

Quality Improvement in Nephrology: What, Why, and How

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Disclosures

- Editorial board, Canadian Journal of Kidney Health and Disease
- Honorarium from Sanofi Canada to speak about quality improvement and CKD-MBD
- Honorarium from Baxter to speak about outcomes after AKI-Dialysis

Objectives

- To recognize the differences and similarities between quality assurance and quality improvement
- To illustrate the benefits of quality improvement in nephrology
- To demonstrate how to complete a quality improvement initiative

What is Healthcare Quality?

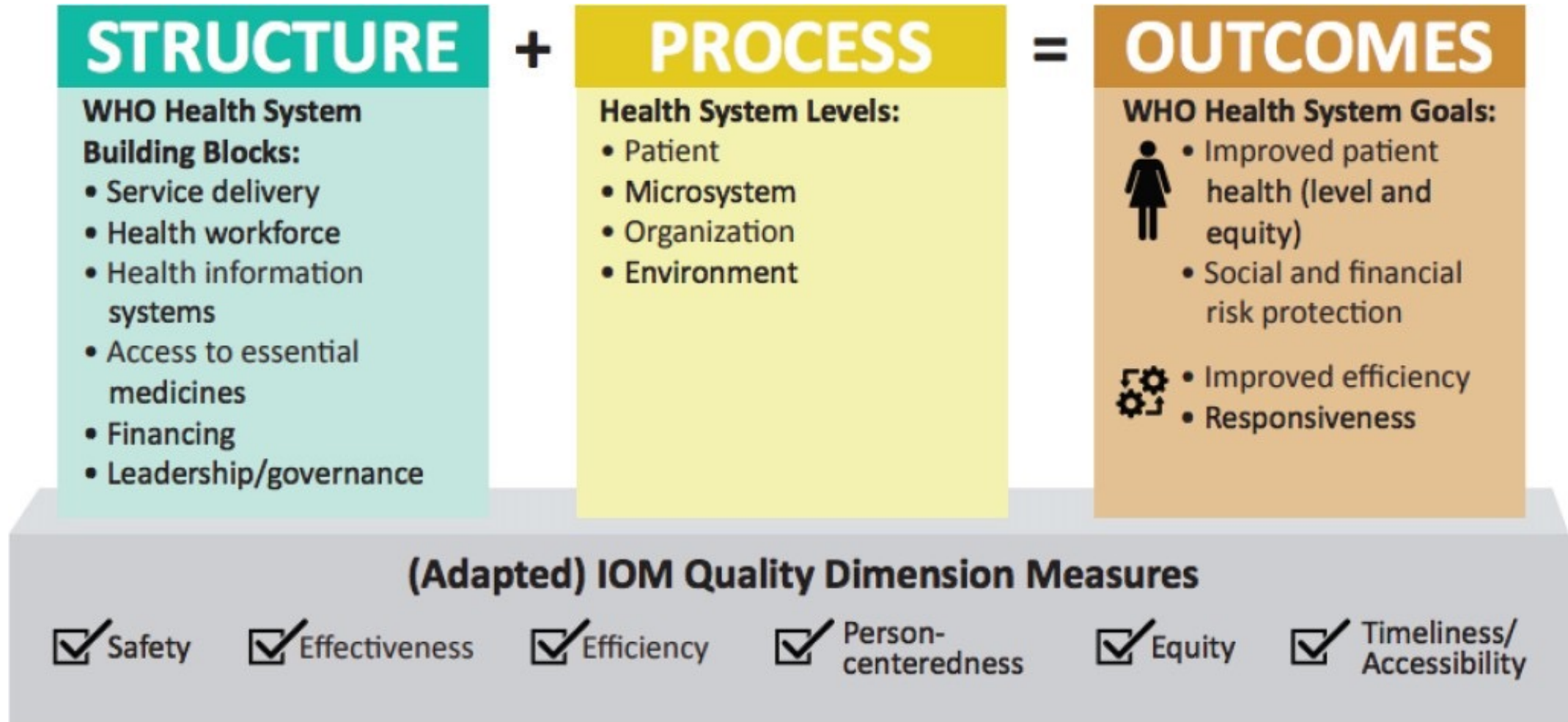
BC Health Quality Matrix Dimensions and Definitions

Acceptability	Care that is respectful to patient and family needs, preferences and values
Appropriateness	Care provided is evidence based and specific to individual clinical needs
Accessibility	Ease with which health services are reached
Safety	Avoiding harm resulting from care
Effectiveness	Care that is known to achieve intended outcomes
Equity	Distribution of health care and its benefits fairly according to population need
Efficiency	Optimal use of resources to yield maximum benefits and results

What is Healthcare Quality?

Category	Definition	Example
Structure	The attributes of the settings in which care occurs <ul style="list-style-type: none">• Material/human resources• Organizational structure	<ul style="list-style-type: none">• Staffing ratios• Methods of reimbursement
Process	What is done in delivering and receiving care	<ul style="list-style-type: none">• Vaccination• Hemoglobin measurement• Advance care documentation
Outcome	The effects of care on the health status of patients and populations	<ul style="list-style-type: none">• Mortality and hospitalizations• Health-related quality of life

What is Healthcare Quality?



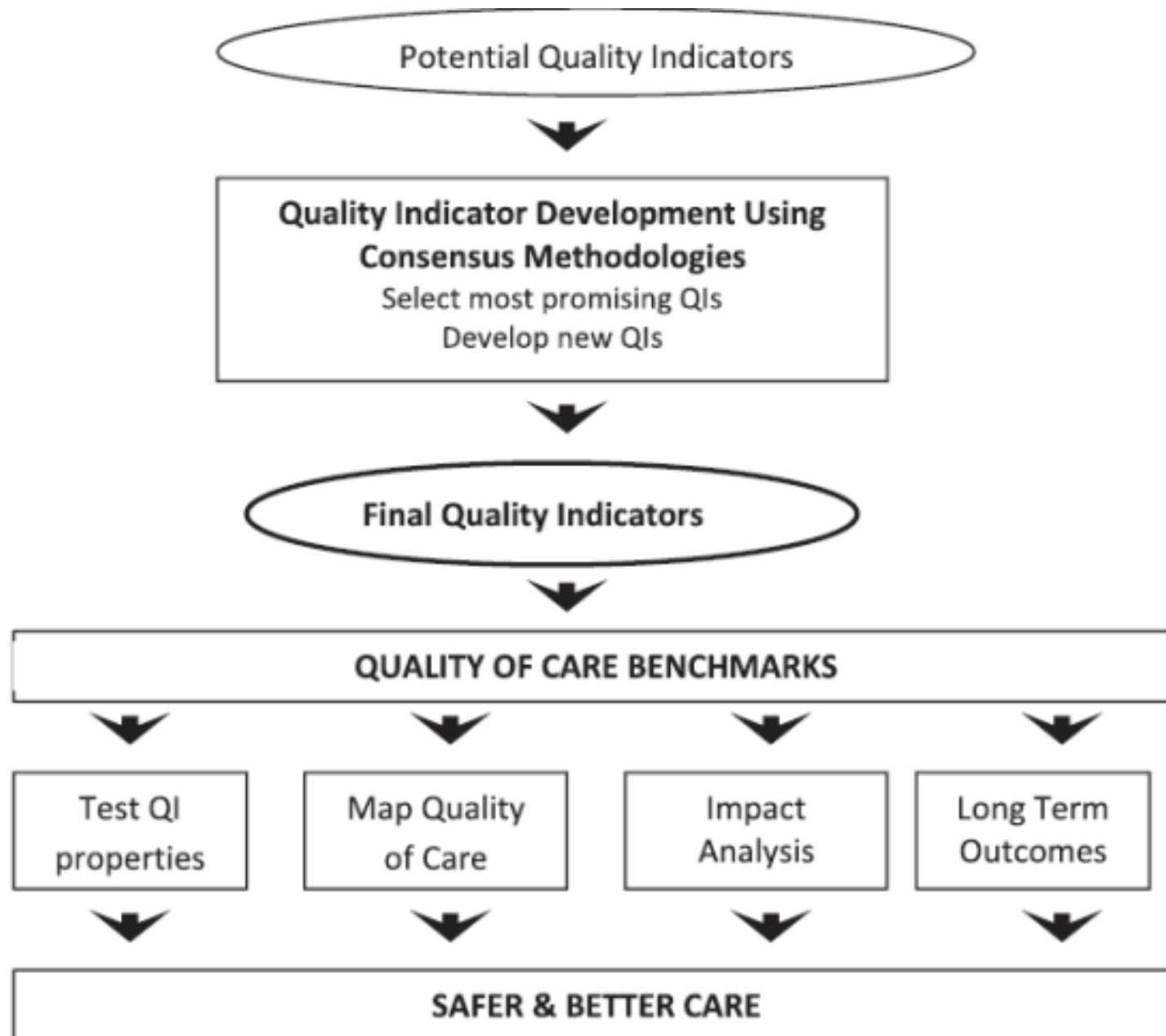
Quality Indicators in Nephrology

PY 2016	PY 2017	PY 2018	PY 2019	PY 2020
Kt/V adequacy	Kt/V adequacy	Kt/V adequacy	Kt/V adequacy	Kt/V adequacy
Hb > 12 g/dl	VAT	VAT	VAT	VAT
VAT	NHSN BSI	NHSN BSI	NHSN BSI	NHSN BSI
NHSN BSI	SRR	SRR	SRR	SRR
Hypercalcemia	Hypercalcemia	Hypercalcemia	Hypercalcemia	Hypercalcemia
		ICH CAHPS ^a	STrR	STrR
		STrR	ICH CAHPS ^a	ICH CAHPS ^a
				SHR
ICH CAHPS ^a	ICH CAHPS ^a	Mineral	Mineral	Mineral
Mineral	Mineral	metabolism	metabolism	metabolism
metabolism	metabolism	Anemia	Anemia	Anemia
Anemia	Anemia	Pain ^a	Pain ^a	Pain ^a
		Depression ^a	Depression ^a	Depression ^a
		NHSN HCP	NHSN HCP	NHSN HCP
				UFR

What is Healthcare Quality?

Table 1. Four Criteria for Accountability Measures That Address Processes of Care.

1. There is a strong evidence base showing that the care process leads to improved outcomes.
2. The measure accurately captures whether the evidence-based care process has, in fact, been provided.
3. The measure addresses a process that has few intervening care processes that must occur before the improved outcome is realized.
4. Implementing the measure has little or no chance of inducing unintended adverse consequences.



Quality Assurance versus Quality Improvement

Accountability, accreditation, pay-for-performance

- Outcomes of aggregate data
- Goals and targets
- Is performance better now than it was last time?

Improvement

- How outcomes are affected by processes
- Did our changes make healthcare better?

Quality Assurance versus Quality Improvement

	Assurance	Improvement
Aim	Accountability, comparison, spur for change	Change local practice
Changes	None	Observable
Sample size	Large	Small
Hypothesis	None	Flexible
Testing strategy	None	Iterative
Data turnaround	Slow (i.e., quarterly)	Fast (i.e., weekly)
Data confidentiality	Public	Restricted to improvement team

Quality Assurance versus Quality Improvement

PY 2016	PY 2017	PY 2018	PY 2019	PY 2020
Kt/V adequacy	Kt/V adequacy	Kt/V adequacy	Kt/V adequacy	Kt/V adequacy
Hb > 12 g/dl	VAT	VAT	VAT	VAT
VAT	NHSN BSI	NHSN BSI	NHSN BSI	NHSN BSI
NHSN BSI	SRR	SRR	SRR	SRR
Hypercalcemia	Hypercalcemia	Hypercalcemia	Hypercalcemia	Hypercalcemia
		ICH CAHPS ^a	STrR	STrR
		STrR	ICH CAHPS ^a	ICH CAHPS ^a
				SHR
ICH CAHPS ^a	ICH CAHPS ^a	Mineral	Mineral	Mineral
Mineral	Mineral	metabolism	metabolism	metabolism
metabolism	metabolism	Anemia	Anemia	Anemia

Monthly reviews = accountability
Evaluation of a local process change = improvement

