Utilising QI methodology in critical care: best practice

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Outline

- Definitions and context
- Scoping the problem and the solution(s)
- Implementation, measurement and evaluation
- Sustain, share, spread and scale-up
- Incorporating QI into the research to practice cycle

What is Quality Improvement (QI)?

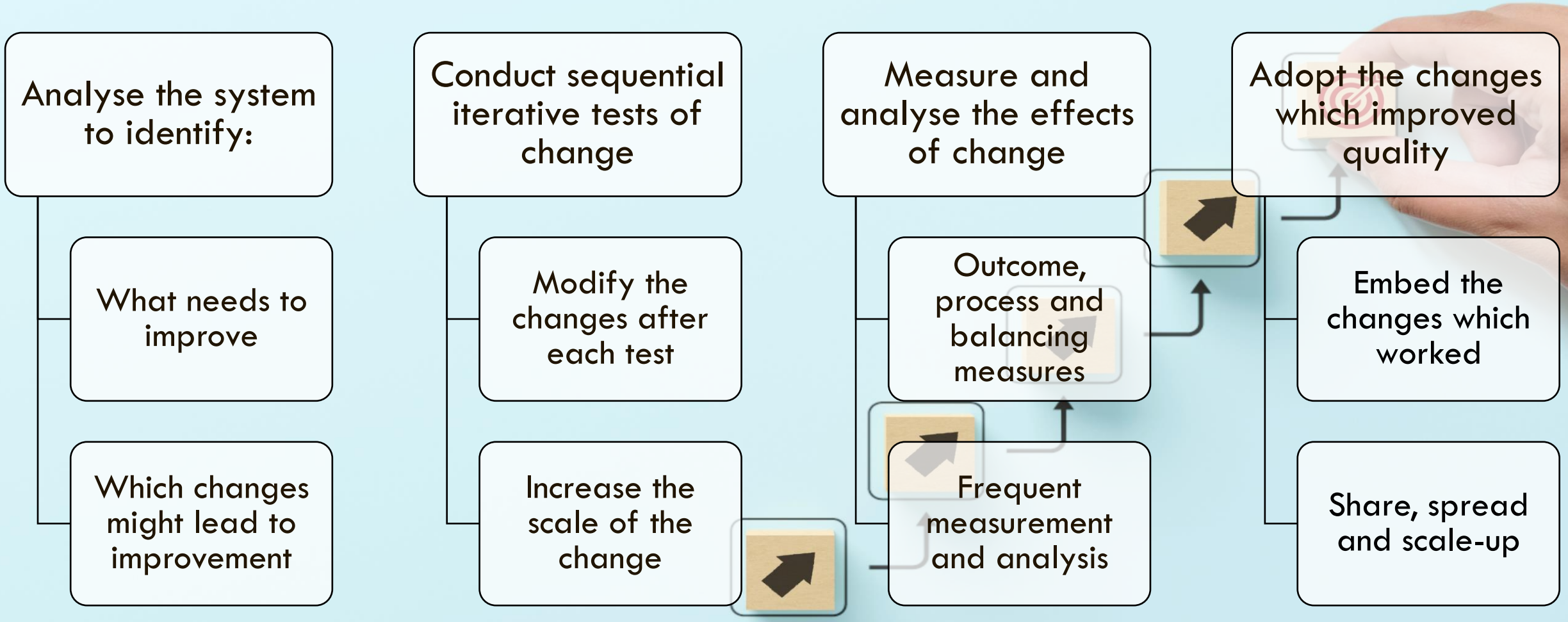
A systematic and continuous effort to improve the *safety*, *effectiveness*, *patient-centredness*, *timeliness*, *efficiency* and *equity* of care received by the patients and service users. It involves:

- Identifying areas for improvement
- Planning and implementing change
- Measuring the impact over time
- Adopting changes which improve quality

Background

- Industrial philosophies to improve manufactured products
- Engineering theories to improve systems and services
- Developed further in healthcare context since 1990s

Quality Improvement Methodology



Limitations to the methodology

Not designed to generate generalisable evidence

‘Product improvement’ focus doesn’t always translate to healthcare

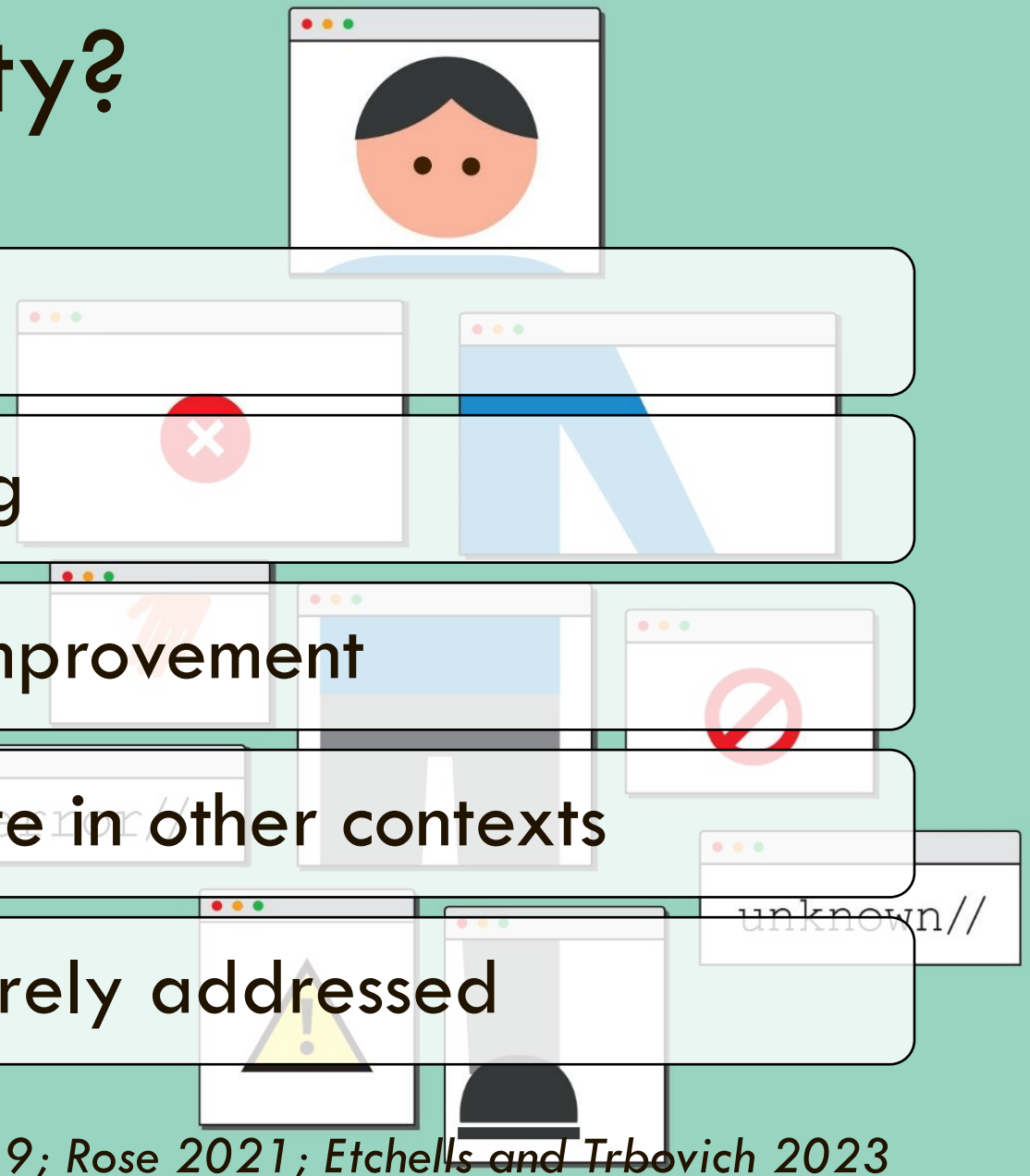
Skills and resource (time) are essential for success

Works best as part of an improvement system

Dixon-Woods 2016; Brathwaite 2018; Stevens and Thomson 2023

Does QI improve quality?

