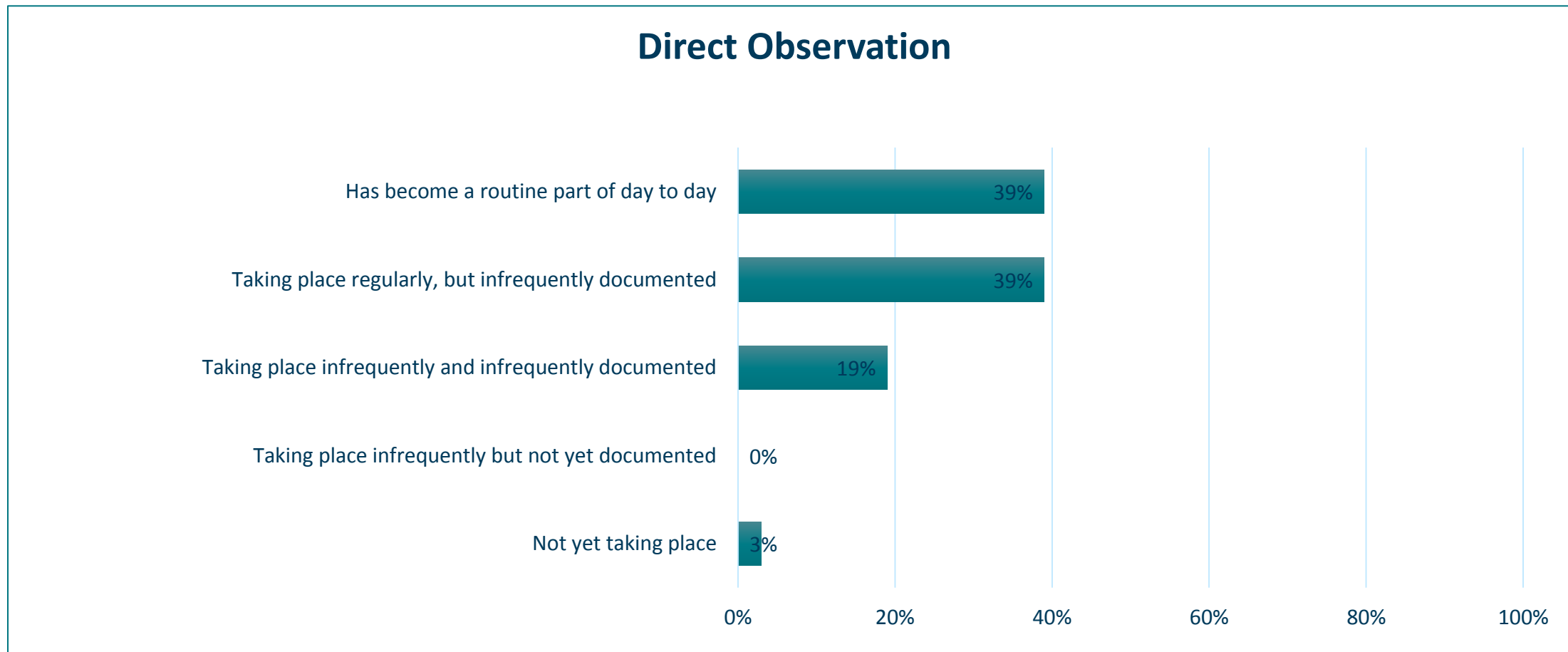
# Key Component: Curriculum Mapping





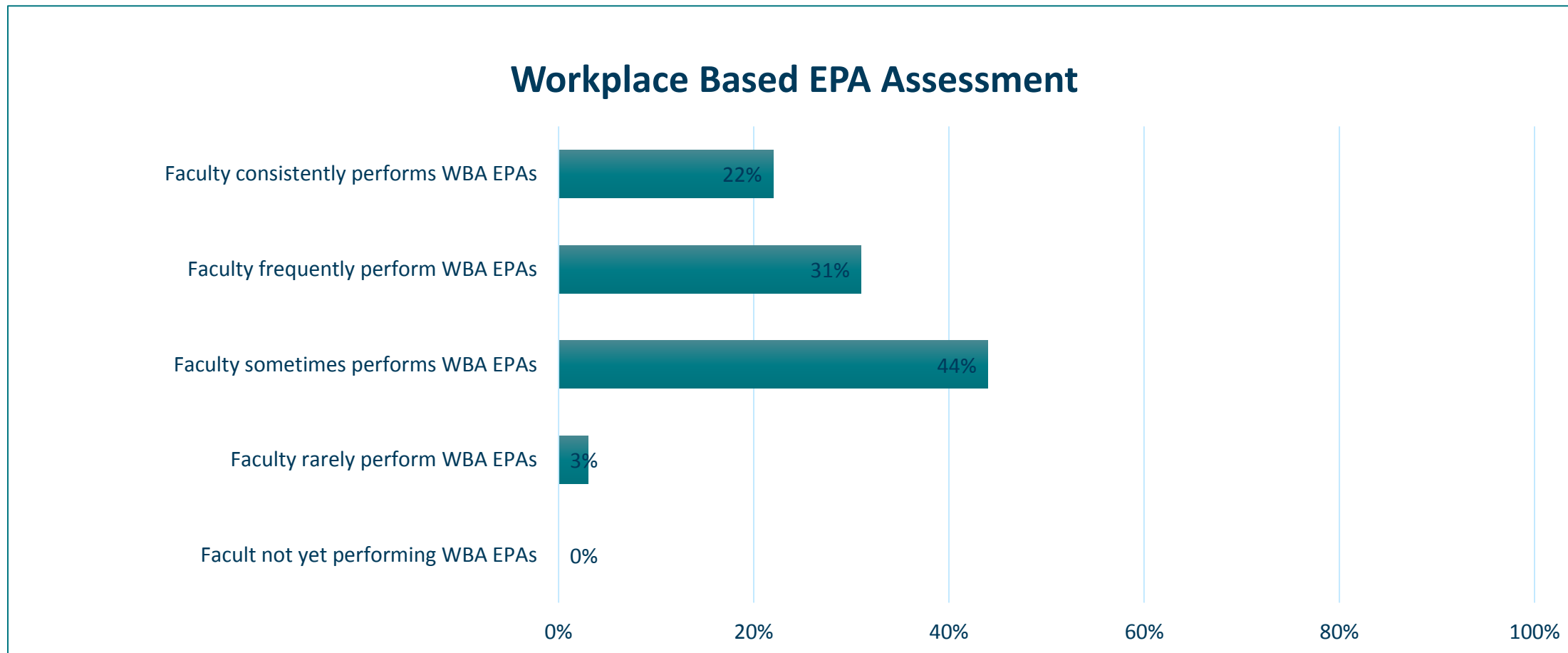


# Key Component: Direct Observation



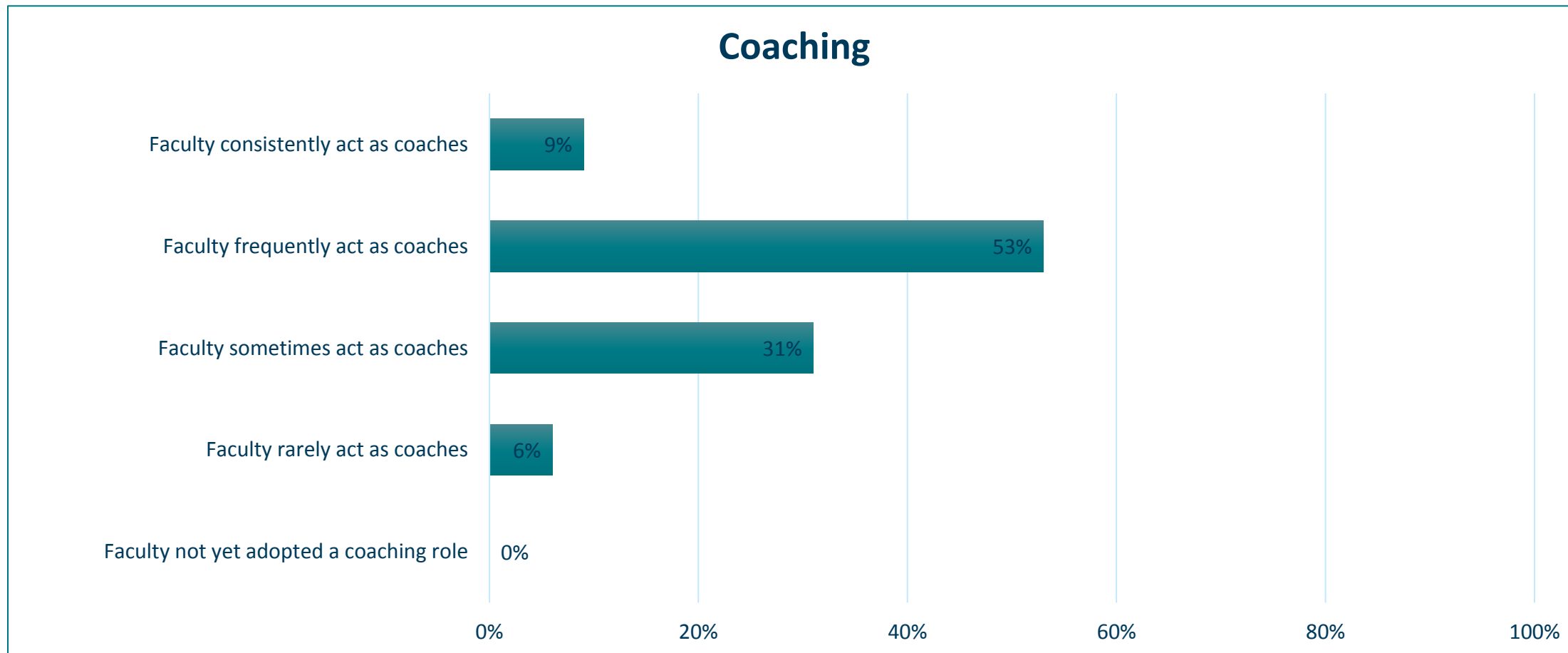


# Key Component: Workplace Based EPA Assessment



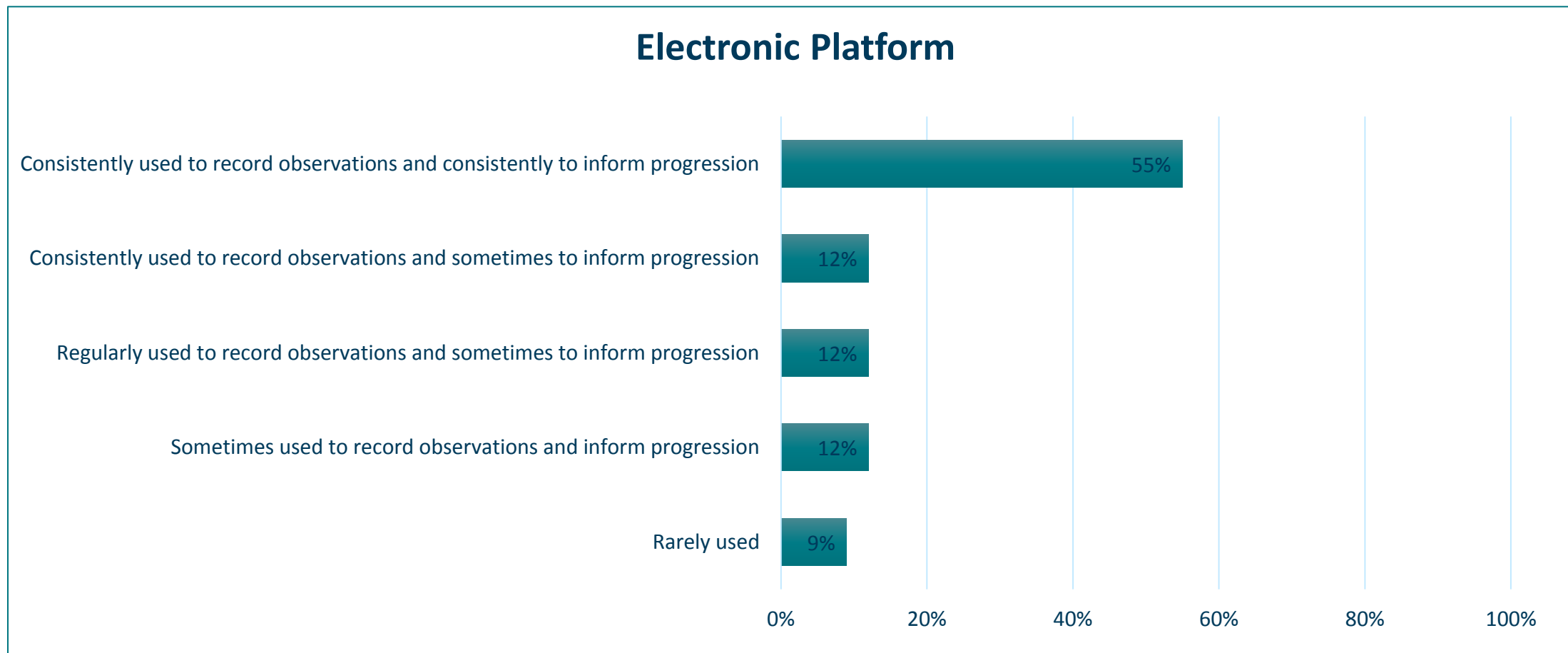


# Key Component: Coaching



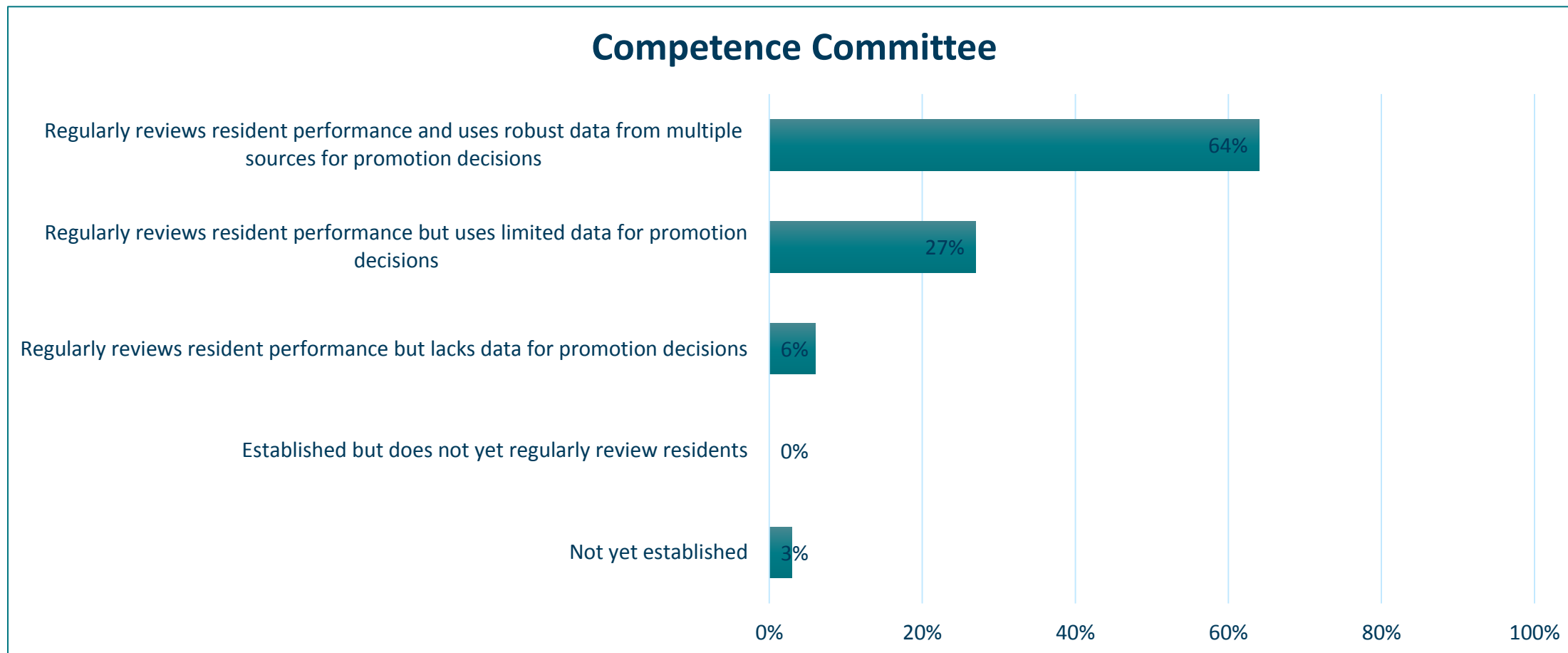


# Key Component: Electronic Platform



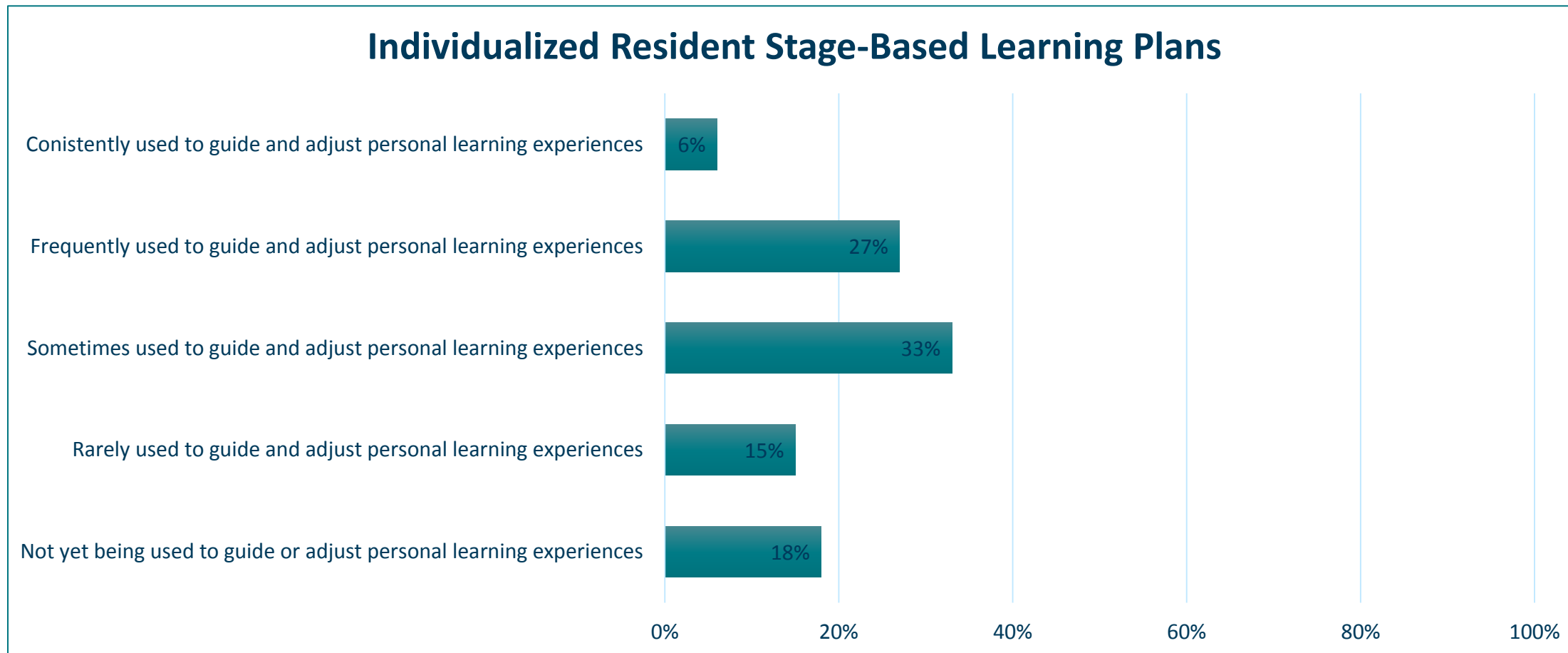