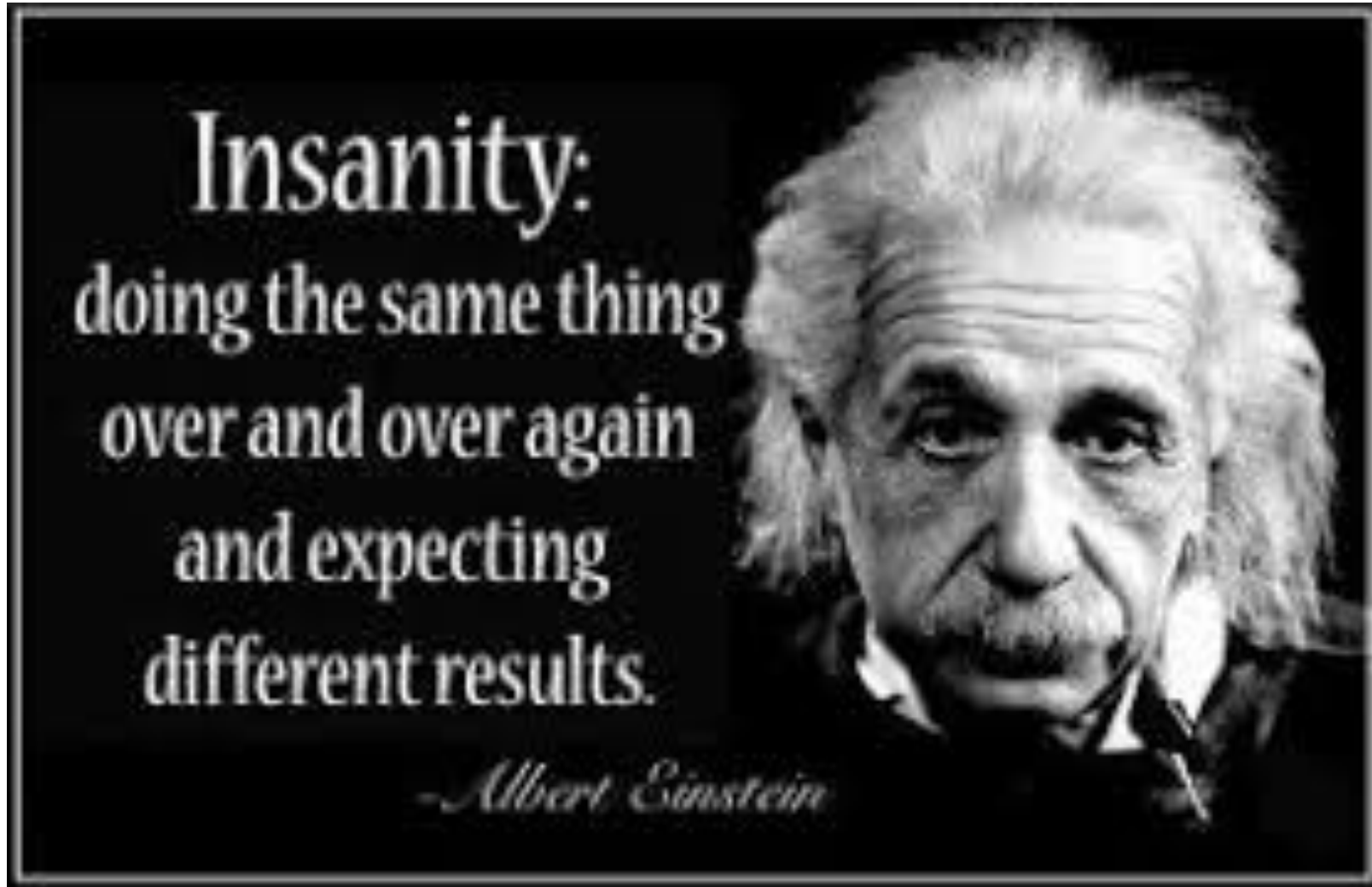
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- To illustrate the benefits of quality improvement in nephrology
- To demonstrate how to complete a quality improvement initiative

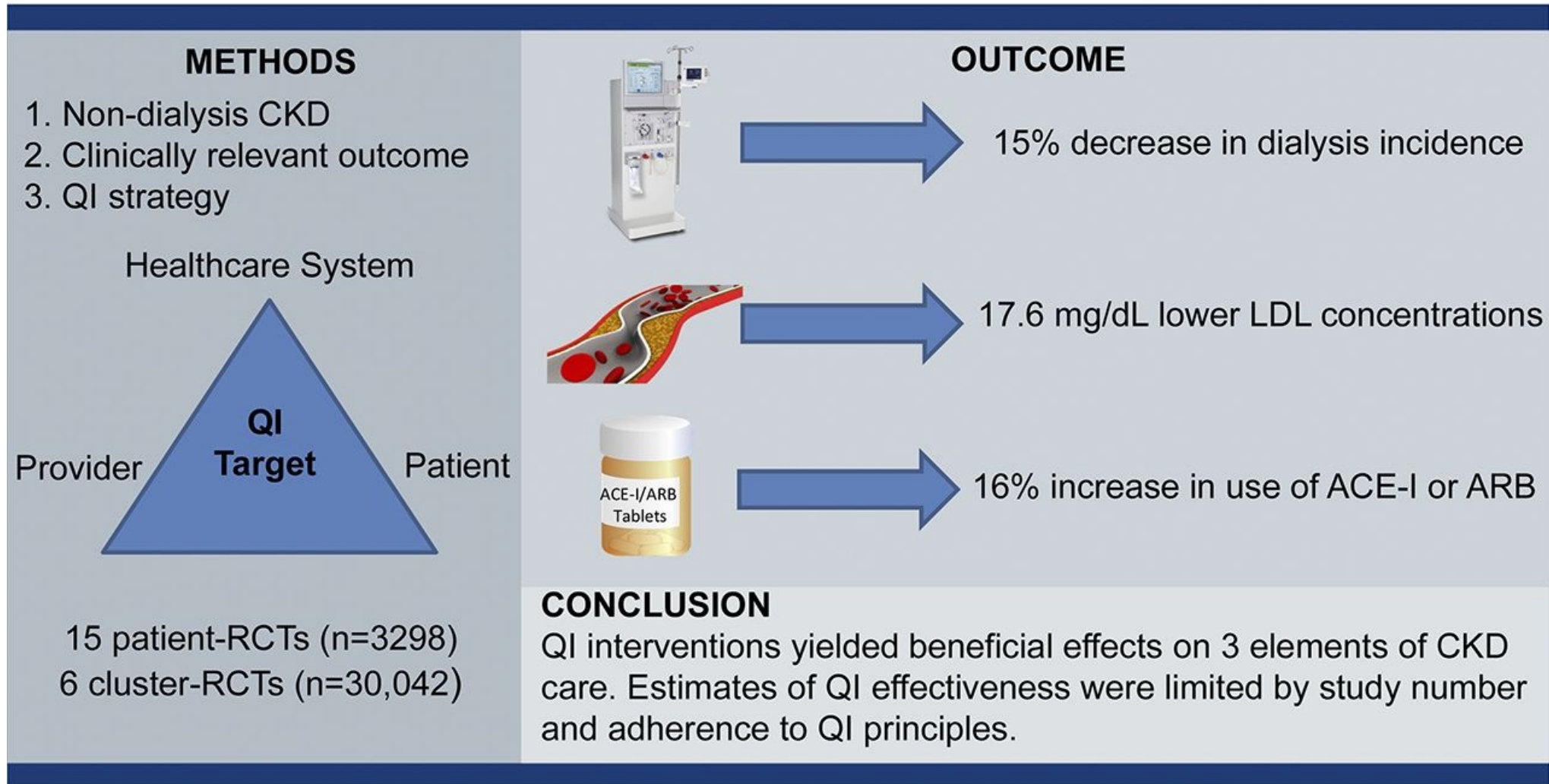
Why Should I Support Quality Improvement?



Why Should I Support Quality Improvement?



Effectiveness of Quality Improvement Strategies for the Management of Chronic Kidney Disease: A Meta-Analysis



Does Changing Routine Hemodialysis Bloodwork From q4 to q6 Weeks Adversely Affect Outcomes?



Kingston, Ontario



Regional Hemodialysis Program

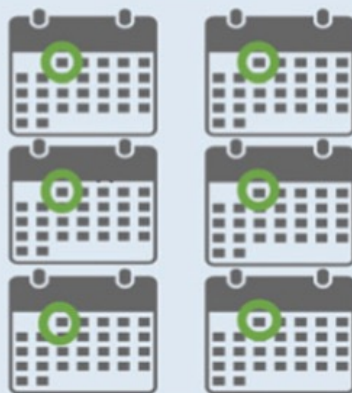
Quality Improvement Project



N = 350-400 prevalent patients per year

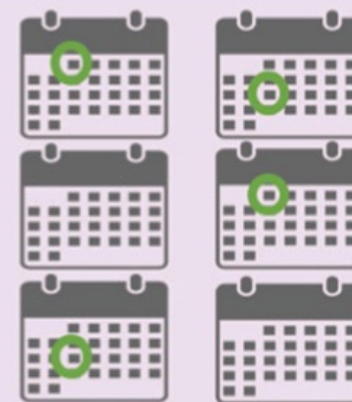
1 Jun 2012 → 23 Mar 2014

q4 weeks testing



25 Mar 2014 → 31 Dec 2015

q6 weeks testing



Hemoglobin Target



PO₄ Target



Mortality Rate

No Difference Between q4 and q6 Week Testing



Direct Lab Savings q4 vs q6 over 252 days: Hb, Ca, PO₄, Ferritin, Iron % Sat
\$24,978* = \$85* per patient-year

*Canadian Dollars

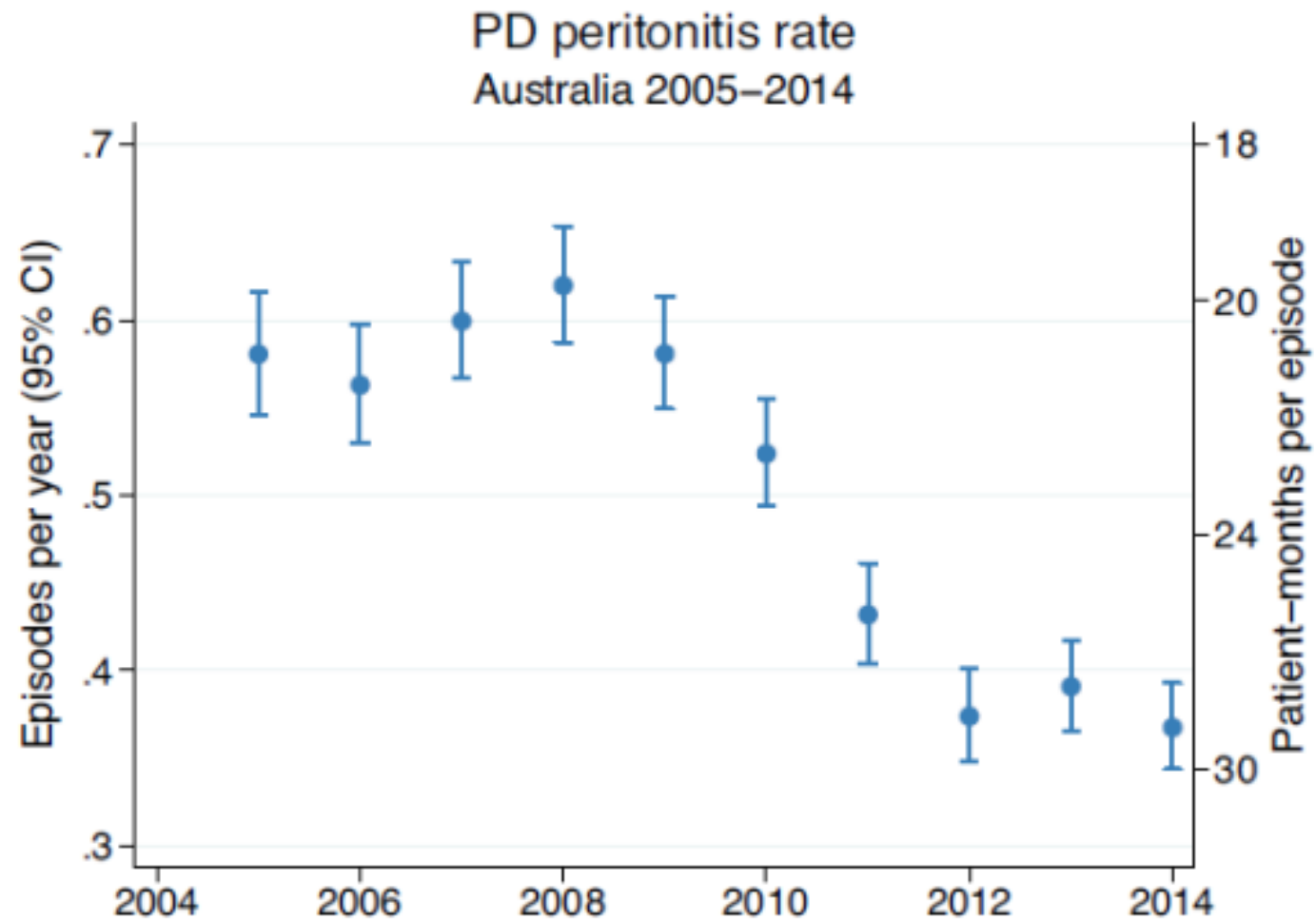
Routine Lab Testing Every 4 Versus Every 6 Weeks for Patients on Maintenance Hemodialysis: A Quality Improvement Project

Samuel A. Silver, Abdullah Alaryni, Abdullah Alghamdi, et al

Am J Kidney Dis (ePub Dec 28, 2018) | DOI: 10.1053/j.ajkd.2018.10.008 | © National Kidney Foundation



