Micromastery in Measuring for Quality Improvement

Workshop at the 15th Clinical Microsystem Festival
Qulturum, Jönköping

Johan Thor, Brant Oliver, Christian von Plessen
When numbers talk

Christian von Plessen
Centre for Quality
When numbers talk

Christian von Plessen
Centre for Quality
“to measure is to know – if you cannot measure it, you cannot improve it”
– Lord Kelvin

“How much by when?”

Offentlig ledelse er en alvorligt syg patient
Af Gitte Redder | @GitteRedder
Torsdag den 24. september 2015, 05:00

Interview: Offentlig ledelse fokuserer for meget på effektivitet, målinger og topprønt. Og for lidt på at udvikle kæden i dialog med medarbejdere. Det mener to forfattere i en udkastet kritisk bog om konkurrencestaven. Den offentlige ledelseskrise er den største siden 1864, siger de.

“In god we trust, all others must bring data”
– W. Edwards Deming

“You cannot fatten a cow by weighing it.”
Fra Skotland
Talk with your neighbor

• What is the difference between a change and an improvement?

• How would you know?
• Micro
Measure and score vital signs

Stabilize critical deterioration

Treat cardiac arrest
Week 18: audit performed, charge nurse on holiday

Week 35: Charge nurse on

% patients with adequate reaction on EWS

Source: Gitte Madsen, North Zealand Hospital
% patients with adequate reaction on EWS

Week 18: audit performed, charge nurse on holiday

Week 35: Charge nurse on holiday

Until week 18: audit performed by quality coordinator

1: Principles of EWS reviewed in team meeting, EWS on white board for all patients
2: Charge nurse AND quality coordinator audit weekly and review a case in team meeting
3: Charge nurse AND quality coordinator audit weekly and review currently admitted cases in team huddles
4: Holiday week 25: EWS reviewed: common language, for nurses and doctors
5: Comments from staff: 'Now I see the meaning of the EWS as a common language, earlier it felt like double documentation.'
6: Repeated review of EWS

Source: Gitte Madsen, North Zealand Hospital
Correct use of EWS
2013-2014
Opdatering af teamseddel

Patienttelegram

Opdatering af tavlen, mødeleder

Daglig registrering

Dato: Registreret af:

Antal i alt i 0633 i dag
Antal med relevant og aktuel indikation i dag
Antal fjernede inden < 72 timer i dag
Antal ptt. med risiko for tryksår i 0633
Antal ptt. med risiko for tryksår revurderet i dag

PVK
KAD
CVK

Tryksår

Sæt en string "1" på "slange" eller "0" hvis der er ingen! Eksempel: "0"-"slange"
Learning steps clinical team

Meet

Measure

©C. Plessen, HIH 2011
C. Plessen, HIH 2011
FIGURE 8.14. BASIC IMPROVEMENT MEASUREMENT PROCESS

Global Aim
The “Big Picture”

Specific Aim
The “Component parts”

Change Idea

Conceptual Definition
“The Measure”

Operational Definition
Specify & Quantify

Measurement Plan
The “How”

Global (Abstract)

Alignment: Aims through Measures

Concrete (Specific)

Source: Adapted for TDIMA by Oliver, 2015.
**MEASUREMENT FUNDAMENTALS: Data Collection Plan Worksheet**