- Low fidelity to method
- Inadequate training and resourcing
- “Projectification” limits sustained improvement
- Challenging to scale up or replicate in other contexts
- Some dimensions of quality are rarely addressed



Davidoff 2015; Reed 2016; Dixon-Woods 2019; Rose 2021; Etchells and Trbovich 2023

Increase the chances of success

- Team members with experience of quality improvement
- Officially sanctioned time
- Projects which engaged service users
- Careful application of methodology at the problem definition stage
- Sufficient data collection before and after change implementation
- Fidelity to PDSA method including rapid learning cycles

Chua et al 2022

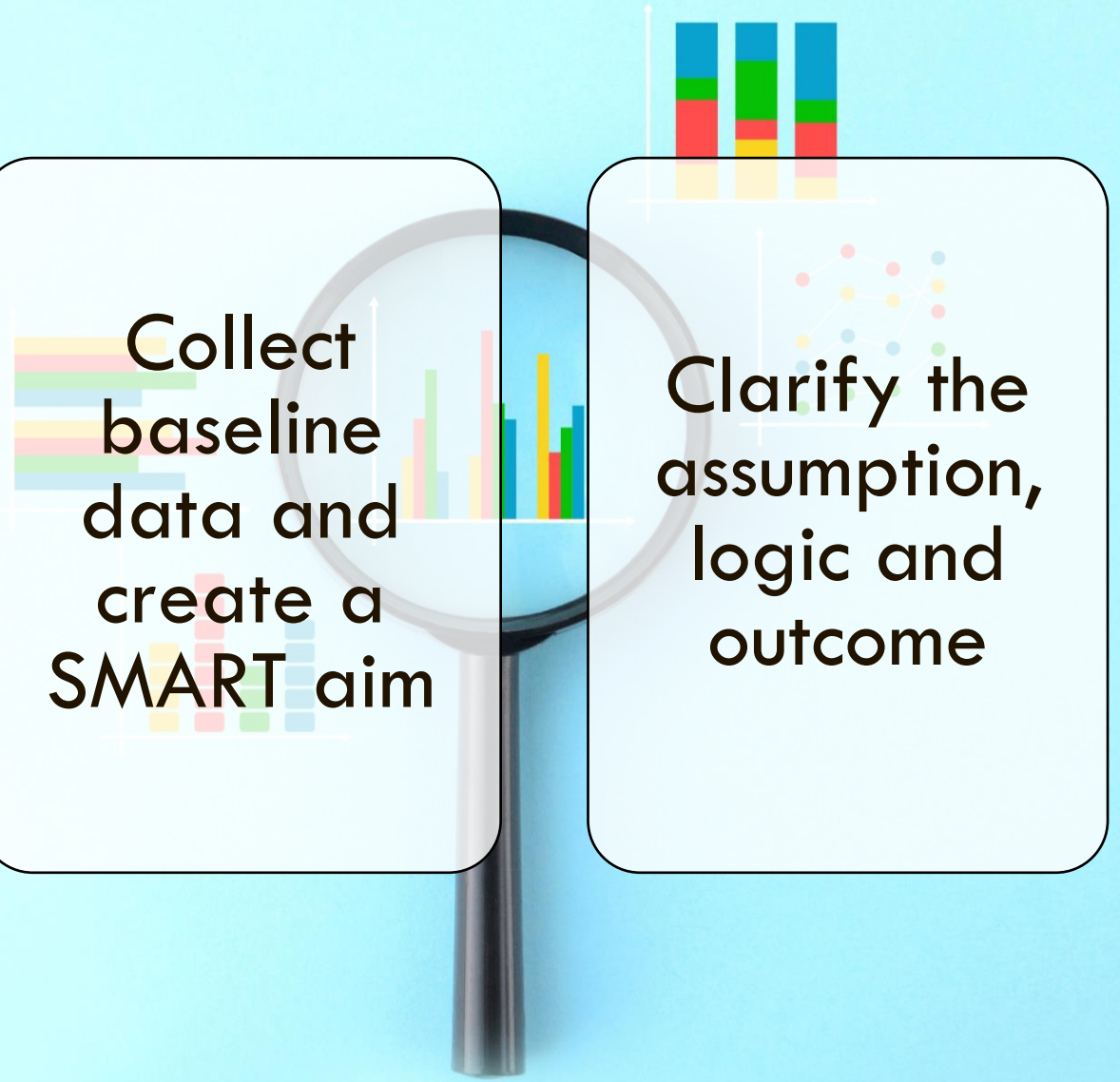
Analyse the system

Define the gap in quality and ask why

Listen, observe and engage

Collect baseline data and create a SMART aim

Clarify the assumption, logic and outcome



Reducing unnecessary diagnostic phlebotomy in intensive care: a prospective quality improvement intervention

Thomas Bodley [1,2] Olga Levi,[3,4] Maverick Chan,[3,5] Jan O Friedrich,[6,7] Lisa K Hicks[1,3,5]

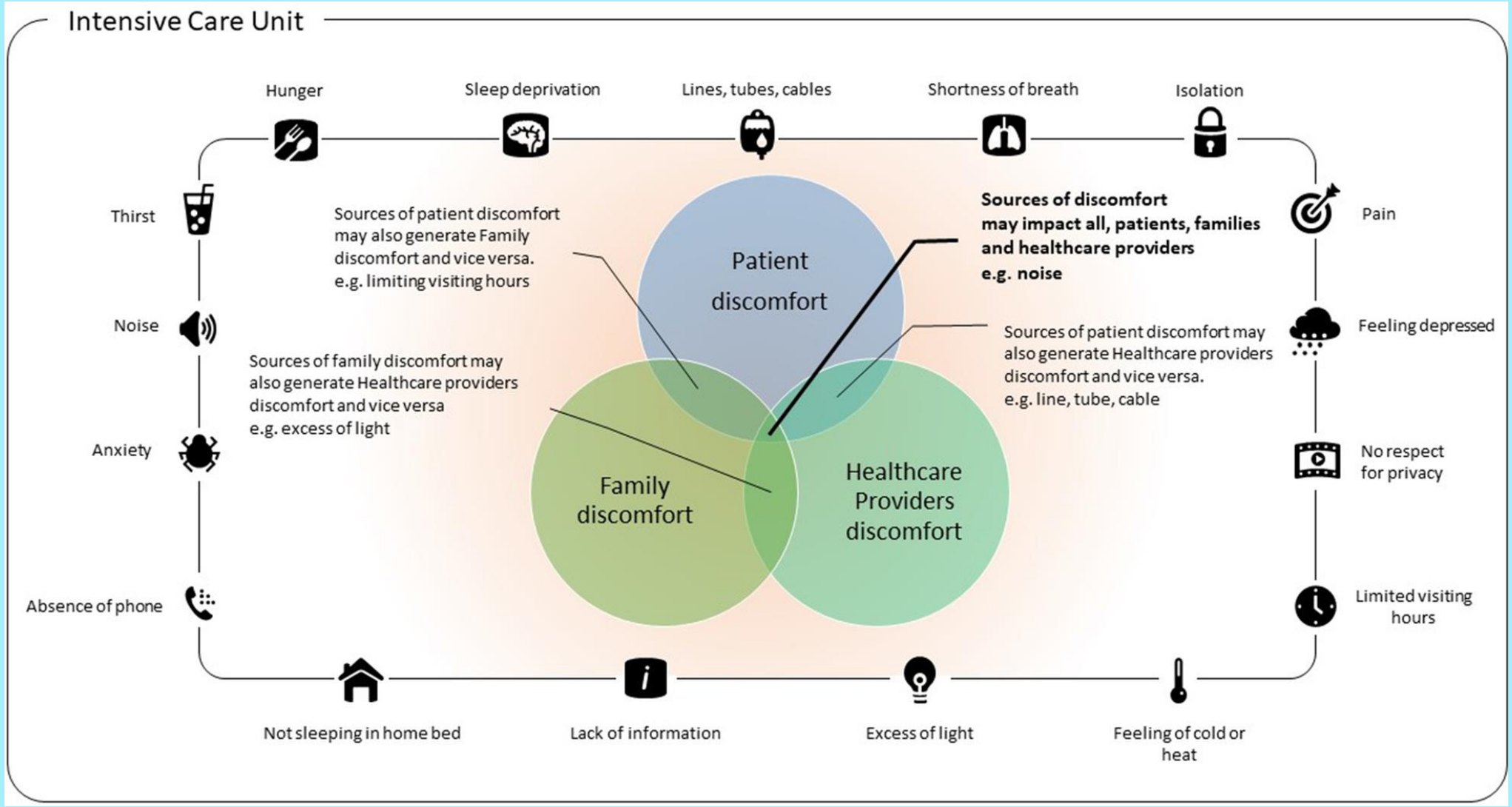
Table 1 Outcome of improvement diagnostics used to develop study interventions and address overutilisation of blood tests