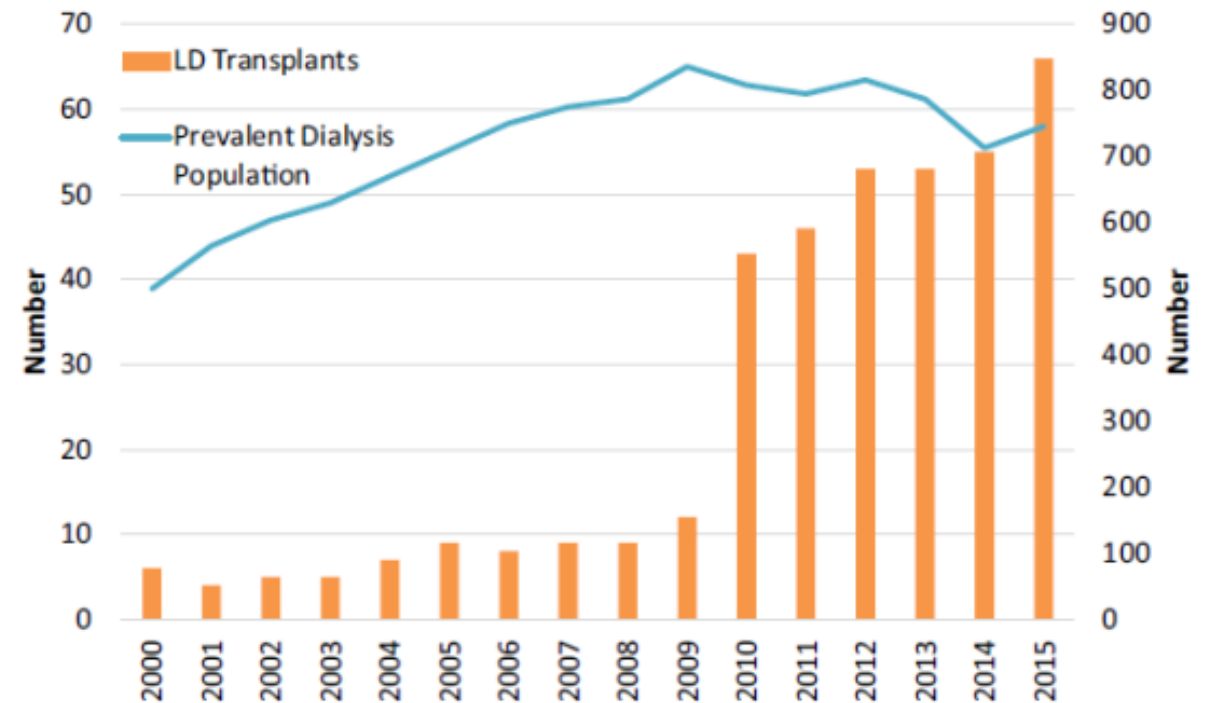
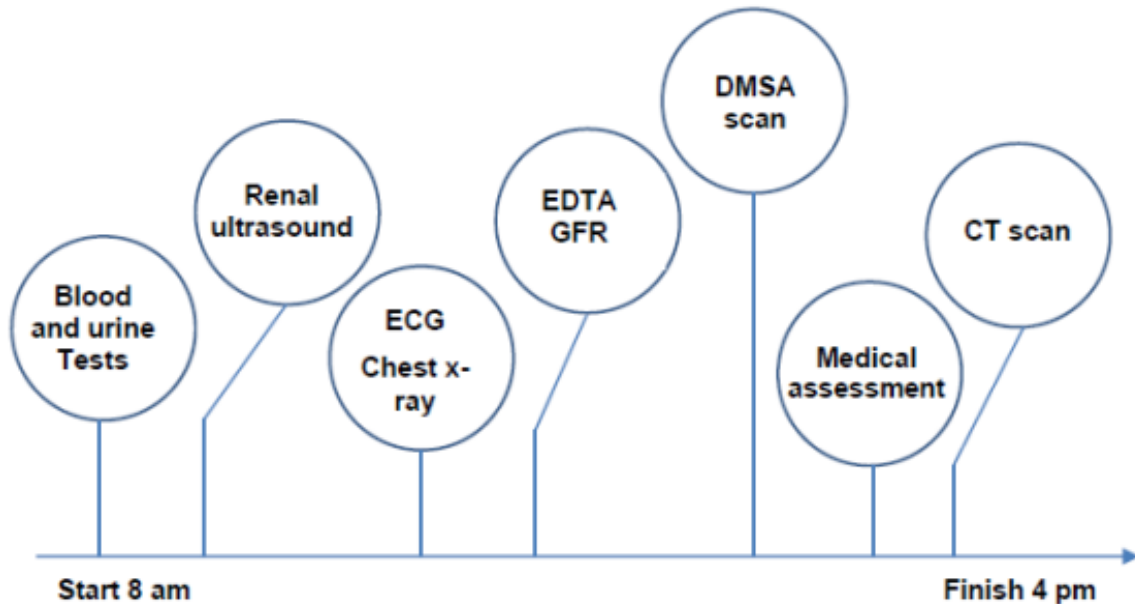
CONTINUOUS QUALITY IMPROVEMENT INITIATIVES TO SUSTAINABLY REDUCE PERITONEAL DIALYSIS-RELATED INFECTIONS IN AUSTRALIA AND NEW ZEALAND



Nataatmadja M et al,
PDI, 2016

The Adoption of a One-Day Donor Assessment Model in a Living Kidney Donor Transplant Program: A Quality Improvement Project

Judi M. Graham and Aisling E. Courtney



Why Should I Support Quality Improvement?



By learning that many routine interventions are not working, we can iteratively improve them until they become effective, or we can reassign staff to perform different interventions that are more effective

Objectives

- To recognize the differences and similarities between quality assurance and quality improvement
- To illustrate the benefits of quality improvement in nephrology
- To demonstrate how to complete a quality improvement initiative

How Do I Participate in Quality Improvement?

How to Begin a Quality Improvement Project

Samuel A. Silver,^{} Ziv Harel,^{†*} Rory McQuillan,[‡] Adam V. Weizman,[§] Alison Thomas,^{*} Glenn M. Chertow,[¶] Jihad Nesrallah,^{††} Chaim M. Bell,^{**†††} and Christopher T. Chan^{*}*

How to Measure and Interpret Quality Improvement Data

Rory Francis McQuillan,^{} Samuel Adam Silver,[‡] Ziv Harel,^{†*} Adam Weizman,[§] Alison Thomas,[‡] Chaim Bell,^{††} Glenn M. Chertow,^{**} Christopher T. Chan,^{*} and Jihad Nesrallah^{†††}*

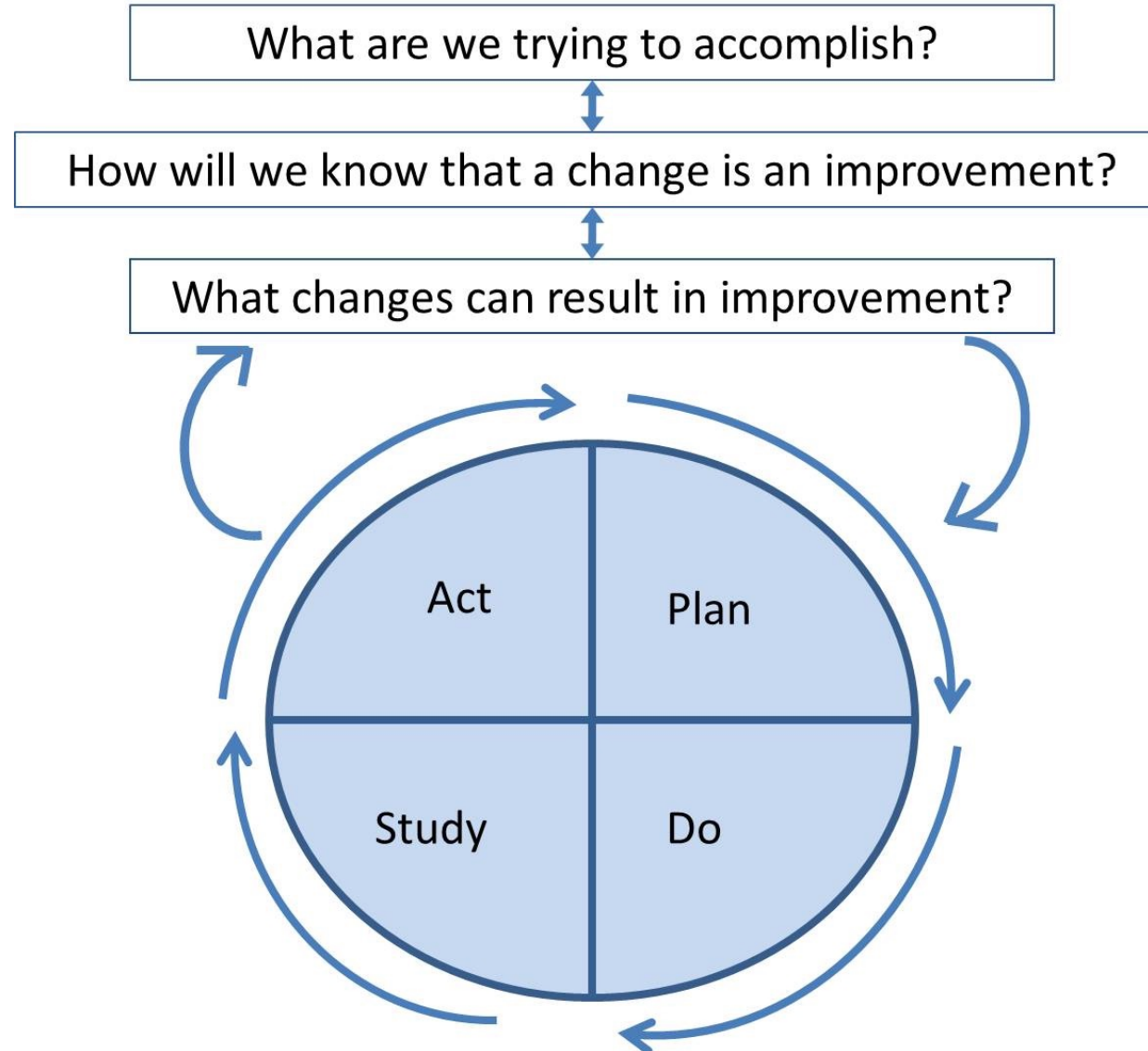
How to Diagnose Solutions to a Quality of Care Problem

Ziv Harel,^{†} Samuel A. Silver,^{*} Rory F. McQuillan,[‡] Adam V. Weizman,[§] Alison Thomas,^{*} Glenn M. Chertow,[¶] Jihad Nesrallah,^{††} Christopher T. Chan,[‡] and Chaim M. Bell^{**†††}*

How to Sustain Change and Support Continuous Quality Improvement

Samuel A. Silver,^{} Rory McQuillan,[‡] Ziv Harel,^{†*} Adam V. Weizman,[§] Alison Thomas,^{*} Jihad Nesrallah,^{††} Chaim M. Bell,^{†††} Christopher T. Chan,[‡] and Glenn M. Chertow^{**}*

How Do I Participate in Quality Improvement?



Diagnose the Problem, Then Treat It

Aim Statement



Root Cause

(Fishbone , 5 Whys, Process Map)



Data Collection



Prioritize Root Causes

(Pareto chart)



Select Change Ideas

(with theory linking change ideas to root causes)

Select the Right QI Target

- Frequent and severe problem (trigger event?)
- Under your direct control
- Feasible (how many resources are needed?)
- Few unintended consequences
- Synergy with other improvement activities at provincial or hospital level
- Patient/staff satisfaction

Select the Right QI Target

- How many charts do we need to review to be confident that we have identified a quality of care problem?

- Long delays



Observed system performance (%)	Desired system performance	
	80%	90%
95	26	140
90	70	Not applicable
85	260	180
80	Not applicable	50
75	280	28
70	80	20
66	45	15
60	25	10
50	12	6
40	10	5
20	5	5

Select the Right QI Target

Sample Size	Audit Result	95% confidence interval
10	50%	19 to 81%
20	50%	28 to 72%
40	50%	35 to 65%
80	50%	39 to 61%
160	50%	42 to 58%
320	50%	45 to 55%
640	50%	46 to 54%

Aim Statement

- **Specific** (What? Who?)
- **Measurable** (Compared to what? By how much?)
- **Attainable** (But not too easy!)
- **Relevant**
- **Time-bound** (By when?)