**INSTRUCTIONS:** Draft a data collection plan for the measure that you conceptually and operationally defined.

1. List the Operational Definition of your selected measure here (cut and paste from your Definitions.doc worksheet):

2. Complete the table below to create a basic data collection plan for your measure:

<table>
<thead>
<tr>
<th>WHO? Who will collect and manage the data and how will they be trained? Who will be the data source, i.e. patients, providers, data registry owners?</th>
<th>(insert your text here)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHAT? What data will be collected, i.e. survey, observation, etc.</td>
<td>(insert your text here)</td>
</tr>
<tr>
<td>WHERE? Where will the data be collected, i.e. clinic, etc.</td>
<td>(insert your text here)</td>
</tr>
<tr>
<td>WHEN? When will the data be collected, i.e. dates of pilot test, pre-intervention, and post-intervention data collection, interval of data collection, targeting (purposive) sampling.</td>
<td>(insert your text here)</td>
</tr>
<tr>
<td>HOW? How will the data be collected, how will you ensure fidelity and validity of measurement, how will you deal with missing data, and is your plan feasible to implement in the current system at this time?</td>
<td>(insert your text here)</td>
</tr>
</tbody>
</table>
14. november 2013

Pressure ulcer number

Dage mellem tryksår

Start prototyping

1-28-00

1-14-00

1-11-00

1-7-00

1-3-00

1-9-00

1-5-00

1-1-00

1-24-00

1-21-00

1-18-00

1-15-00

1-12-00

1-8-00

1-4-00

1-1-00

1-0-00
Compliance with pressure ulcer bundle

Dage mellem tryksår

Start prototyping

Pressure ulcer number

14. november 2013
Compliance with pressure ulcer bundle

‘Har ikke set efter’

‘...og så skjær der noget nyt’

Start prototyping

Hvordan ved vi, at en forandring er en forbedring?

Hvad ønsker vi at opnå?

Vilke forandringer iværksættes for at skabe forbedringer?

14. november 2013
Talking about quality: exploring how ‘quality’ is conceptualized in European hospitals and healthcare systems

Sin Wilig, Karina Aase, Christian von Plessen, Susan Burnett, Francisco Nunes, Anne Marie Weggelaar, Boel Anderson-Gare, Johan Calitrop, Naomi Fure and For QUASER-team

Abstract

Background: Conceptualization of quality of care – in terms of what individuals, groups and organizations include in their meaning of quality, is an unexplored research area. It is important to understand how quality is conceptualised as a means to successfully implement improvement efforts and bridge potential disconnect in language about quality between system levels, professions, and clinical services. The aim is therefore to explore and compare conceptualization of quality among national bodies (macro level), senior hospital managers (meso level), and professional groups within clinical micro systems (micro level) in a cross-national study.

Methods: This cross-national multi-level case study combines analysis of national policy documents and regulations at the macro level with semi-structured interviews (363) and non-participant observation (803 hours) of key meetings and shadowing of staff at the meso and micro levels in ten purposively sampled European hospitals (England, the Netherlands, Portugal, Sweden, and Norway). Fieldwork at the meso and micro levels was undertaken over a 12-month period (2011–2012) and different types of micro systems were included (maternity, oncology, orthopaedics, elderly care, intensive care, and geriatrics).

Results: The three quality dimensions clinical micro -effectiveness, patient safety, and patient experience were incorporated in macro level policies in all countries. Senior hospital managers adopted a similar conceptualization, but also included efficiency and costs in their conceptualization of quality. ‘Quality’ in the forms of measuring indicators and performance management were dominant among senior hospital managers (with clinical and non-clinical background). The differential emphasis on the three quality dimensions was strongly linked to professional roles, personal ideas, and beliefs at the micro level. Clinical micro-effectiveness was dominant among physicians (evidence-based approach), while patient experience was dominant among nurses (patient-centered care, enough time to talk with patients). Conceptualization varied between micro systems depending on the type of services provided.

Conclusion: The quality conceptualization differed across system levels (macro-meso-micro), among professional groups (nurses, doctors, managers), and between the studied micro systems in our ten sampled European hospitals. This entails a managerial alignment challenge translating macro level quality definitions into different local contexts.

Keywords: Quality conceptualization, Clinical effectiveness, Patient safety, Patient experience, Multi-level case study, Quality improvement.
Under 5% av alle infektioner?