Root cause of overutilisation	Improvement target for root cause	Intervention(s) for improvement target	Rationale for intervention selection
1. Lack of education and awareness of ICU blood testing volumes with an acceptance/underlying culture of increased ICU blood testing.	Increase awareness. Alter clinician and team expectations for blood testing away from 'just in case' blood testing to rational test ordering in response to a specific clinical question.[14 15]	1. Grand rounds kickoff presentation. 2. MD trainee education sessions. 3. Advertising/branding the 'Pause the Draw' campaign (logo, button badges). 4. Educational posters. 5. Audit and feedback of unit level blood test volumes.	Education and awareness support stakeholder buy-in. Branding with logos and posters increases awareness and enthusiasm for the initiative. Audit and feedback create incentive to change individual behaviour and blood testing culture in the ICU.
2. Underutilisation of the ICU daily rounds event as a moment to re-evaluate unnecessary blood tests.	Enhance use of daily rounds as a consistent opportunity to reassess blood testing.	1. Rounds checklist prompting the question: 'Is all blood work ordered in (the EHR) necessary?'. Required involvement of MD and RN disciplines.	Decisions about ordering and drawing blood tests should be made with input from the multidisciplinary team. Better use of the team daily rounds event as a moment to pause and review blood testing should prompt discontinuation of unnecessary orders.
3. Electronic health record (EHR) orders enable frequent blood testing without prompting reassessment.	Improve the balance between the EHR as an enabler of frequent blood tests and as a tool to improve blood testing stewardship. Embed test ordering options that allow clinicians to consider less frequent blood testing.	1. Electrolyte replacement order set modification to remove unnecessary compulsory blood tests. 2. ICU admission order set options for less frequent testing. 3. Recurring laboratory changes to require reassessment of frequent blood tests after 24 hours. 4. Electronic 'add-on' blood testing function to avoid the need to redraw blood if a test is added.	Multiple strategies should be used to empower clinicians to rationalise blood test orders. Removing compulsory blood testing allows clinician discretion for when blood work is needed. Providing easy to use options for less frequent blood tests enables selection of the most appropriate blood test frequency. Forcing functions to prompt reassessment of very frequent blood tests should reduce unnecessary testing.

Improving the intensive care experience from the perspectives of different stakeholders

Latour *et al. Critical Care* (2022) 26:218
https://doi.org/10.1186/s13054-022-04094-x

Jos M. Latour[1,2*], Nancy Kentish-Barnes[3], Theresa Jacques[4,5], Marc Wysocki[6], Elie Azoulay[3] and Victoria Metaxa[7]



Improving adherence to facility protocol and reducing blood culture contamination in an intensive care unit: A quality improvement project

M. He et al. / Australian Critical Care 33 (2020) 546–552

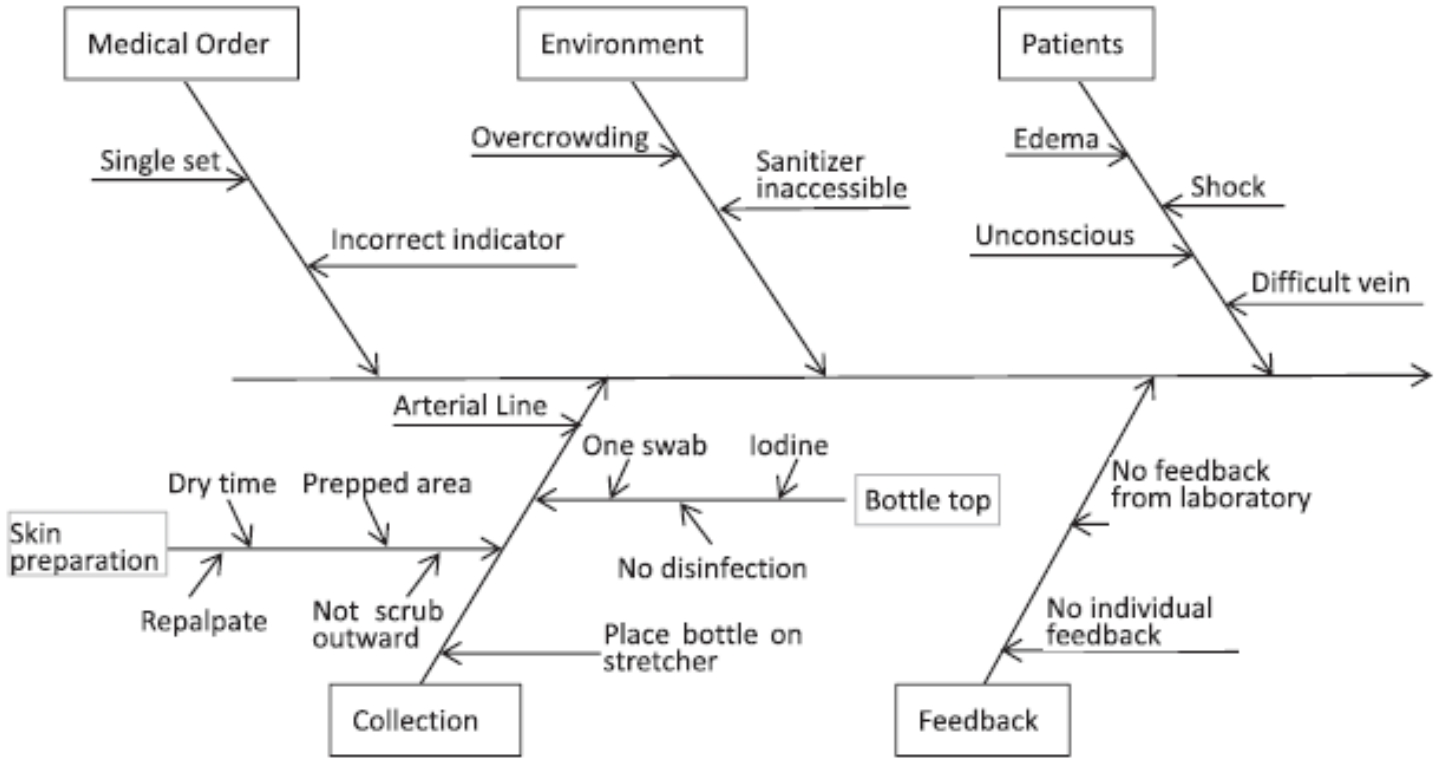
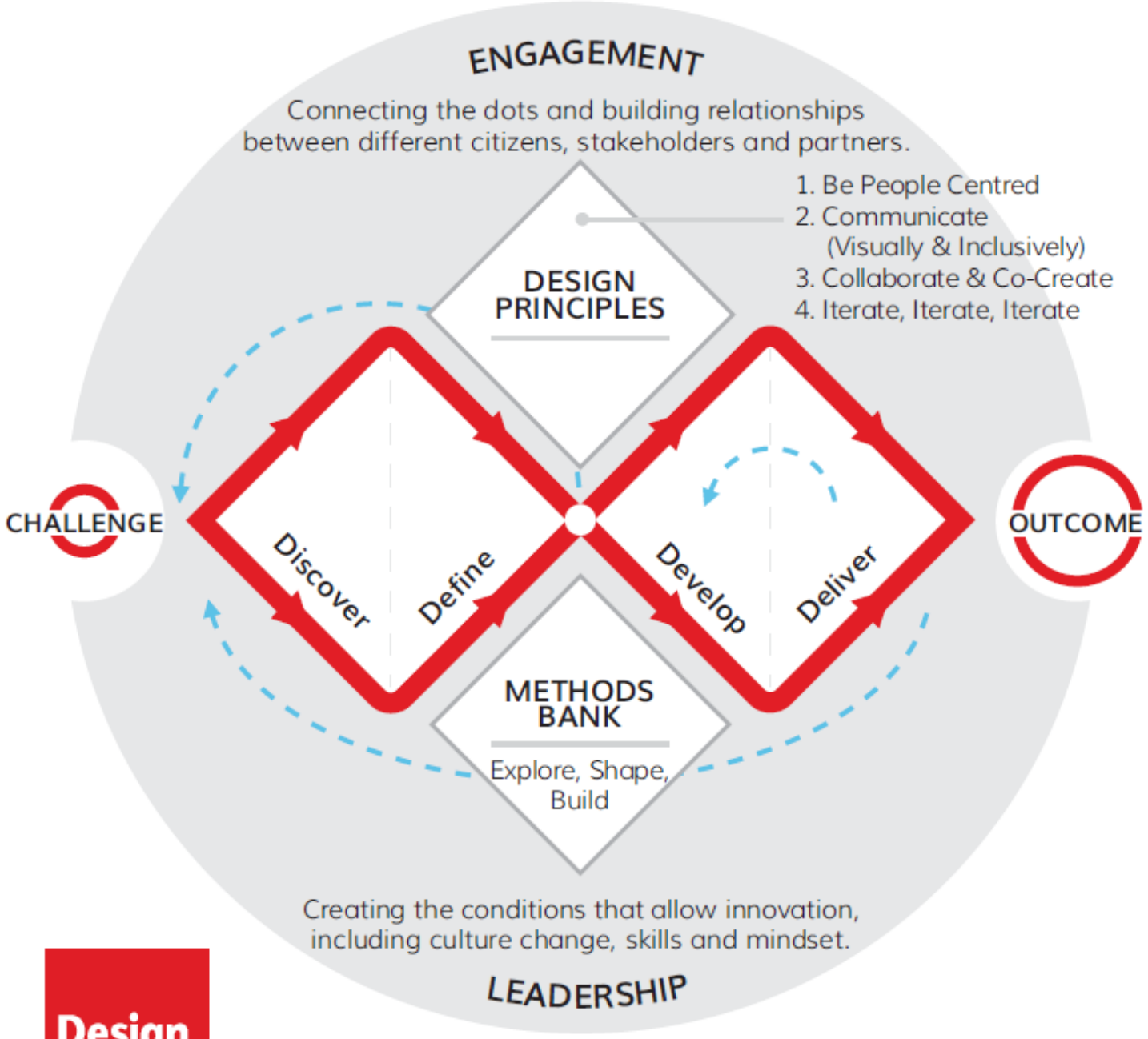