Aim Statement

- We aim to reduce AKI
- We aim to reduce nephrotoxic associated AKI
- We aim to reduce nephrotoxic associated AKI by 30% by the end of the project

Diagnose the Problem, Then Treat It

Aim Statement



Root Cause

(Fishbone , 5 Whys, Process Map)



Data Collection



Prioritize Root Causes

(Pareto chart)



Select Change Ideas

(with theory linking change ideas to root causes)

Diagnose the Problem, Then Treat It



Diagnose the Problem, Then Treat It

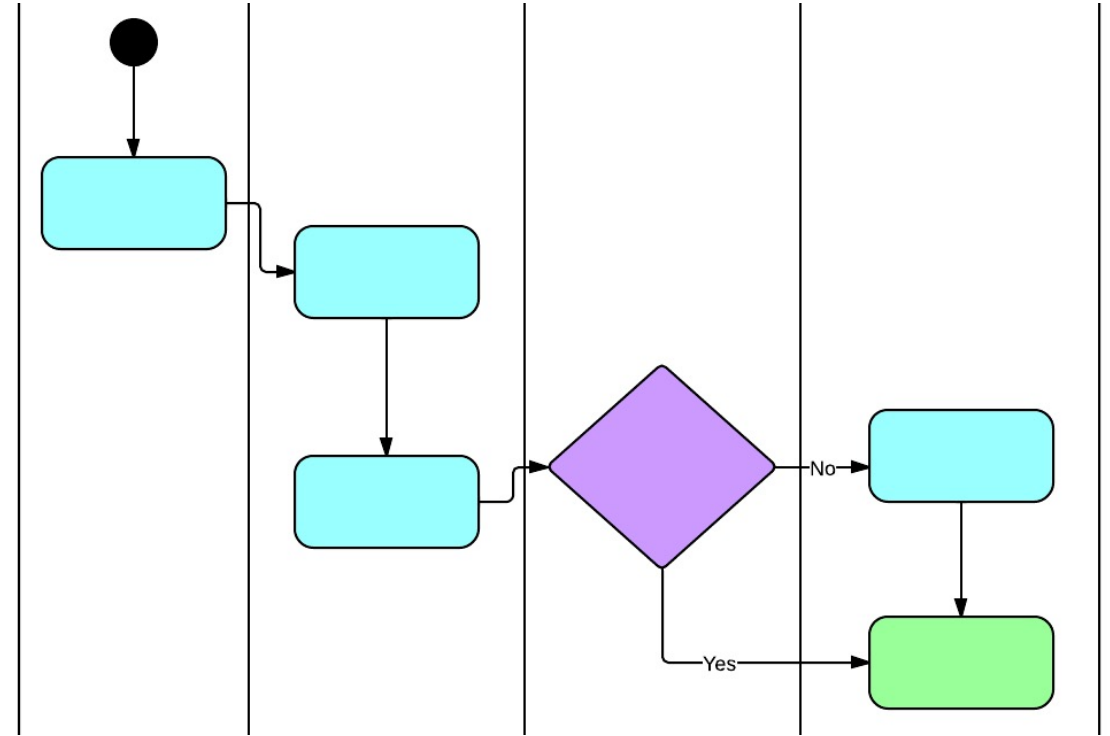
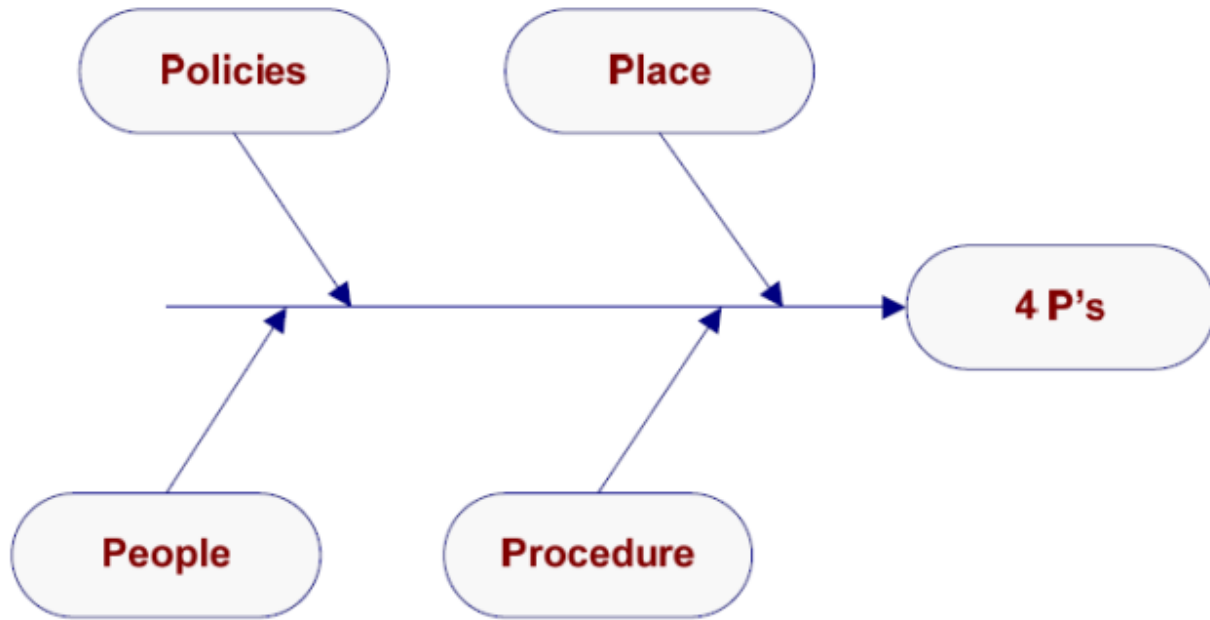
A Successful Approach to Fall Prevention in an Outpatient Hemodialysis Center

Michael Heung,* Therese Adamowski,* Jonathan H. Segal,* and Preeti N. Malani^{†‡§||}

*Divisions of *Nephrology, †Infectious Diseases, and ‡Geriatric Medicine, Department of Internal Medicine, University of Michigan Health System, Ann Arbor, Michigan; §Veterans Affairs Ann Arbor Healthcare System, Ann Arbor, Michigan; and ||Geriatric Research Education and Clinical Center (GRECC), Ann Arbor, Michigan*

- With use of root cause analysis, in which an adverse event is examined for all potential contributing causes, the team identified several risk factors for falls
- On the basis of these findings, a targeted series of interventions was performed

Diagnose the Problem, Then Treat It



Diagnose the Problem, Then Treat It

Fall Risk Factor

Intervention

High-risk patient population

- Formal staff education program
- Implementation of fall risk assessment tool
- Active and passive patient education programs

Elevated scale

- Construction of in-ground scale

Poor ambient lighting

- Full lighting during shift change periods

Wet floors

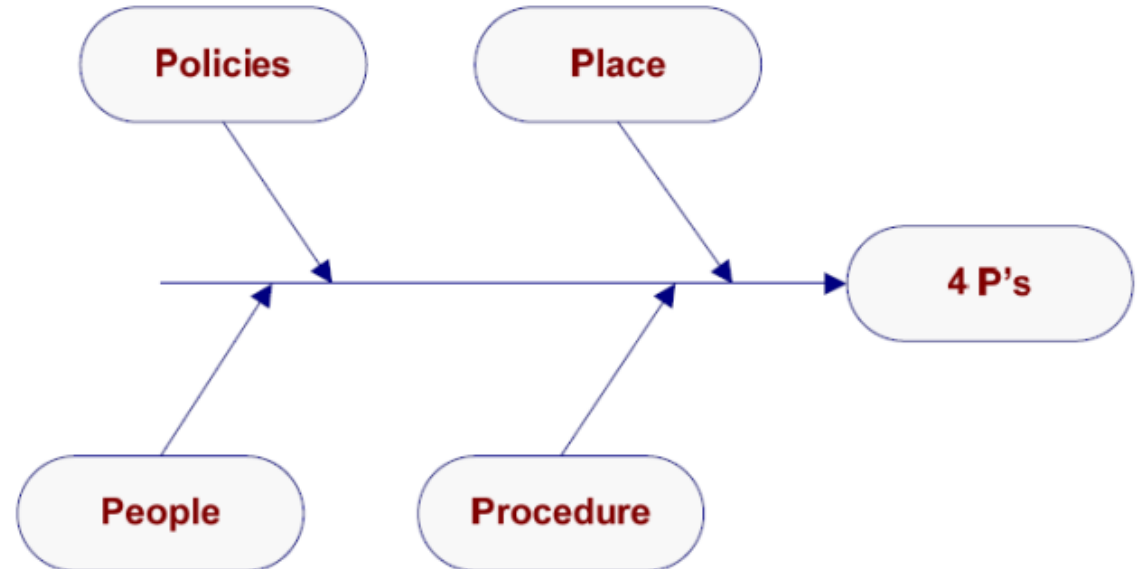
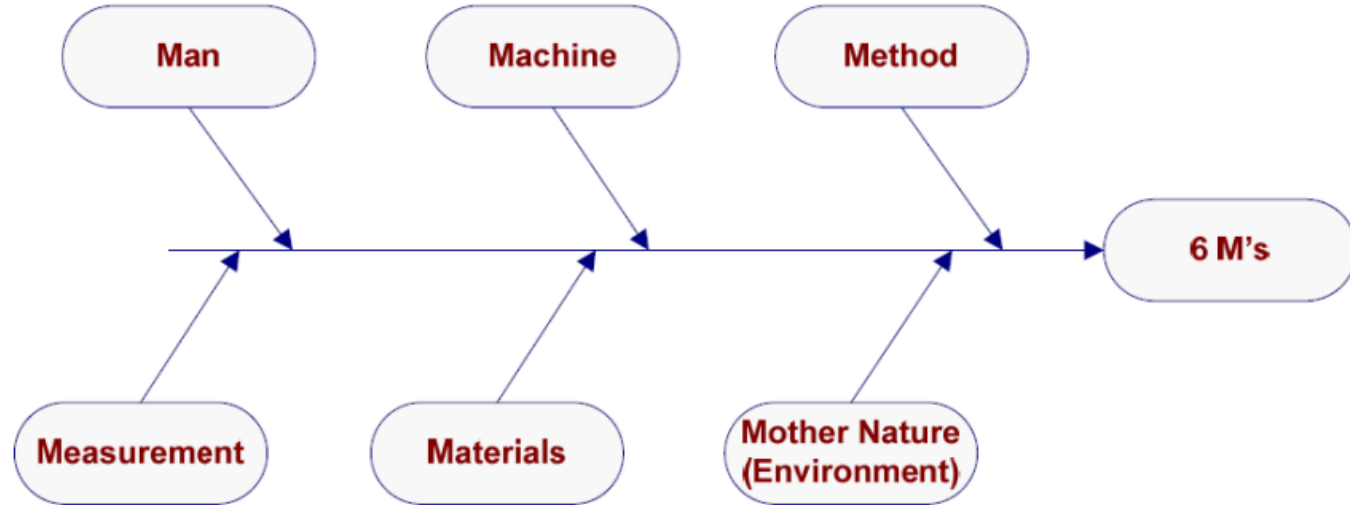
- Routine use of towels around dialysis machines to wick leaked fluid

Lack of supportive device in patient restroom

- Installation of support bars in patient restroom

Fishbone Diagram

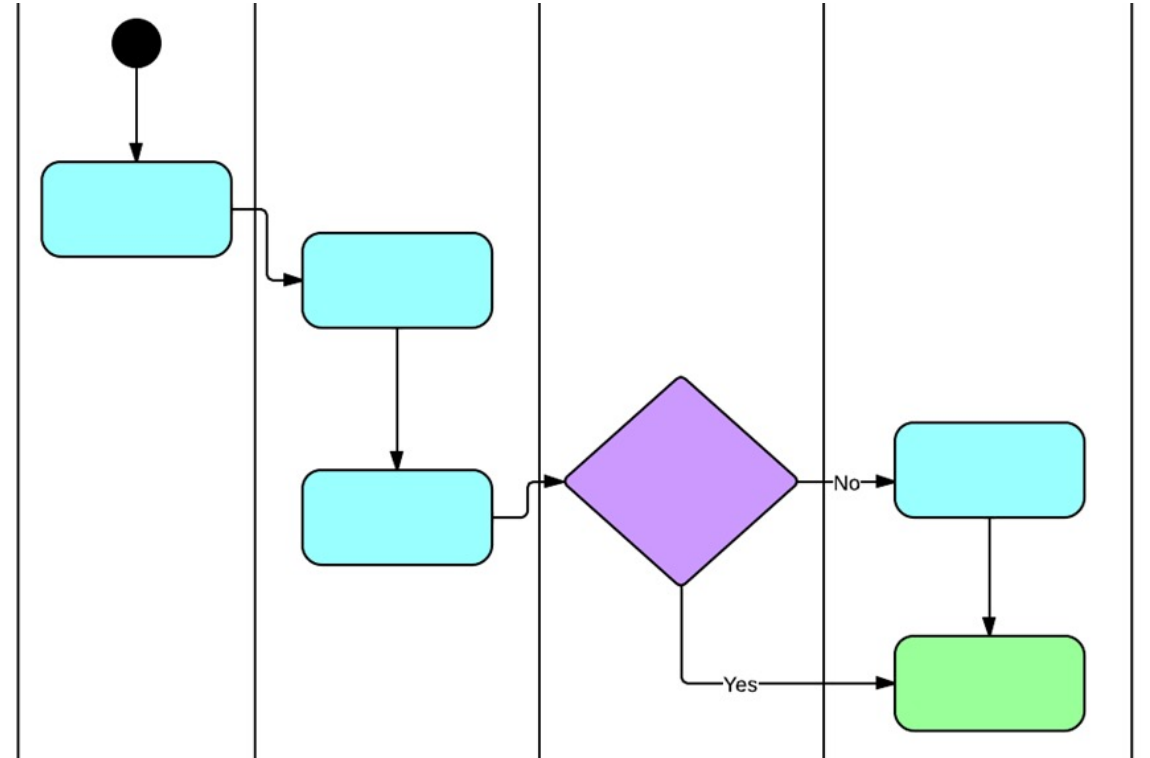
- Stakeholder brainstorming session
- Quality of care problem on the right
- Causes and contributing factors branching off



Which potential root causes are important to investigate further?