Under 10 %

Mål

Bedre kvalitet og pasientsikkerhet

Færre sygehusinfektioner

Færre kirurgiske infektioner

Færre sepsis etter abdominalkirurgi

Målinger

Under 5% av alle infektioner

Under 10 %

100 dager mellom alvorlig sepsis
Figure 1 Monthly counts of unwanted events. Horizontal line: upper acceptance limit. Red bars: unacceptable values. Green bars: acceptable values.
<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1</td>
<td>71%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>68%</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>68%</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>73%</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>81%</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>76%</td>
</tr>
</tbody>
</table>
Bruk av målinger i kvalitetsudvikling

• Eksempel og læring fra en sengepost

• Eksempel og læring fra en helseregion

• Checkliste bruk af målinger i kvalitetsutvikling
Checkliste for bruk av målinger

- Forbedringer skapes “ved sengen”
- Data blir først til nyttig viten når fagfolk bruker dem
- Målinger gir mening når sammenhengen mellom prosess og resultat er kjent
- Variasjon i målinger på meso- og makrosystemniveau brukes til læring/koordinering
- Mål og målinger må spille sammen på tværs av systemniveauer
- Kvalitetsmålinger analyseres med statistisk proceskontrol
- Målinger avspeiler en (liten) del av virkeligheten
- ...

Region Syddanmark
CENTER FOR KVALITET
Learning steps clinical/regional teams

Meet

Measure

Neuro
MED AFST, TS, PVK

KIR DAG
KIR

iMprOVE

Neuro
MED AFST, TS, PVK

KIR DAG
KIR

©C. Plessen, HIH 2011
Risikoer ved datadrevet ledelse (Berlinske Business 3.3.13)

1. Ledere/organisationen ikke parat til å handle på data

2. Organisasjonen drukkner i data

3. Overdrevet fokus på nye målinger/glemmer eksisterende viten i organisasjonen

4. Arbeider bare med det som kan måles
Et par anbefalinger fra E. Schein:

• Careful with aims!

• Hire people that have faith in people

• Consider structures, processes AND Relationships
18.000 cm²
FIGURE 8.9. CASCADING MEASURES

FIGURE 8.4. DALLAS ONE CF CENTER VALUE COMPASS

**Population**
Population characteristics related to population eligible for transfer

**Clinical Outcomes**
How well is the mesosystem performing in optimizing Cystic Fibrosis management and outcomes?

**Experience of Care**
What is the transfer experience like for people with Cystic Fibrosis and their families?

**Process Performance**
How well is the mesosystem performing in facilitating the transfer process?

*Source: B. Oliver and J. Becker, for TDIMA and Dallas OneCF Center, 2014.*
### FIGURE 8.5. DUMMY DASHBOARD STRUCTURE

<table>
<thead>
<tr>
<th>Population Measure #1</th>
<th>Population Measure #2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Outcome Measure</td>
<td>Experience Outcome Measure</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Measure #1</td>
<td>Process Measure #2</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: B. Oliver and J. Becker, for TDIMA and Dallas OneCF Center, 2014.*
FIGURE 8.6. DALLAS ONE CF CENTER POPULATED DUMMY DASHBOARD

POPULATION MEASURE #1

CLINICAL OUTCOME MEASURE

EXPERIENCE OUTCOME MEASURE

PROCESS MEASURE #1

PROCESS MEASURE #2

Source: B. Oliver and J. Becker, for TDIMA and Dallas OneCF Center, 2014.
FIGURE 8.7. DALLAS ONE CF CENTER INITIAL DASHBOARD

Cystic Fibrosis Healthcare Quality Improvement
Dallas OneCF Cystic Fibrosis Center: Pediatric to Adult Care Transition

Population and Performance Characteristics

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Patients Referred to Adult Center</td>
<td>-</td>
</tr>
<tr>
<td>% Patients in Follow-up</td>
<td>-</td>
</tr>
</tbody>
</table>

Narrative Summary

- OneCF Center project is focused on the handoff from the pediatric center to the adult center at the point of transfer.
- Goals include improving communication between medical teams and improving follow-up care and overall health following transition to adult care.
- Criteria for beginning transition include being 17 or senior in high school, whichever is later.
- Patients with developmental impairments may benefit from delayed transfer.
- Time of year for transfer will be a joint decision with family but recommended based on post-graduation plans.
- Medical handoff communication tool was created and implemented for use.
- Current focus is on refinement and measure of both process and medical outcomes.