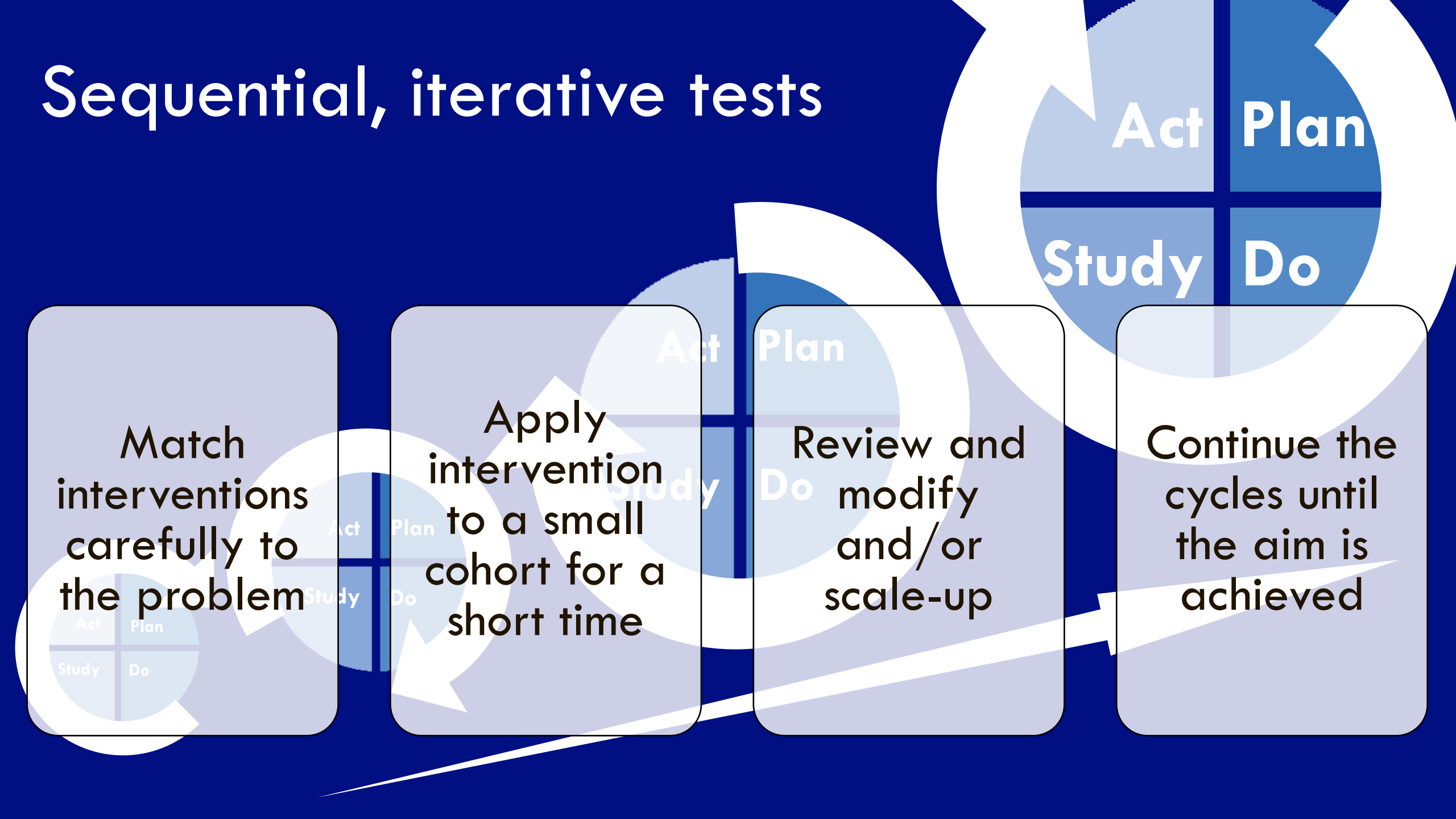
Fig. 1. Cause-and-effect analysis. Note: This diagram, which was generated from observations and interviews with the staff members, delineates the major sources of errors leading to increased rates of BCC. BCC, blood culture contamination.