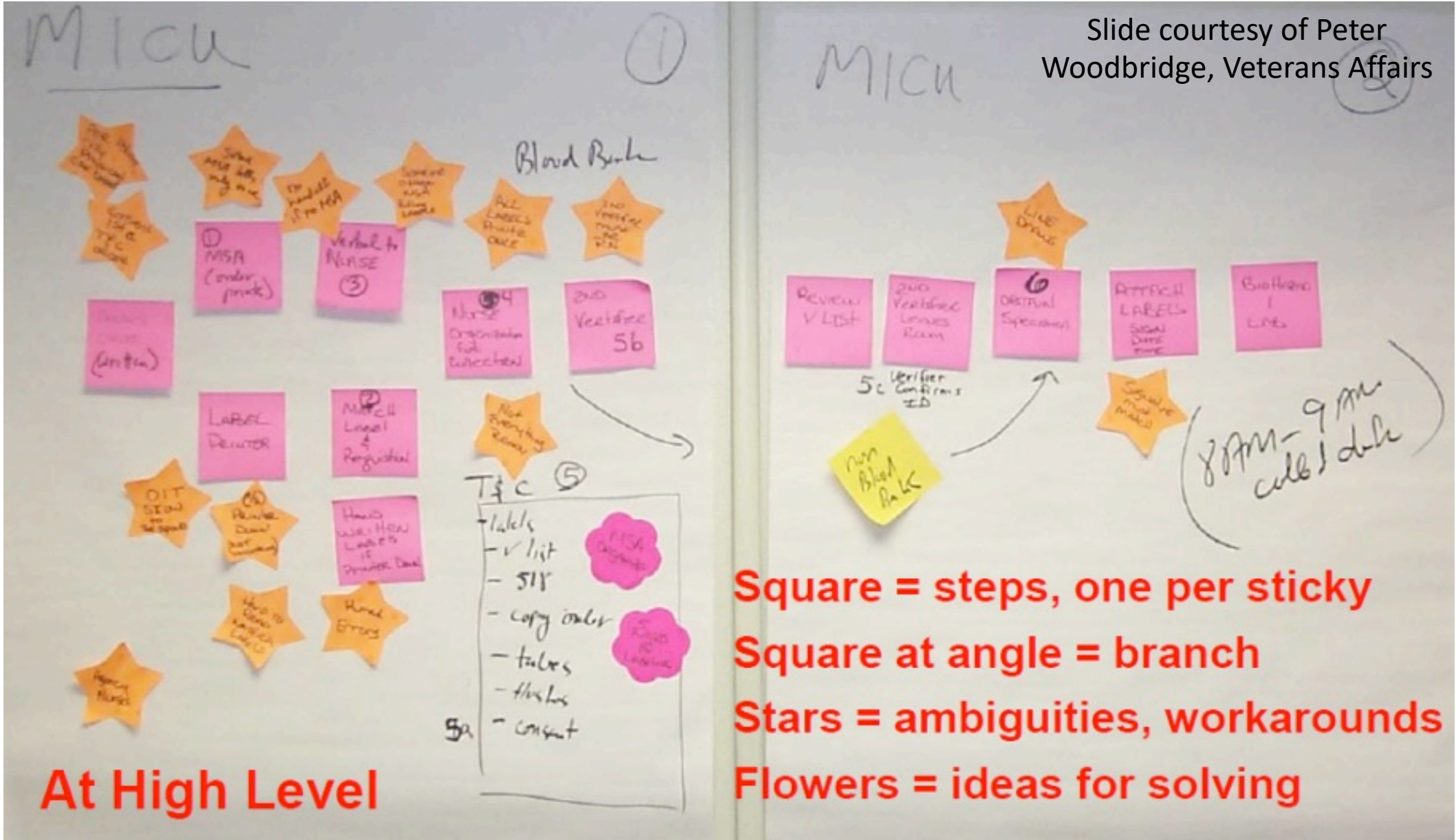
Process Maps

- People involved in the process map the process
- Define the beginning and end
- Different shapes/symbols represent different actions
- Many different types of process maps



Ask questions and identify opportunities for improvement

Process Maps



The 5 Whys

- Items on a Fishbone or Process Map may be just another symptom of the problem and not the root cause
- The 5 Whys allows you to strip away layers of symptoms and uncover the root cause
 - Begin with a quality of care problem or potential root cause
 - Ask “Why”
 - Keep asking “Why” until you get to a root cause
 - Most problems have multiple root causes
 - Do not stop until you find a cause that is actionable

The 5 Whys

- Why did this patient develop PD peritonitis?
- Non-sterile technique → Why?
- Stressed, overwhelmed, pain → Why?
- Recent hospitalization for wrist fracture → Why?
- **Range of motion is restricted**

Developing Change Ideas



I'll be happy to give you
innovative thinking

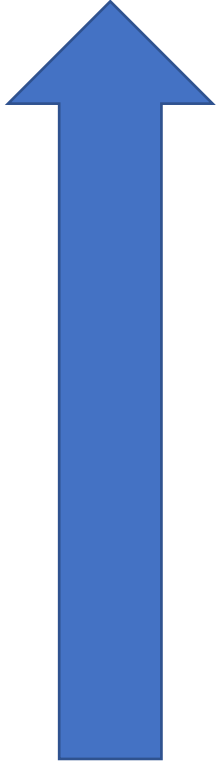
What are the guidelines?

Developing Change Ideas

1. Immediate advantage → Better than other options?
2. Complexity → Easy to understand and use?
3. Compatibility → Consistent with how we do things?
4. Trialability → Can we test drive it first?
5. Observability → Are the results obvious?

Developing Change Ideas

**Increasing
Effectiveness**



Design-Oriented

1. Forcing function and constraints
2. Automation and computerization
3. Simplification and standardization

Person-Oriented

4. Reminders, checklists, and double-checks
5. Rules and policies
6. Training and education

Developing Change Ideas

- Benchmarking against best practices
- Literature, conferences, collaboratives, site visits

Developing Change Ideas

Change concept: the general notion or approach to change

Change idea: the specific idea or intervention you might implement in your practice

Developing Change Ideas

Use change concepts to generate specific change ideas

- Eliminate things that are not used
- Minimize handoffs
- Do tasks in parallel
- Reduce choice of features
- Give people access to information
- Listen to patients
- Use constraints
- Offer service anytime/anyplace

Developing Change Ideas

- Problem: High no-show rate in clinic
- Theory: Patients forgetting their appointment date and time
- Change concept: Reminders
- Change ideas:
 - Send the patients a reminder in the mail
 - Phone call reminder the day before

Developing Change Ideas

- TRIZ exercise
- By December 31, 2018, 30% of all new dialysis patients will be on peritoneal dialysis within 6 months of initiating dialysis

How do we ensure that patients are never started on peritoneal dialysis?

Developing Change Ideas

- Do not educate patients
- Do not educate fellows
- Pay more for hemodialysis
- No operating room time
- No surgical expertise
- Constantly rotate nurses during training
- Do not support patients during transition to home

Which of these things are we doing right now?

Is there anything on this list that is in our power to change today?

Developing Change Ideas

1. What did you change?
2. Why would the change work?
3. How long would the change take to work?
4. Did the change take hold? (fidelity)
5. Did anything bad happen?

Evaluation

Multifactorial intervention with nurse practitioners does not change cardiovascular outcomes in patients with chronic kidney disease

Arjan D. van Zuilen¹, Michiel L. Bots², Arzu Dulger¹, Ingeborg van der Tweel², Marjolijn van Buren³, Marc A.G.J. ten Dam⁴, Karin A.H. Kaasjager⁵, Gerry Ligtenberg⁶, Yvo W.J. Sijpkens⁷, Henk E. Sluiter⁸, Peter J.G. van de Ven⁹, Gerald Vervoort¹⁰, Louis-Jean Vleming³, Peter J. Blankestijn^{1,11} and Jack F.M. Wetzels^{10,11}

Evaluation

1. What did you change?

- Intensive NP management for patients with CKD according to flowcharts

2. Why would the change work?

- Physicians do not have the time to address all aspects of CVD risk at each visit

3. How long would the change take to work?

- Years

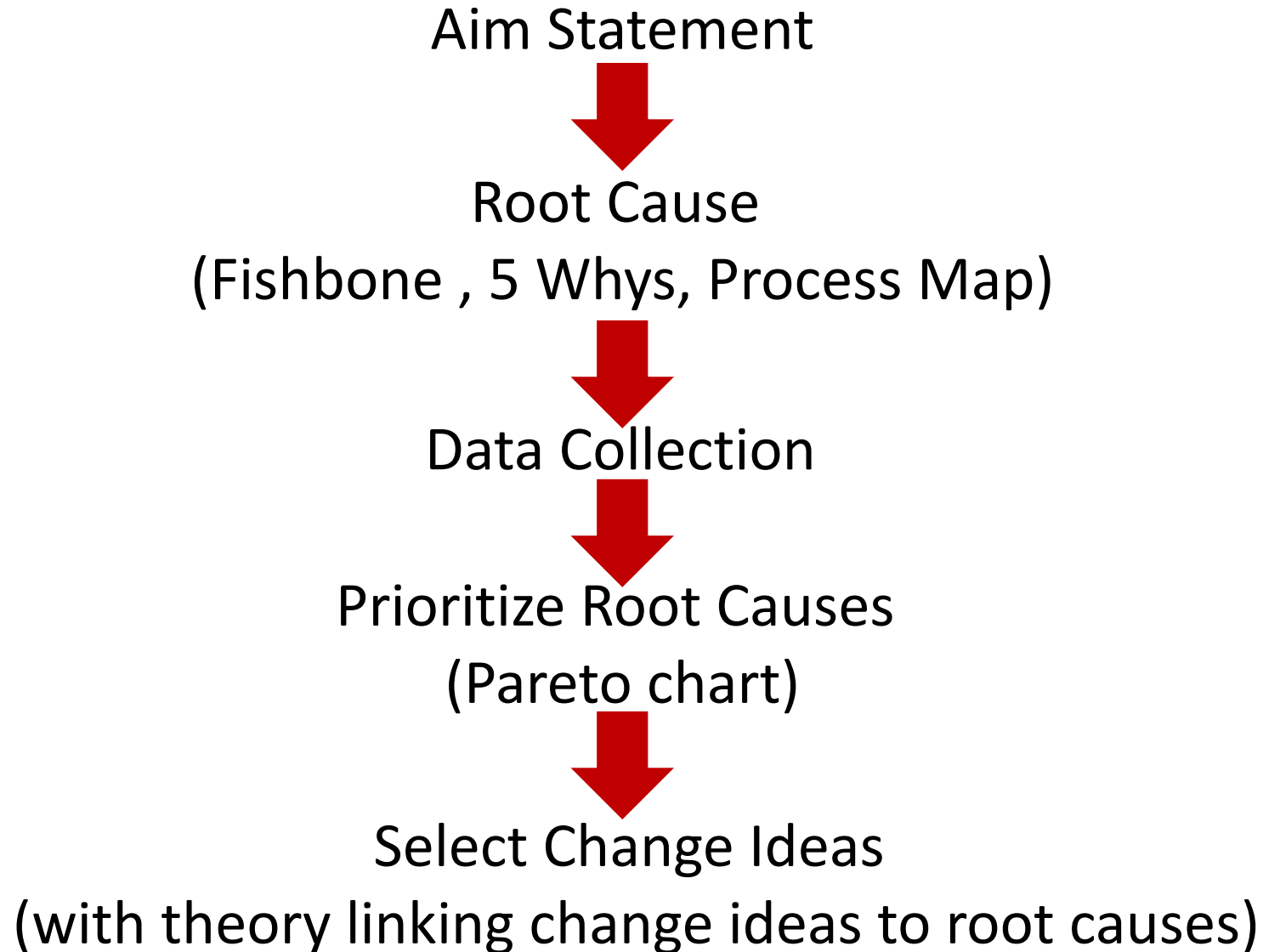
4. Did the change take hold? (fidelity)