Performance Measures

- **Performance Outcomes for 2014 (Year 3):**
  - 58.8% transferring patients are meeting CFF goals for FEV1, greater than 80%
    - predicted.
  - 41.2% transferring patients are meeting CFF goals for BMI percentile, greater than 50%
  - 70.6% transferring patients are meeting CFF goals for completing 4 visits to the clinic per calendar year.
  - 35.3% transferring patients met criteria for a CF exacerbation at their last pediatric visit.

- **Performance Measures to be implemented:**
  - Patient and Parent Satisfaction Survey will be completed following first adult clinic visit, except for year one which will receive it ASAP.
  - Analysis of BMI and FEV1 patterns for 2 years prior to and following transfer.

Source: B. Oliver and J. Becker, for TDIMA and Dallas OneCF Center, 2014.
FIGURE 8.8: DALLAS ONE CF CENTER SPC DASHBOARD (2016)

Clinical Performance: Average FEV1 by Month (XbarS Chart)

Clinical Performance: %BMI by Month (XbarS Chart)

Process Performance: Percentage of Patients Transferred to Hospital by Quarter (p Chart)

Clinical Performance: Exacerbations by Month for Transferred Patients (p Chart)

Process Performance: % Attending first adult visit within 90 days of last pediatric visit by quarter (p Chart)

Experience of Care: Average Patient Transition Satisfaction Score by Quarter (XmR Chart)

Key: —— special cause variation signal (dashed circle)

Source: B. Oliver, for TDMA and Dallas OneCF Center, 2014.
Micromastery in Measuring for Quality Improvement

Workshop at the 15th Clinical Microsystem Festival
Qulturum, Jönköping

Johan Thor, MD, MPH, PhD
Associate Professor
E-mail: johan.thor@ju.se
The Centrality of Measurement

“Reliable measurement [of quality indicators] is important for the ability to conduct, and evaluate, improvement efforts.”

Generalizable scientific knowledge + Particular context → Measurable performance improvement

Quality measurement is central to improvement.

A Model for Improvement
1. What are we trying to accomplish? (Aim)
2. How will we know if a change is an improvement? (Measurement)
3. What changes can we make that will result in improvement? (Change)
Data to Support Improvement

Patterns that can guide improvement efforts are best revealed by plotting data over time.

Three Dimensions of Quality

Structure

- Buildings, equipment, human resources

Process

- Activities; what we do in health and care

Outcome

- Outcomes of health and care services

Example: Diabetes Care

Structure

Availability of photographic eye examination

Process

Regular eye examination; laser treatment when needed

Outcome

Maintained eye sight; incidence of retinopathy
Measurement and Improvement

• Not all purposes with quality measurement can be satisfied with the same measurements – some purposes are incompatible and need to be addressed separately
Counterproductive mixing

“We are increasingly realizing not only how critical measurement is to the quality improvement we seek but also how counter-productive it can be to mix measurement for accountability or research with measurement for improvement.”

Registries Contain Data On:

- Patient demographics
- Provider organization characteristics
- The Structure of care
- The Process of care (including patient-reported experience measures)
- The Outcomes of care (including patient-reported outcome measures)

http://kvalitetsregister.se/englishpages/orderthebook.2429.html
What is a Quality Registry, Really?

A data base?

A network, or Community of Practice, with dedicated and knowledgeable stakeholders?