# Key Component: Competence Committee





# Key Component: Individualized Resident Stage-based Learning Plans





# Faculty Development and Resources

- Faculty development topics focused on “What is CBD” and the “how-to” for on the ground work. This information was primarily delivered by grand rounds, emails, and workshops.
- Most respondents found their faculty development to be effective, and indicated that they would continue this development as CBD continues.
- Most respondents used resources from their local program and Faculty of Medicine, although many said Royal College information was helpful.





# Challenges and Benefits

## Challenges

- Time
  - To prepare for CBD, complete EPAs
- EPAs
  - Opportunity to complete, number
- Faculty and resident buy-in
- Electronic platform

## Benefits

- Feedback
  - Higher quality and quantity
- More objective resident assessment
- Early identification of struggling residents
- Better faculty and resident engagement





# Fidelity and Integrity: The Second Pillar

- **Fidelity**<sup>1</sup>: *the extent to which critical components of CBD are present in the program*
  - Appear on track to achieve fidelity
- **Integrity**<sup>2</sup>: *the extent to which the program embodies the qualities of CBD that will lead to desired outcomes over time*
  - May still be a work in progress

1. Century J, Rudnick M, Freeman C. *A framework for measuring fidelity of implementation: A knowledge*. American Journal of Evaluation 2010;31:199-218.

2. Patton MQ. *What is essential in developmental evaluation? On integrity, fidelity, adultery, abstinence, impotence, long-term commitment, integrity, and sensitivity in implementing evaluation models*. American Journal of Evaluation 2016;37:250-65.