Double-diamond for co-design



Design Council

Sequential, iterative tests



Match interventions carefully to the problem

Apply intervention to a small cohort for a short time

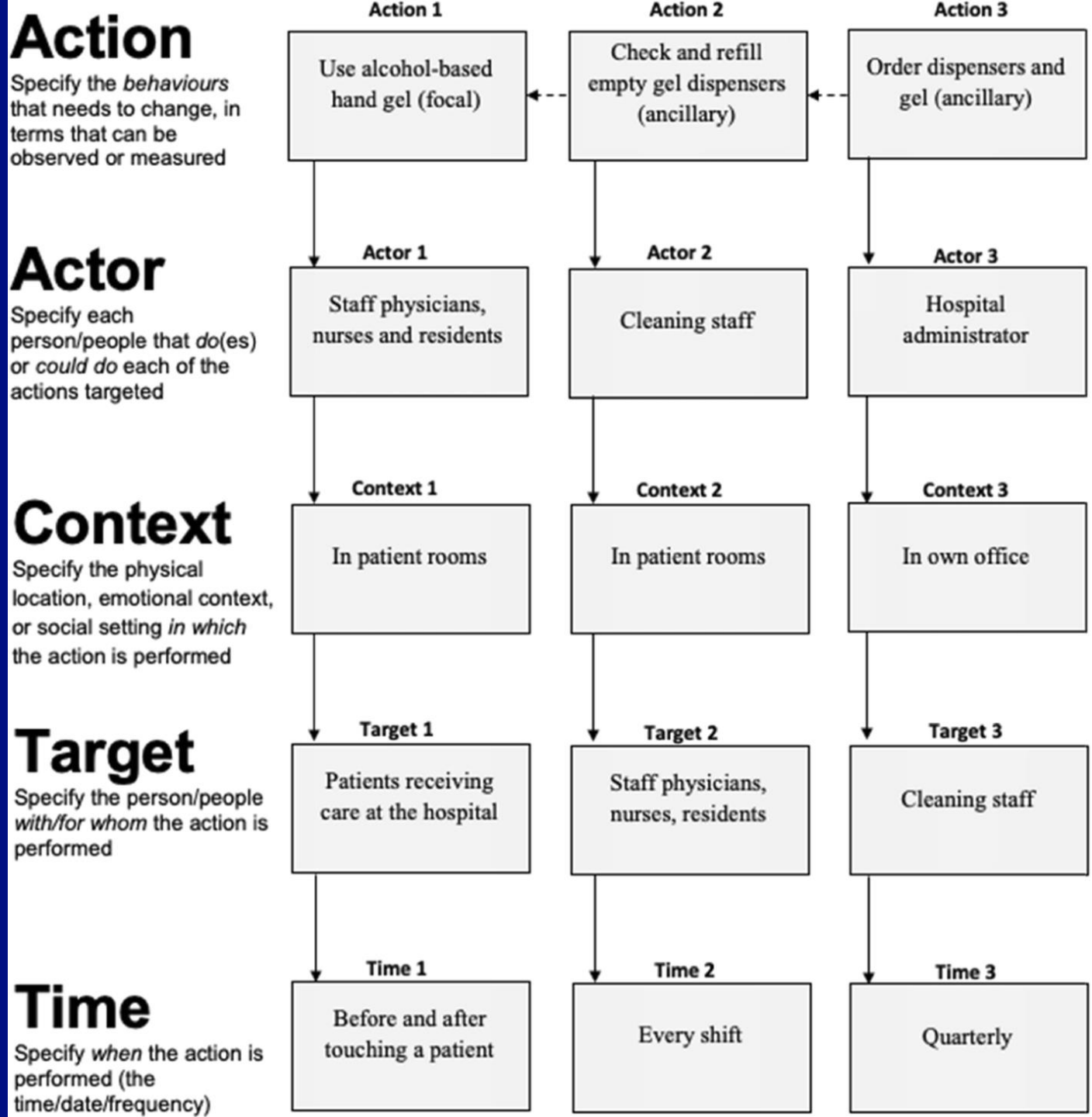
Review and modify and/or scale-up

Continue the cycles until the aim is achieved

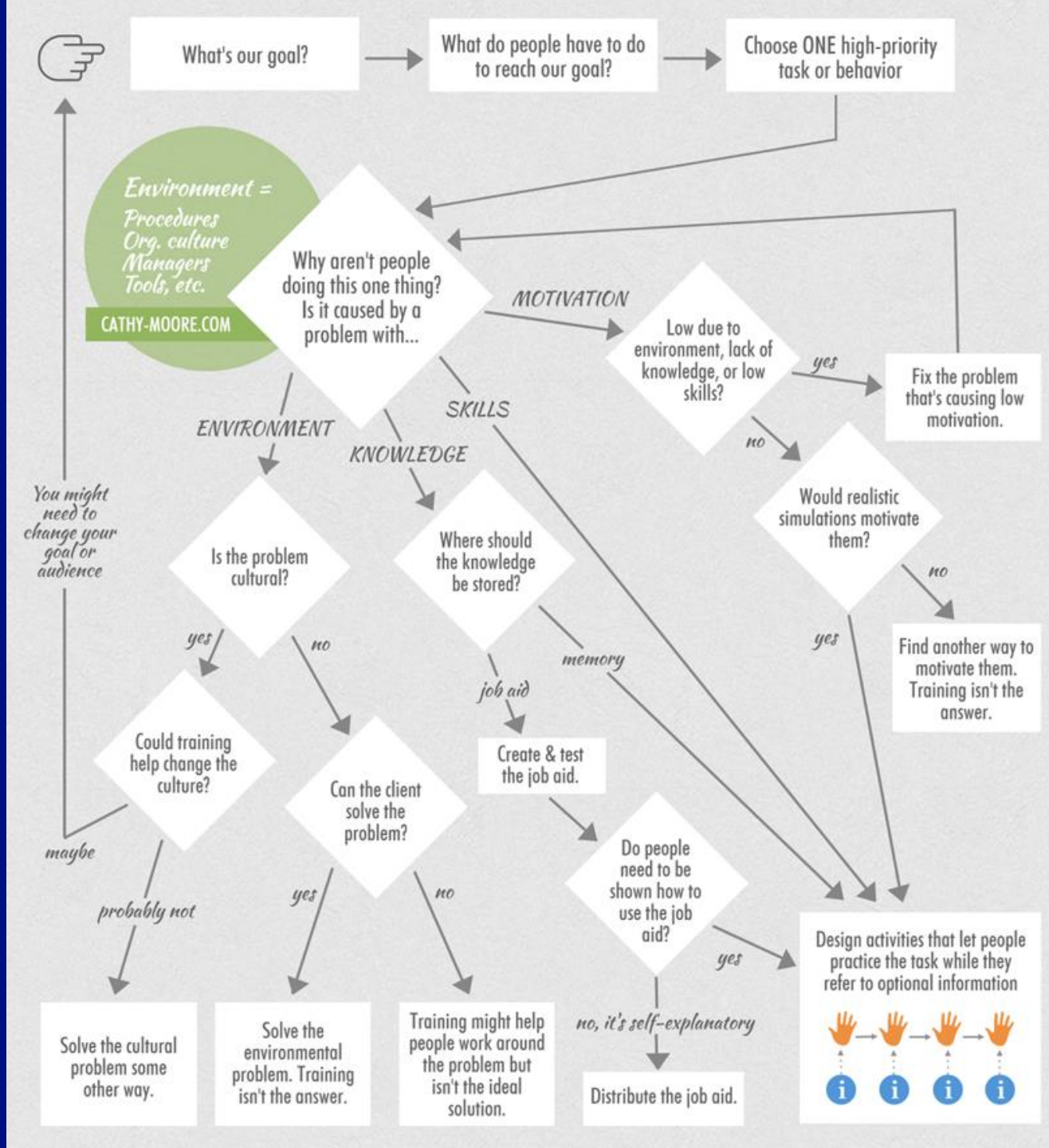
Action, actor, context, target, time (AACTT): a framework for specifying behaviour

Justin Presseau[1,2,3*], Nicola McCleary[1,2], Fabiana Lorencatto[4], Andrea M. Patey[1], Jeremy M. Grimshaw[1,2,5] and Jill J. Francis[6]

Presseau *et al. Implementation Science* (2019) 14:102

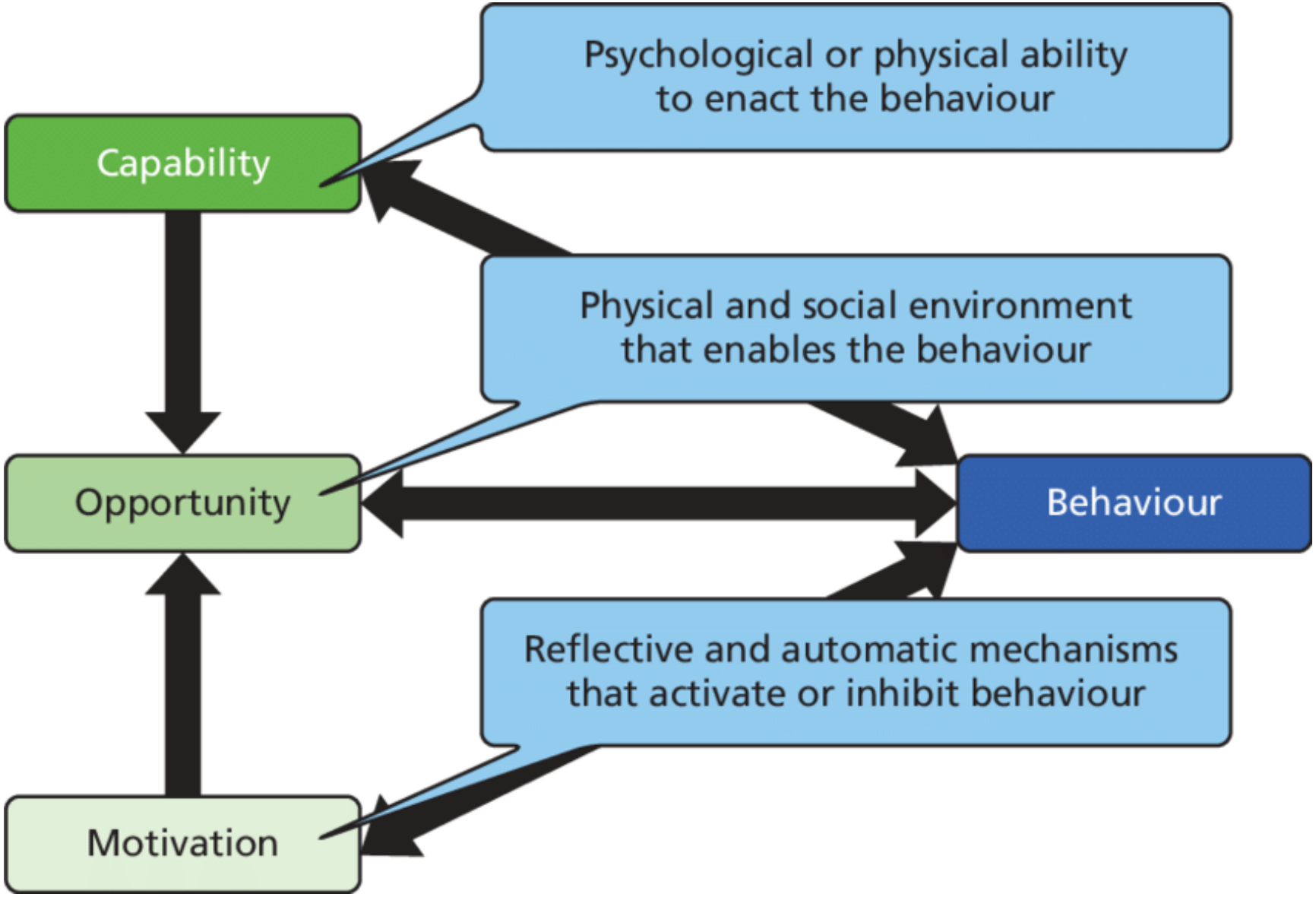


Will training help?