Eventually, when Information Systems have reached sufficient functionality, the registry/data base will be less central – it is the networks of dedicated and knowledgeable stakeholders that are needed to measure, analyze and improve healthcare quality!
Variation in Health Care

• Variation can signal that care is not consistently in line with the best available evidence
• Variation can also indicate success in improving care by changing work practices
• Misinterpretation of variation can cause worse quality and higher cost
Walter Shewhart

- Shewhart’s data presentation rules:
  - Data have no meaning apart from their context.
  - Data contain both signal and noise. To be able to extract information, one must separate the signal from the noise within the data.

“What is variation in a system over time?”

Walter A. Shewhart — 1920s, Bell Laboratories

Every process exhibits variation:

- Random cause variation
- Special cause variation

Source: Peter Kammerlind, Qulturum
Registries and Healthcare Improvement

1. **Clinical epidemiology.** National Quality Registries yield new knowledge regarding healthcare methods and health outcomes which can guide changes in clinical practice.

Registries and Healthcare Improvement

1. **Clinical epidemiology.** National Quality Registers yield new knowledge regarding healthcare methods and health outcomes which can guide changes in clinical practice.

2. **Public reporting of providers’ adherence to guidelines and of their patients’ outcomes.** Providers can compare themselves with each other, find guidance on how to increase adherence and evaluate improvement efforts. Patients and other stakeholders can also compare providers and take action accordingly.


Source: [http://www.ucr.uu.se/swedeheart/](http://www.ucr.uu.se/swedeheart/)
Registries and Healthcare Improvement

With POR (the Patient’s Own Registration), patients can record their own condition and monitor its progress and the effects of different treatments. This disease overview is used with the patient’s clinician to identify the best possible treatment. Together, we create better health for each patient. The Swedish Rheumatology Quality Registry: http://srq.nu/
Registries and Healthcare Improvement

1. Clinical epidemiology: National Quality Registers yield new knowledge regarding healthcare methods and health outcomes which can guide changes in clinical practice.

2. Public reporting of providers’ adherence to guidelines and of their patients’ outcomes. Providers can compare themselves with each other, find guidance on how to increase adherence and evaluate improvement efforts. Patients and other stakeholders can also compare providers and take action accordingly.

3. Clinicians and patients use NQR-related data collaboratively to guide the design of care plans for individual patients.
Case: Cardiac Care

- Work with a cardiology team, led by Karl Landergren, MD, from the Kalmar County Council in southeast Sweden
- Set in a leadership development program concerning Value-Based Healthcare
- Drawing on the SWEDHEART registry for cardiac care
- SPC analysis by Mark Splaine, MD, MS
Swedish Web-system for Enhancement and Development of Evidence-based care in Heart disease Evaluated According to Recommended Therapies
Data at Different Levels
(For Same Measure)

30-day mortality for MI patients age < 80, per county of patient according to population register, 2012–2013.

The top funnel plot shows mortality in each unit without taking casemix into account. The bottom funnel plot indicates the difference between observed mortality and predicted mortality according to the patient’s background factors.

SWEDHEART Annual Report 2013, Issued 2014, RIKS-HIA Figure 56, p.36 and Figure 61, p.39
When asked "How does your service perform and how do your patients fare?" Dr. Landergren pointed to the SWEDHEART Quality Index.

The index includes 11 evidence-based actions known to influence patient outcomes where there is significant variation across the country. Each center is assessed for performance on these 11 actions.