- More patient visits in the NP group

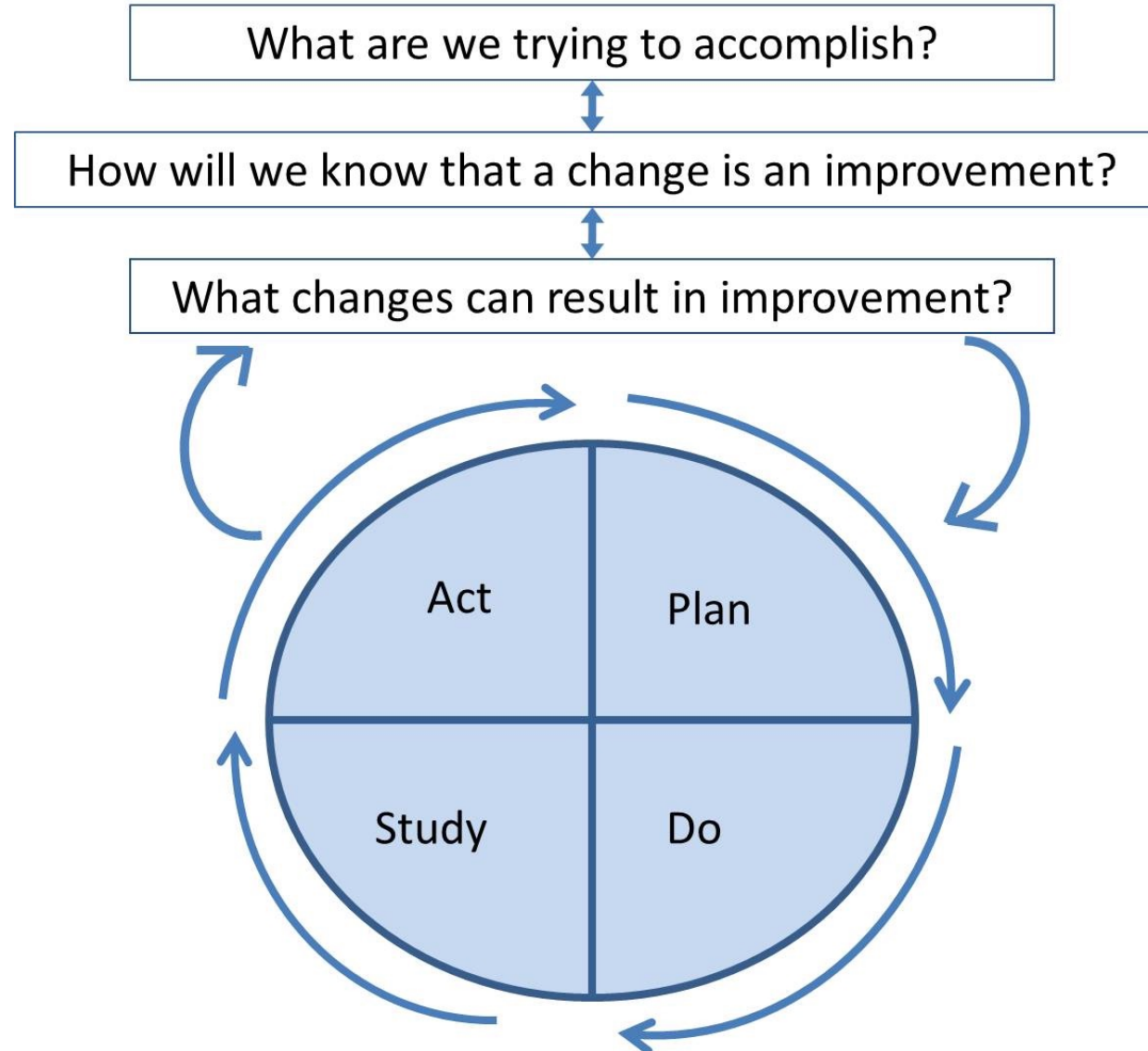
5. Did anything bad happen?

- Patient and staff experiences? Costs?

How Do I Participate in Quality Improvement?



How Do I Participate in Quality Improvement?



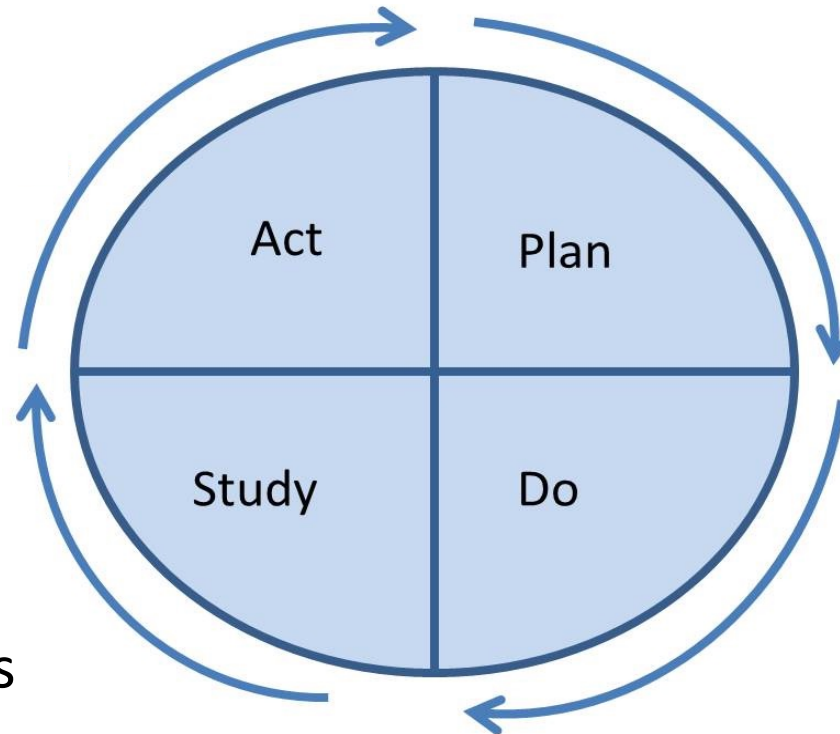
How Do I Participate in Quality Improvement?

- **Outcome measures** → Evaluate the effect of a system on patients
 - Rate of nephrotoxin associated AKI
- **Process measures** → Evaluate system performance and potential changes
 - Rate of nephrotoxin exposure
 - % of patients getting daily serum Cr
- **Balancing measures** → Monitor for unintended consequences of changes to a system
 - All-cause mortality

PDSA Cycles

- Adopt, modify, abandon?
- Plan next change
- Make a new prediction

- How does the data match your prediction?
- How did staff and patients respond to the change?

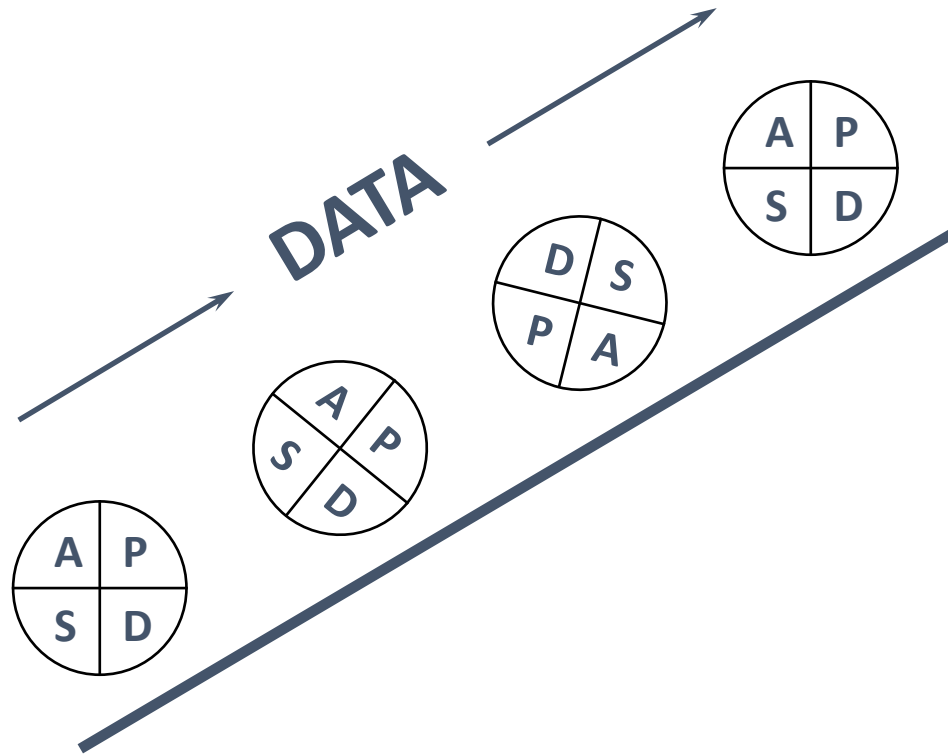


- Aim and measures
- Make a prediction
- Who, what, where, and when
- How long?
- Accountability

- Execute the change
- Record observations
- Collect quantitative and qualitative data

PDSA Cycles

**Hunches
Theories
Ideas**

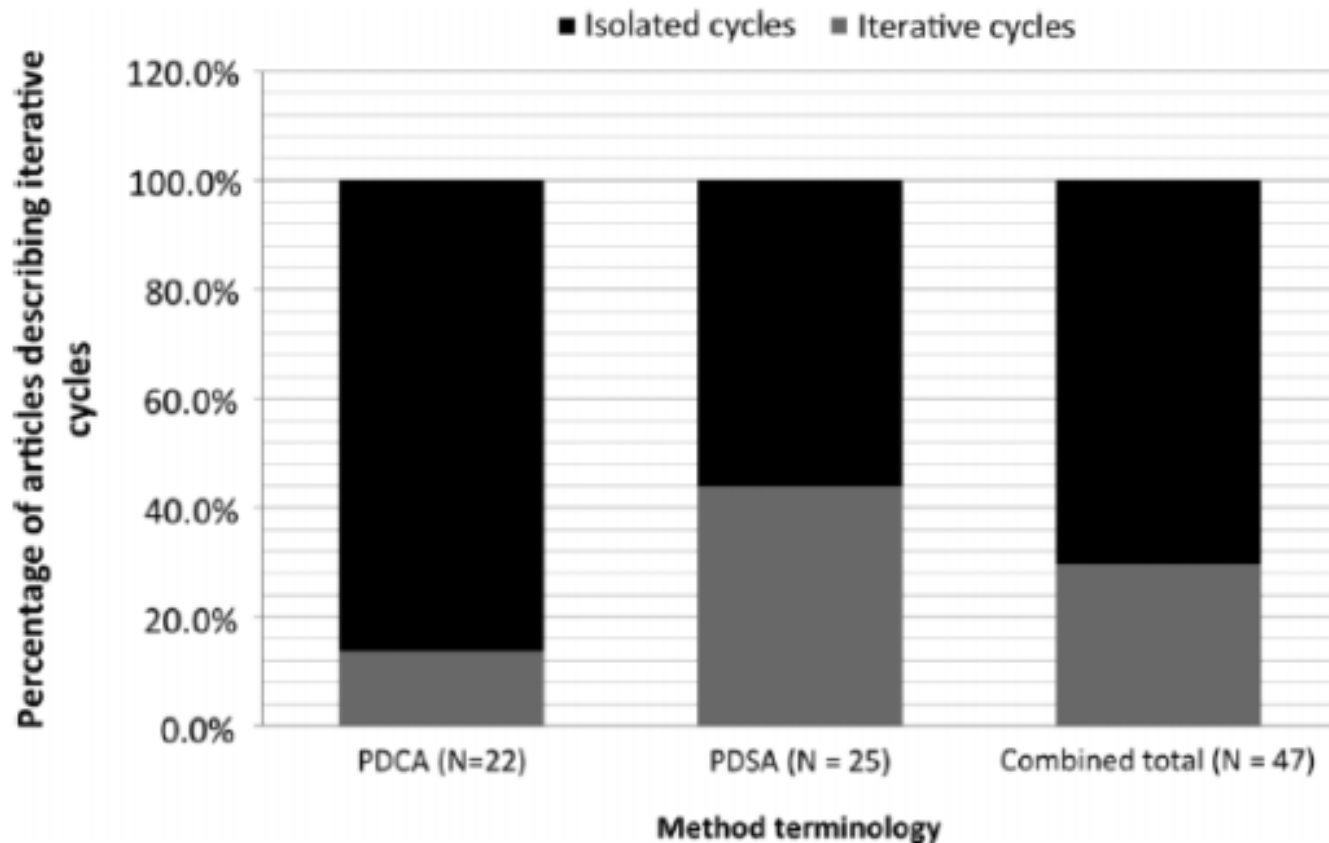


**Changes that
Result in
Improvement**

PDSA Cycles

- The goal is not perfect measurement, but to determine whether your changes have improved the system
 - Timely
 - Reliable
 - Useful to the quality improvement team
- Do not underestimate the time required for data collection to guide improvement efforts

PDSA Cycles



Less than 1 in 5 studies reported data at monthly or more frequent intervals to inform progression of cycles