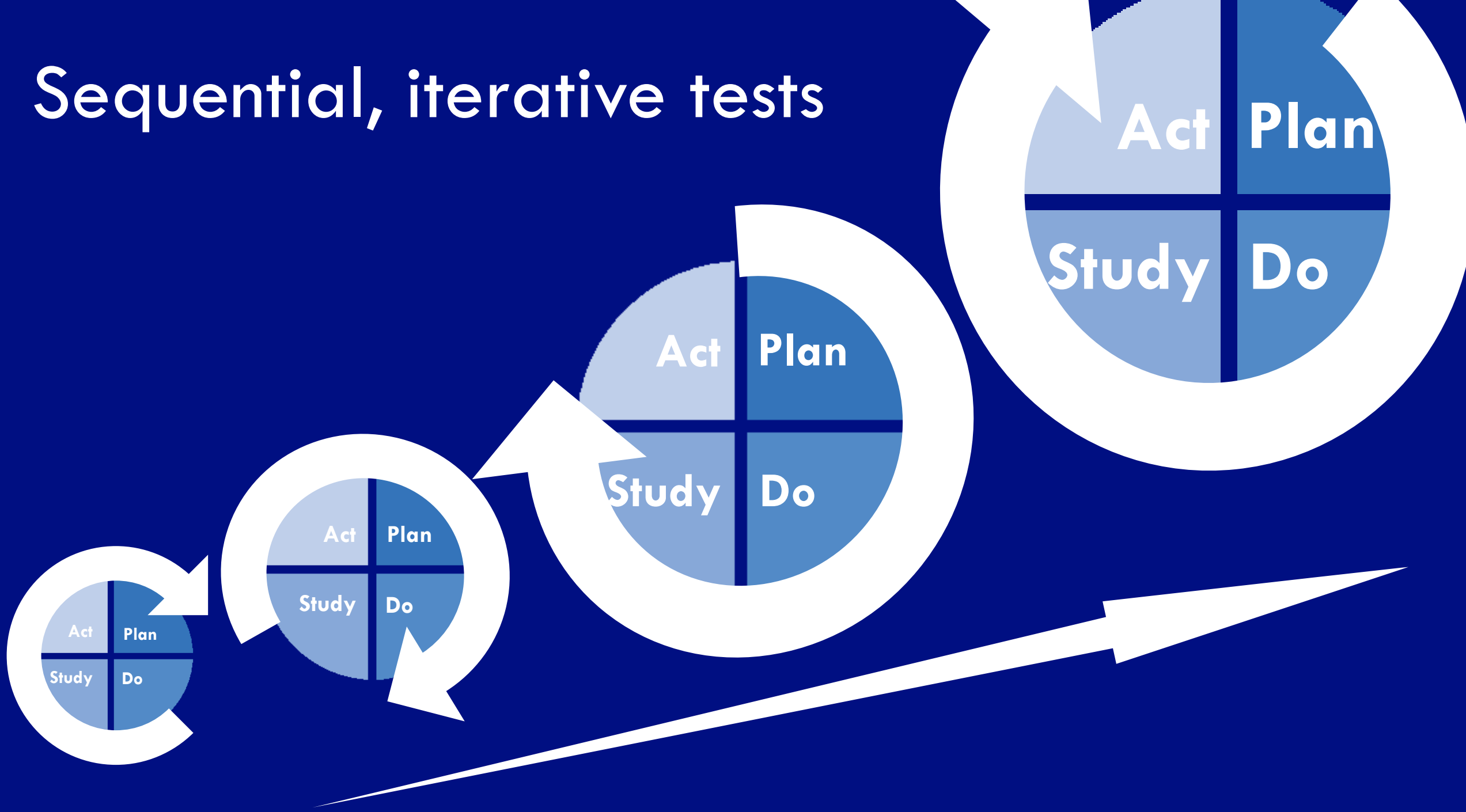


COM-B Model of Behaviour

(Mitchie et al 2011)



Sequential, iterative tests



Reducing Exposure to Opioid and Benzodiazepine Medications for Pediatric Cardiac Intensive Care Patients: A Quality Improvement Project*

Amy Donnellan, DNP, CPNP-AC[1]; Jaclyn Sawyer, PharmD, BCPPS[2]; Anne Peach, MSN, CPNP-AC[1]; Sandra Staveski, RN, PhD, CPNP-AC[1,3]; David P. Nelson, MD, PhD[1,4]; J. Nick Pratap, MB BChir, MRCPCH, FRCA[1,4,5]

TABLE 1. Summary of Plan-Do-Study-Act

No.	Plan/Do	Study	Act
Preparatory work for QI project	Preparatory communication Email to CICU faculty and staff Face-to-face QI introduction	Many CICU staff did not review email prior to initial PDSA	ADAPT: modified communication Provided face-to-face communication
PDSA 1	Initial comfort algorithm used for a single intubated postoperative patient (6-mo-old complete atrioventricular canal repair)	Difficult to follow flow sheet Delay receiving morphine infusion Recognized need for dedicated IV for opioid/benzodiazepine administration	ADAPT: modified practice change Dedicated IV catheter for opioid/benzodiazepine Process change initiated to initiate morphine infusion in operating room
PDSA 2	Modified comfort algorithm used for single intubated postoperative patient (4-year-old ventricular septal defect repair)	Difficulty administrating intermittent morphine boluses Add pain management plan to surgical pre-brief	ADAPT: modified practice change Initiated nursing clinical practice change regarding morphine boluses off infusion pump
PDSA 3	Comfort algorithm discussed during surgical pre-brief	Favorable response from staff regarding improved communication	ADOPT
PDSA 4	Modified comfort algorithm used for single intubated postoperative patient (1-mo-old aortic arch advancement)	Dexmedetomidine and acetaminophen dosing not clearly specified in comfort algorithm	ADAPT: modified change Adapted algorithm to include standardized administration of acetaminophen and ketorolac
PDSA 5	Modified comfort algorithm used for three intubated postoperative patients	Favorable response to acetaminophen and ketorolac addition	ADOPT

An initiative to reduce medication errors in neonatal care unit of a tertiary care hospital, Kolkata, West Bengal: a quality improvement report

Mondal S, *et al. BMJ Open Quality* 2022;**11**:e001468. doi:10.1136/bmjoq-2021-001468