<table>
<thead>
<tr>
<th>Quality indicator</th>
<th>0.5 points</th>
<th>1 point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reperfusion in STEMI/LBBB</td>
<td>80%</td>
<td>85%</td>
</tr>
<tr>
<td>Reperfusion in STEMI/LBBB within recommended time</td>
<td>75%</td>
<td>90%</td>
</tr>
<tr>
<td>Coronary angiography in target group in NSTEMI</td>
<td>75%</td>
<td>80%</td>
</tr>
<tr>
<td>P2Y12 blockers in NSTEMI</td>
<td>85%</td>
<td>90%</td>
</tr>
<tr>
<td>ACE inhibitors/ARBs in target group for myocardial infarction</td>
<td>85%</td>
<td>90%</td>
</tr>
<tr>
<td>Proportion with myocardial infarction as principal diagnosis (&lt;80 years) included in RIKS-HIA</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>Proportion of myocardial infarctions &lt;75 years in RIKS-HIA undergoing follow-up (SEPHIA)</td>
<td>75%</td>
<td>90%</td>
</tr>
<tr>
<td>Proportion of smokers who have stopped after 12–14 months</td>
<td>60%</td>
<td>70%</td>
</tr>
<tr>
<td>Proportion who have taken part in physical training programme after 12–14 months</td>
<td>50%</td>
<td>60%</td>
</tr>
<tr>
<td>Proportion with LDL cholesterol &lt;1.8 mmol/L or &gt; 50 reduction after 12–14 months</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Proportion with systolic blood pressure &lt;140 mmHg after 12–14 months</td>
<td>70%</td>
<td>75%</td>
</tr>
</tbody>
</table>
Quality index in 2012 per hospital (with > 10 patients in each target group)

Quality index in 2013 per hospital (with > 10 patients in each target group)

Quality index in 2014 per hospital (with > 10 patients in each target group)

Median 5.0

Median 5.5

Median 6.0

OK; so you perform comparatively well but could still improve. How?
A lot of data....but hard to find the useful information in this format

How do I find and convey the important information in this “ocean” of data?
Kalmar: Time from ECG to PCI

Goal Achieved (61/75) = 81%

Average time is 70 minutes; two patients had significantly long times (>183 minutes).
Goal Achieved (9/32) = 28%

Average time is 126 minutes; one patient had a significantly long time (>321 minutes).
Events per year (total STEMI patient transports): 2012 = 0 (14), 2013 = 3 (20), 2014 = 5 (22)

Note: An event is an ambulance transport of a STEMI patient without ECG
How should clinicians and managers go from this...

...and this...

...to this?
Reflections

• NQRs *can* be used to guide and evaluate local clinical improvement efforts
• Access to data on its own does not automatically lead to healthcare improvement
• NQR data are limited – e.g. some data are only collected once a year – and may need to be complemented by temporary, local measurement
• Improvement efforts require access to current data; sometimes it takes time before data become available locally
The perceived benefit of quality measurement must outweigh the perceived burden.

**Perceived benefit**
- Better health and care
- Support for learning and improvement
- Professional development
- Ability to compare performance
- Valid measures

**Perceived burden**
- Data extraction from the health record
- Duplicate data entry
- Paper questionnaires
- Multiple log-ins
- Data feedback delays
- Inaccessible data that are hard to interpret
Literature


Literature

- Berwick DM. A primer on leading the improvement of systems. BMJ. 1996 Mar 9;312(7031):619-22.
- Batalden PB, Davidoff F. What is “quality improvement” and how can it transform healthcare? Quality and Safety in Health Care. 2007; 16:2-3.
Literature


National Government
Laws and regulation; licensure of health professionals; national guidelines; oversight; Health Technology Assessment

County Councils & Regions
Responsible for most healthcare, provided either directly or via private contractors.

Municipalities
Social services, some home healthcare, elder care, community psychiatry

21 Counties
290 municipalities
In 2016: 96 National Quality Registries (NQRs); 12 NQR candidates; all initiated and led by healthcare professionals.

NQRs cover many areas of healthcare, from common to rare conditions, from nursing and primary to tertiary care.