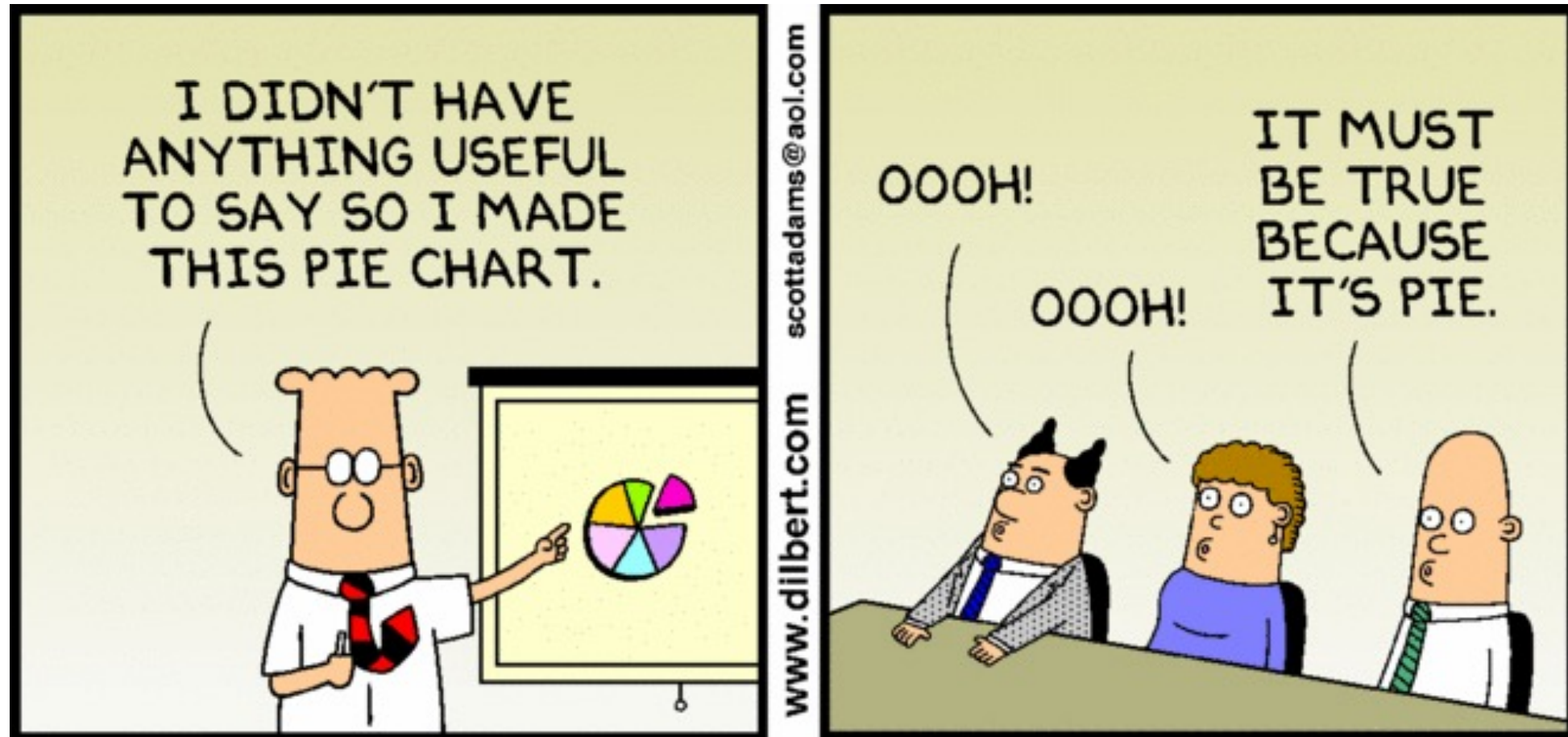
PDSA Cycles

- Small sample size
- Pick willing volunteers
- Simple, non-resource intensive changes
- Prioritize changes that do not require committees/approvals
- Avoid technical slowdowns
- Do not over-measure
- Do not be afraid to abandon an unsuccessful change

PDSA Cycles

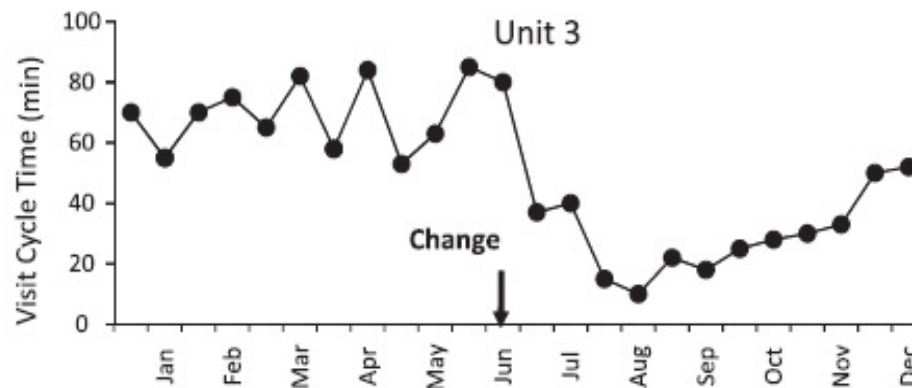
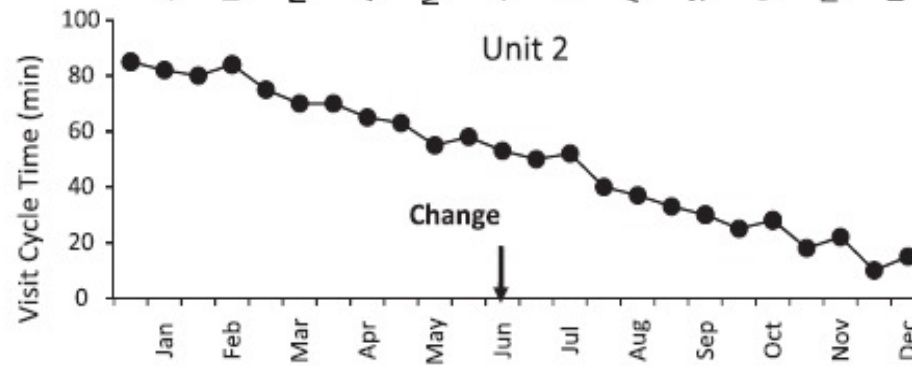
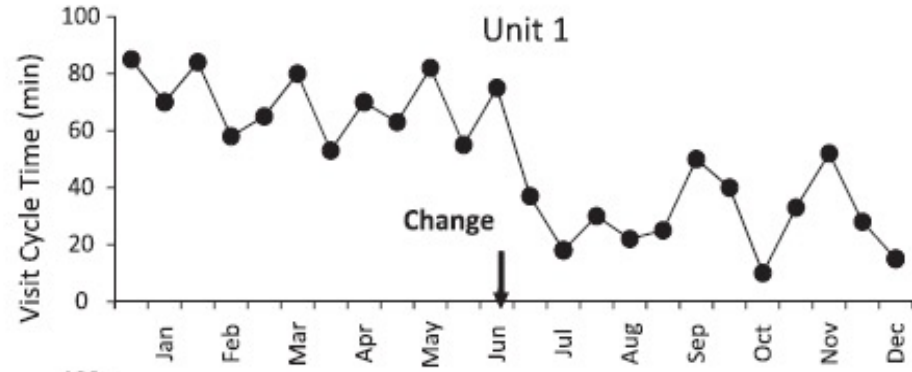
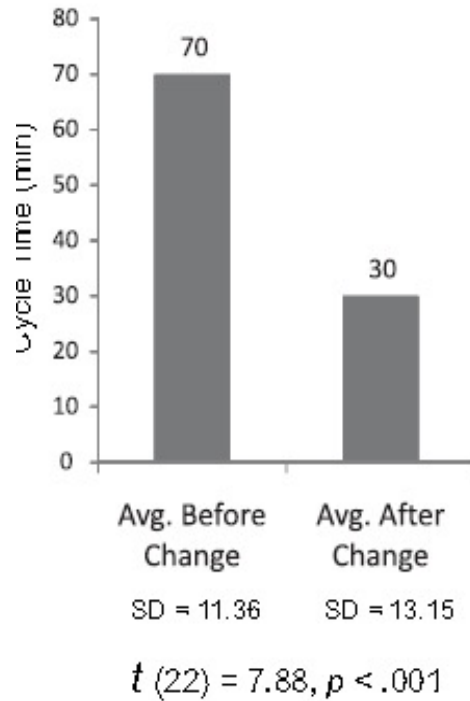
- Determines which of several changes will lead to improvement
- Determines whether changes will work in your local setting
- Increases your belief that changes will result in improvement
- Can be done quickly, with little time or money
- Minimizes resistance when you implement your change

How Do We Know that a Change is an Improvement?