# Advice and Recommendations

- Provide clear, easy to access information and resources for programs
- Encourage and facilitate the sharing of best practices
- Learn from past challenges
- Share information and early outcomes of CBD, monitor neg outcomes
- Improve electronic platforms



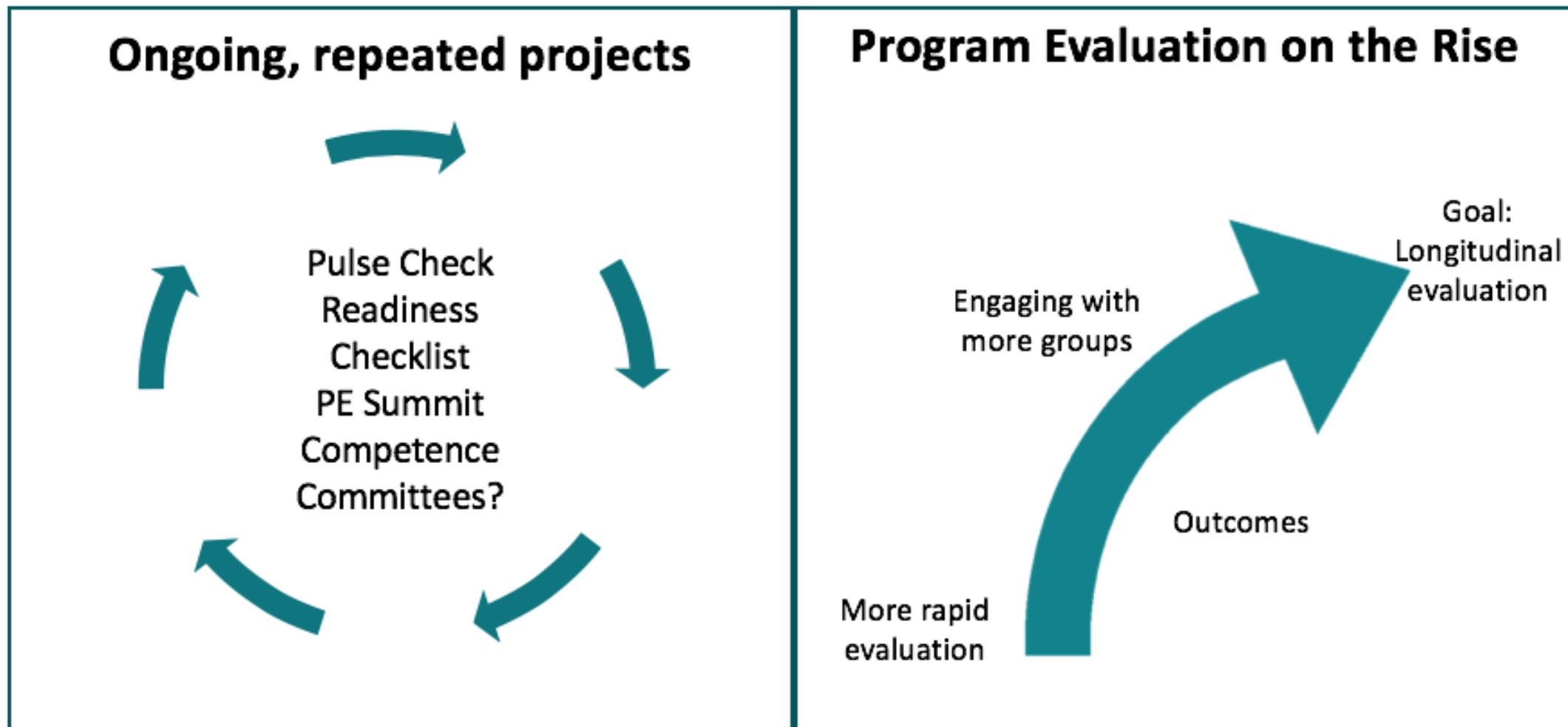


# Current Projects

Project	Purpose	Focus
Pulse Check	To monitor implementation, and learn challenges and opportunities for improvement	2017 and 2018 launch disciplines
Readiness to Implement Checklist	To determine a program's readiness to implement CBD, in order to determine what factors influence outcomes	2019 launch disciplines
Rapid Evaluation	To examine the broad picture of CBD implementation, and compare and contrast across programs	Key stakeholders from partner programs
Competence Committees	To examine the fidelity and integrity of Competence Committees	2017, 2018, and 2019 launch disciplines



# What's Next for Program Evaluation



# Key Takeaways

- Program evaluation is on the rise, with many upcoming projects
- Studies have recently been completed, and results will be more widely shared in the coming months
- Many program evaluation committees have recently formed, engaging stakeholders from across the system
- The program evaluation is being conducted to ensure CBD is being implemented as intended, and that it is having the desired impact.



# Thank You

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# Reflections



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# Final Thoughts





# Thank You

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