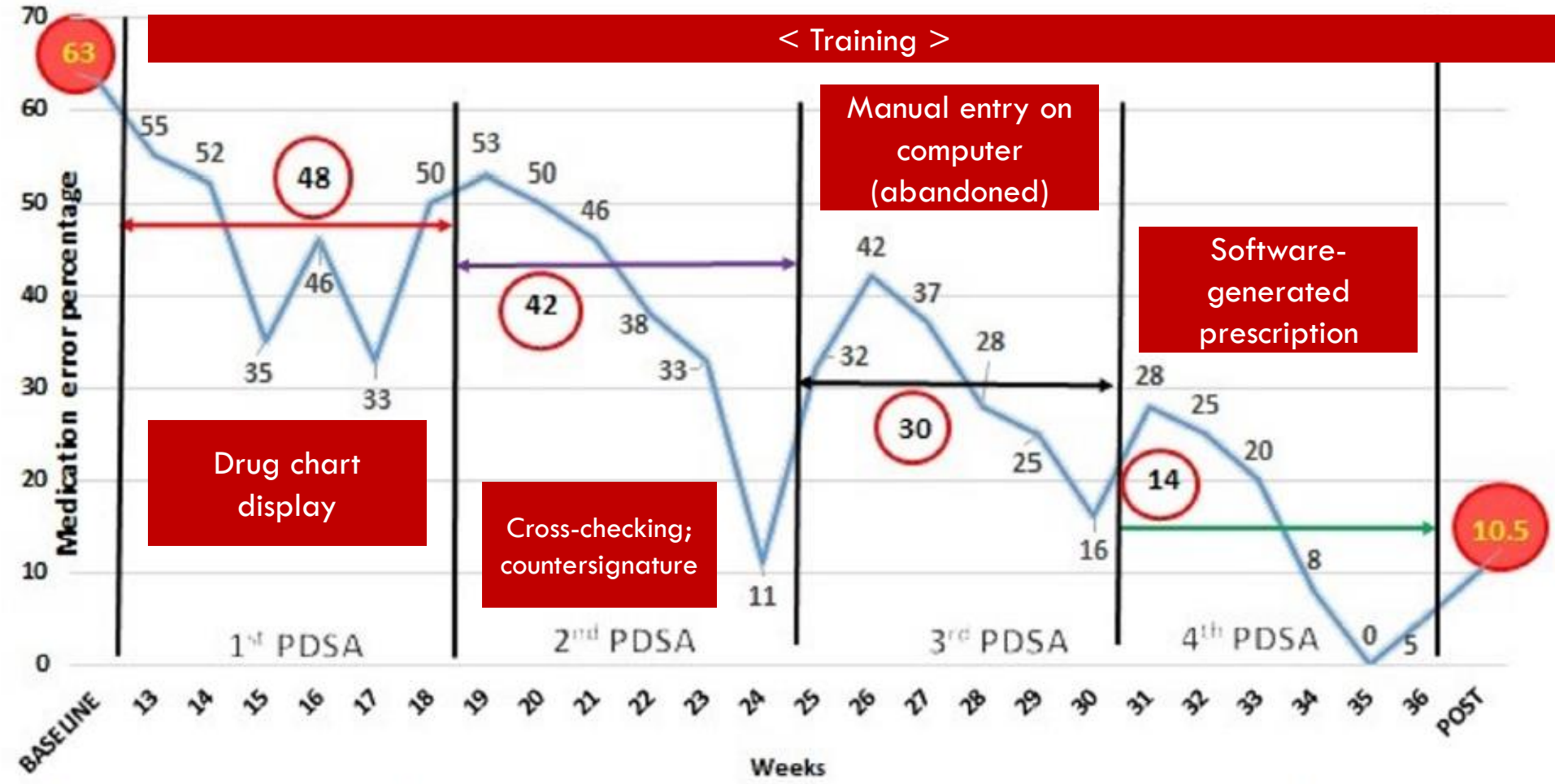
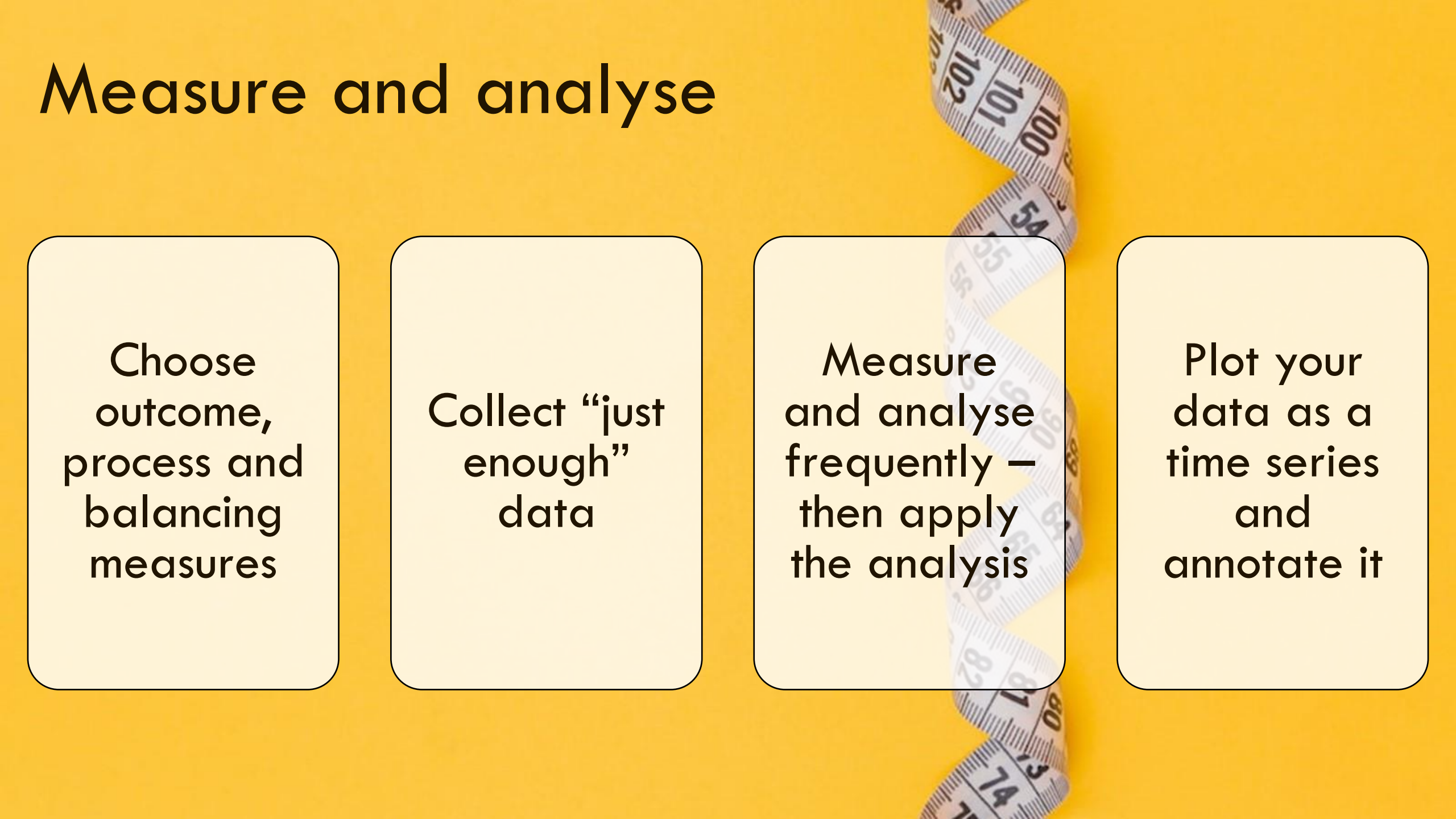


Figure 3 Time series chart of PDSA cycles with decline in median medication error percentage (circled figures), in comparison with the baseline and post-intervention phase. PDSA, plan–do–study–act.

Measure and analyse



Choose outcome, process and balancing measures

Collect “just enough” data

Measure and analyse frequently – then apply the analysis

Plot your data as a time series and annotate it

Assessment of a Situation Awareness Quality Improvement Intervention to Reduce Cardiac Arrests in the PICU

Dewan et al

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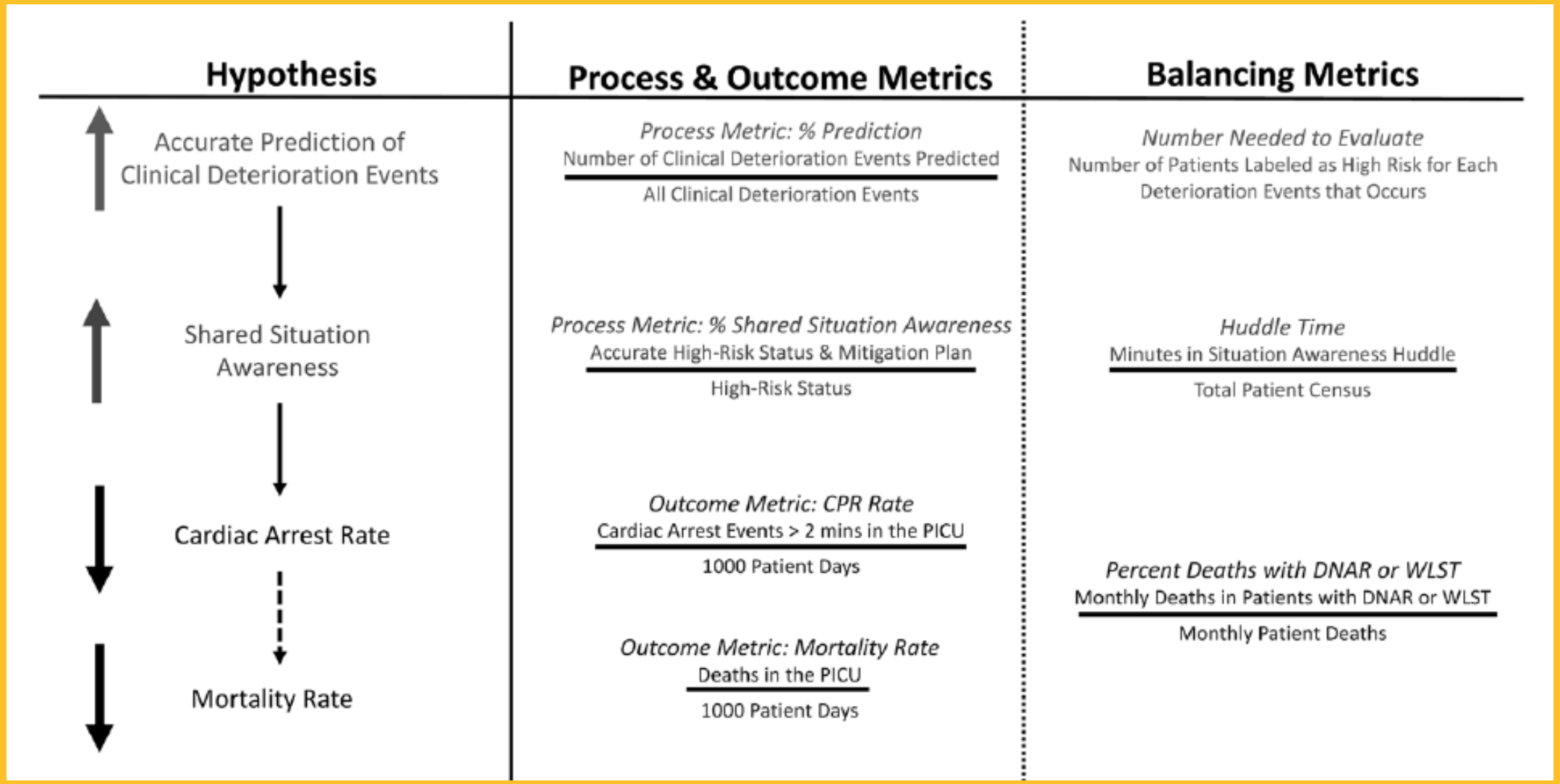
www.pccmjournal.org



Time series evaluation of improvement interventions to reduce alarm notifications in a paediatric hospital