Run Charts

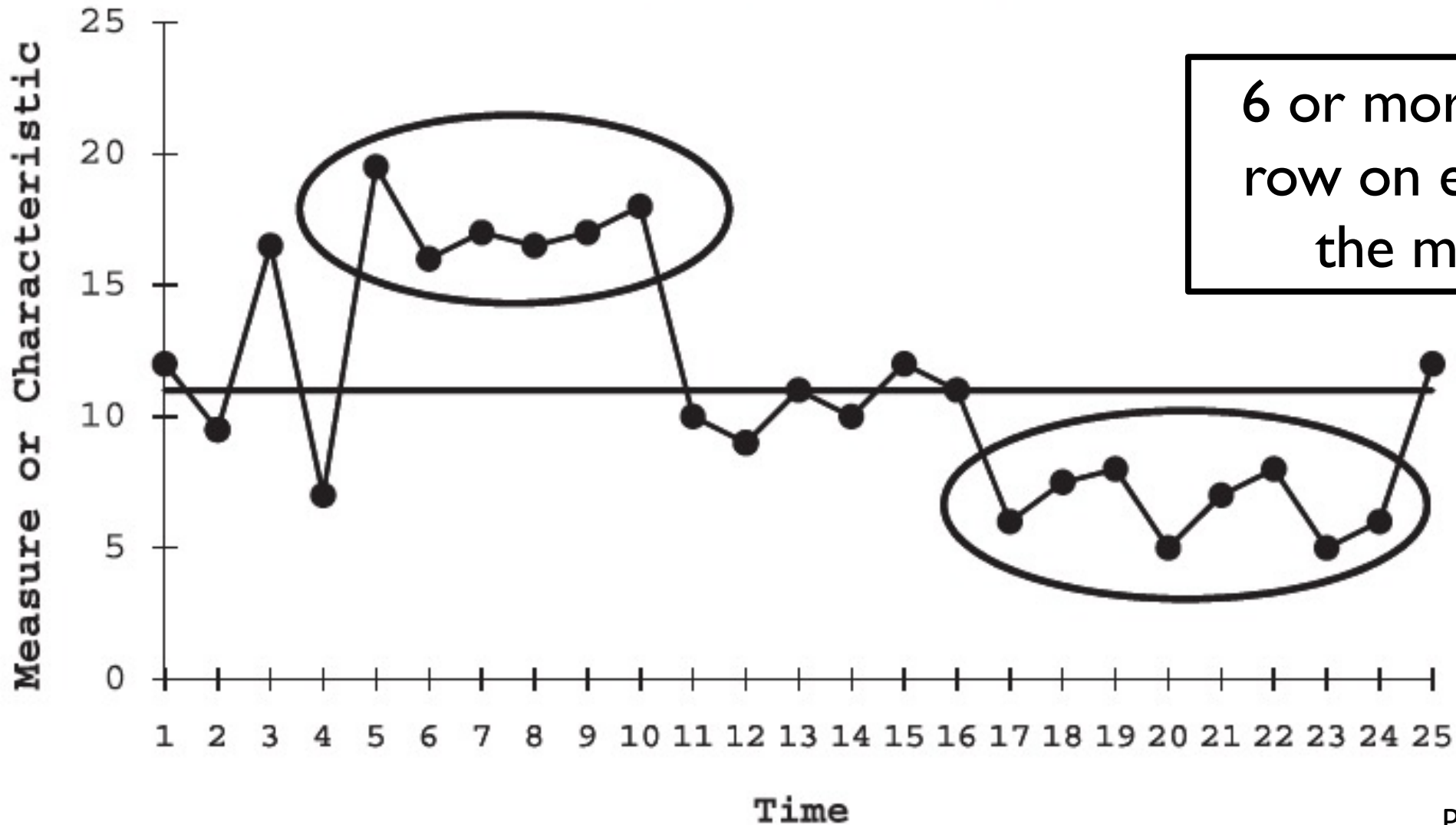
Cycle Time Results for Units 1, 2 and 3



Same bar graph, with 3 different interpretations

Run Charts

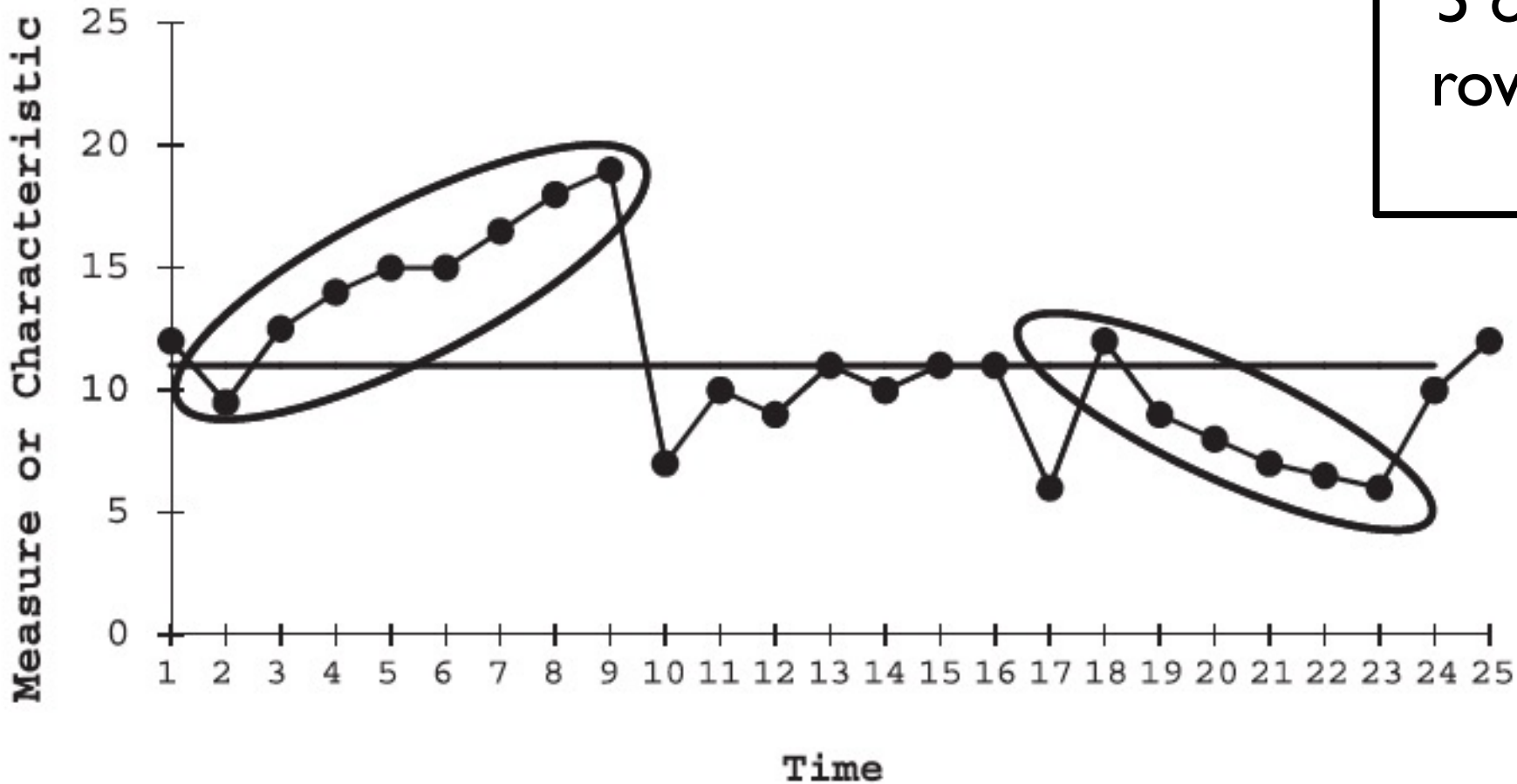
Rule 1: Shift



6 or more points in a row on either side of the median line

Run Charts

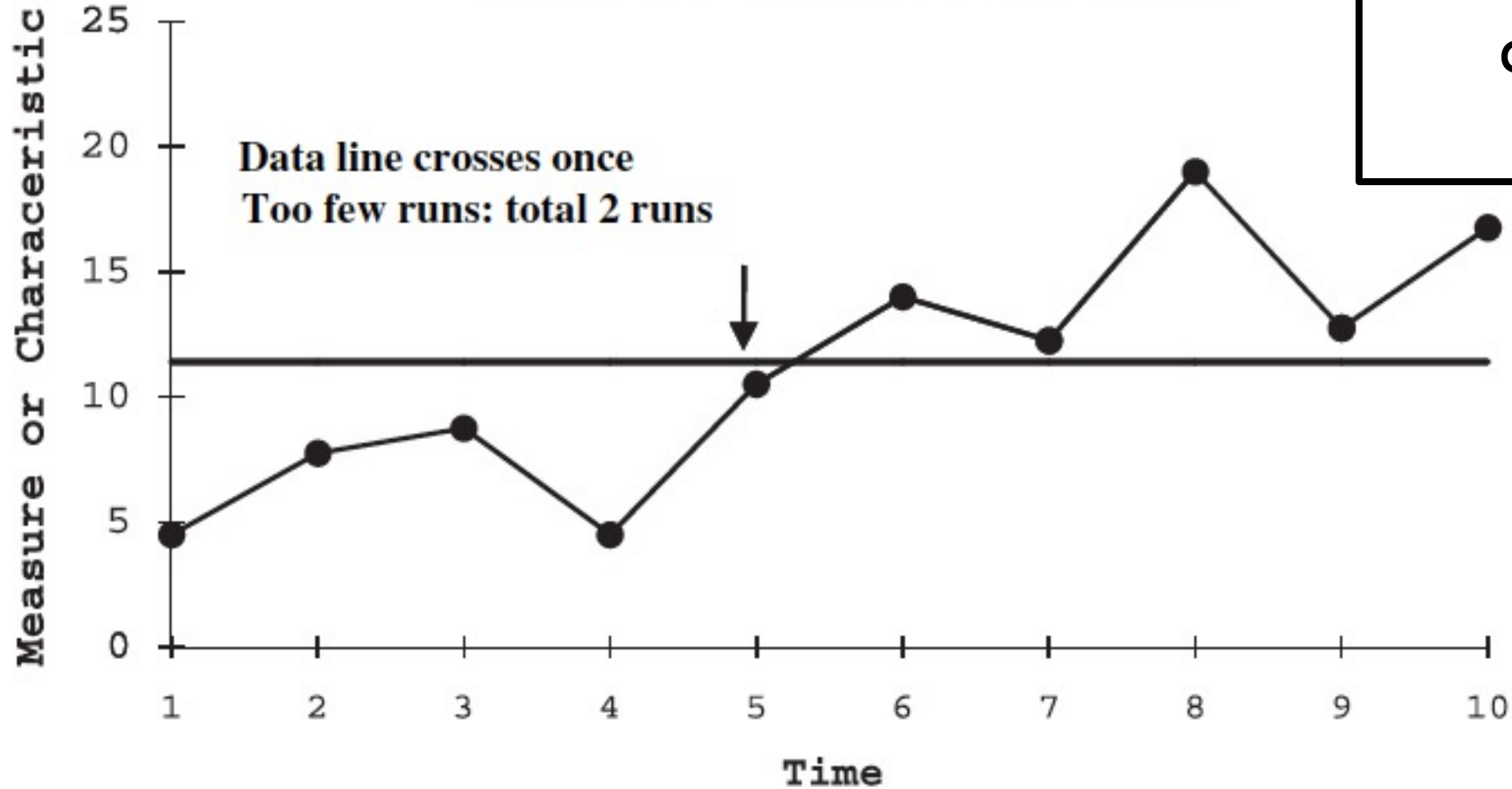
Rule 2: Trend



5 or more points in a row all going up or all going down

Run Charts

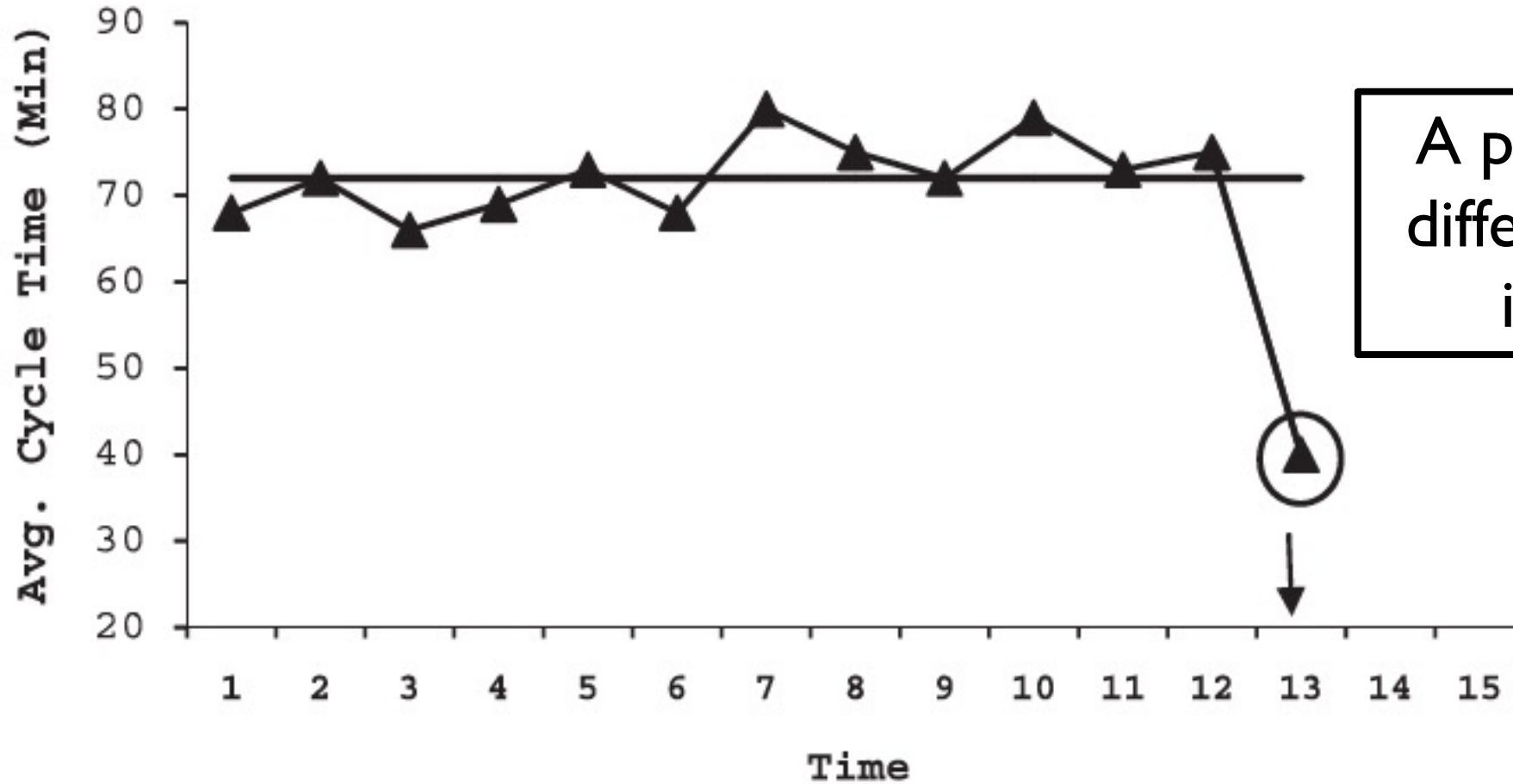
Rule 3: Number of Runs



Too few or too many crossings of the median line

Run Charts

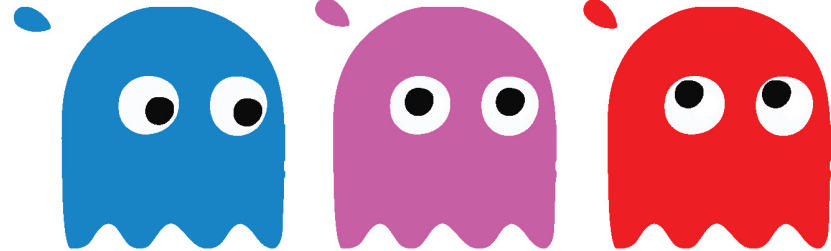
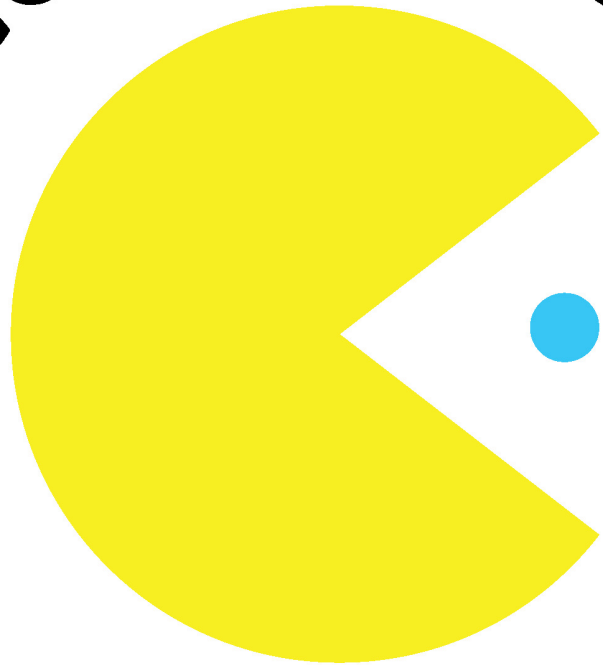
Rule 4: Astronomical Data Point



A point that is clearly different than the rest, i.e., the 'outlier'

How Do I Participate in Quality Improvement?

CULTURE!



Conclusions

- **To recognize the differences and similarities between quality assurance and quality improvement**
 - It's not the measure, but how you use it
- **To illustrate the benefits of quality improvement in nephrology**
 - If done well, should improve patient and staff outcomes
- **To demonstrate how to complete a quality improvement initiative**
 - Choose an aim, select measures, test changes, repeat
 - You cannot change what you do not understand
 - Target the system, not the individual
 - All changes do not lead to improvement, but all improvement requires change

Acknowledgements

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- Paula Blackstien-Hirsch
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- Ed Etchells
- Ziv Harel
- Adeera Levin
- Rory McQuillan

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■ Kidney Research
Scientist Core Education
and National Training Program



Canadian Institutes of Health Research / Instituts de recherche en santé du Canada



Ontario Renal Network



Kingston Health
Sciences Centre

Centre des sciences de
la santé de Kingston



Quality Improvement in Nephrology: What, Why, and How

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