Colleen M Pater ,[1] Tina K Sosa,[2] Jacquelyn Boyer,[3] Rhonda Cable,[4] Melinda Egan,[5] Timothy K Knilans,[1,6] Amanda C Schondelmeyer,[2,6,7] Christine L Schuler,[2,6] Nicolas L Madsen[1,6]

Pater CM, *et al*. *BMJ Qual Saf* 2020;**29**:717–726. doi:10.1136/bmjqs-2019-010368

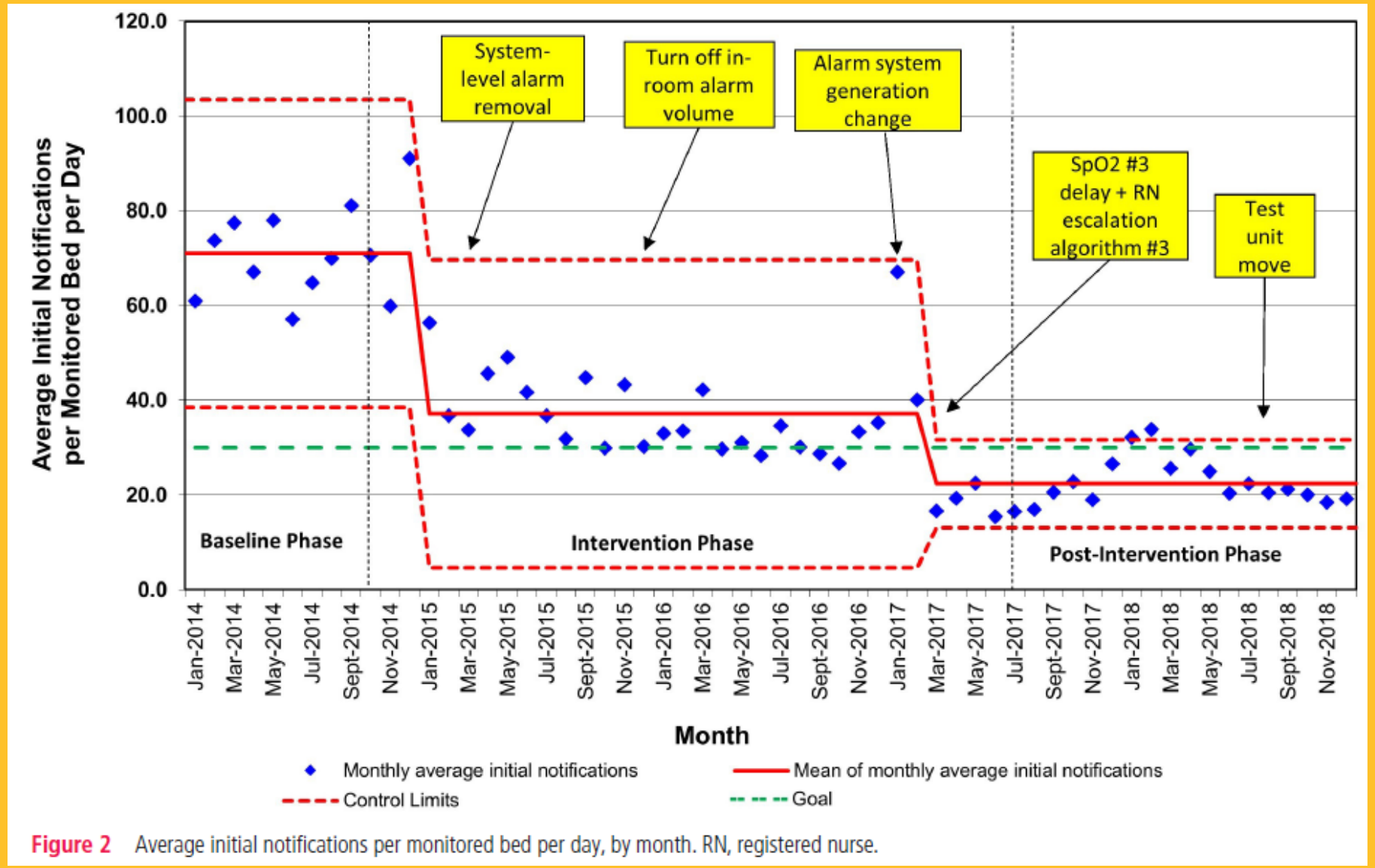


Figure 2 Average initial notifications per monitored bed per day, by month. RN, registered nurse.

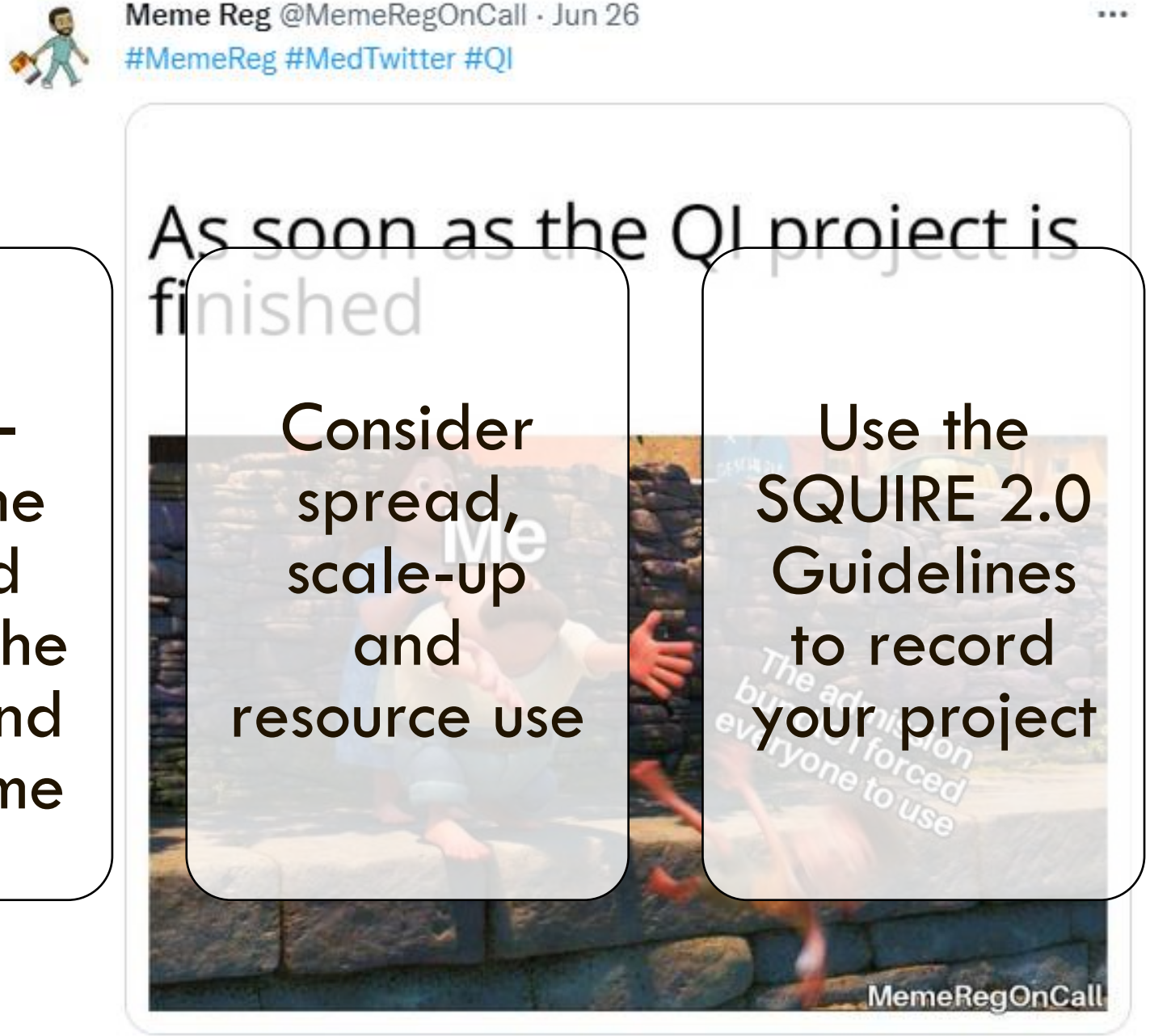
Embed and share

Treat ‘embedding’ as a separate project stage

Share locally – restate the aims and describe the process and the outcome

Consider spread, scale-up and resource use

Use the SQUIRE 2.0 Guidelines to record your project



QI is well-designed for implementing evidence into clinical practice

- Flexible and adaptable to suit any type or size of problem and any local context
- Growing pool of QI expertise among clinical and non-clinical staff working in and with critical care teams
- Well-described QI initiatives can inform practice and develop evidence-base for implementation science
- Requires considerable resources, time, leadership, collaboration, supervision and skill to do well

Thank you