Examples: Stroke; Ischemic heart disease; Heart failure; most forms of cancer; Bipolar disorder; Eating disorders; End-of-life care; Neurology with MS, Parkinson’s etc; Dementia care; HIV-AIDS; Diabetes Mellitus; Orthopedics; Pediatric care; Renal failure.
Financing and Governance

The Ministry of Health and Welfare (70%); the Swedish Association of Local Authorities and Regions (SALAR) (30%)

Funding is provided according to specified criteria: 400,000 – 7,100,000 annually/registry

Each NQR is governed by a multiprofessional group of national experts, and often patients

The more mature the NQR, the greater the expectations on it and the potential funding
Quality improvement is “the combined and unceasing efforts of everyone — healthcare professionals, patients and their families, researchers, payers, planners and educators — to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development”.
Batalden PB, Davidoff F. What is “quality improvement” and how can it transform healthcare? Quality and Safety in Health Care. 2007; 16:2-3.

Figure 1  Linked aims of improvement.
Anatomy of a Control Chart

Measured value ("x")

Central measure (average)

Calculated* control limits

* Control limits are placed at 3 sigma from the central measure (corresponds to 3 standard deviations)
Some rules for analyzing control charts

**Detecting special cause variation**

- Any point outside of the limits
- 8 points on same side of average line
  - Often called a *shift*
- 6 consecutive increases or decreases (7 points) without going the other way
  - Often called a *trend*

Figure by Mark Splaine, MD, MS
A Model for Improvement

1. What are we trying to accomplish? (Aim)
2. How will we know if a change is an improvement? (Measurement)
3. What changes can we make that will result in improvement? (Change)

Actions When You Understand Variation

<table>
<thead>
<tr>
<th>Process result</th>
<th>Meaning</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process with only common cause variation</td>
<td>Predictable</td>
<td>Not satisfied with average: redesign process to get a better result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduce variation: make the process even more predictable or reliable</td>
</tr>
<tr>
<td>Process with special cause variation</td>
<td>Unpredictable</td>
<td>Identify the cause: If positive, then can it be replicated or standardized. If negative, then cause needs to be eliminated. Target the special causes - to get the process predictable</td>
</tr>
</tbody>
</table>

Figure by Mark Splaine, MD, MS
Case: Pediatric Diabetes

Average HbA1c by Department

Average HbA1c by age 2012-2014

Three Breakthrough Collaboratives with Swediabkids 2011-2016

All centers participated in a collaborative – all improved average HbA1c.

Mean-HbA1c mmol/mol, 2010

Mean-HbA1c mmol/mol, 2016

Nation: 64 mmol/mol

Nation: 58 mmol/mol

Swedish Healthcare

2 § The goal for the healthcare system is good health and care on equal terms for the entire population, given with respect for the equal worth and dignity of The person with the greatest need for healthcare priority.

The Swedish Healthcare Act (1982:763)
Thrombus Aspiration during ST-Segment Elevation Myocardial Infarction

Ole Fröbert, M.D., Ph.D., Bo Lagerqvist, M.D., Ph.D., Göran K. Olvecrona, M.D., Ph.D., Elmira Omerovic, M.D., Ph.D., Thorarinn Gudnason, M.D., Ph.D.

METHODS

We conducted a multicenter, prospective, randomized, controlled, open-label clinical trial, with enrollment of patients from the national comprehensive Swedish Coronary Angiography and Angioplasty Registry (SCAAR) and end points evaluated through national registries. A total of 7244 patients with STEMI undergoing PCI were randomly assigned to manual thrombus aspiration followed by PCI or to PCI only. The primary end point was all-cause mortality at 30 days.

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The Randomized Registry Trial — The Next Disruptive Technology in Clinical Research?

Michael S. Lauer, M.D., and Ralph B. D'Agostino, Sr., Ph.D.
Registry-Based Randomized Clinical Trials

”By including a randomization module in a large inclusive clinical registry with unselected consecutive enrolment, the advantages of a prospective randomized trial can be combined with the strengths of a large-scale all-comers clinical registry. We believe that prospective registry-based randomized clinical trials are a powerful tool for conducting studies efficiently and cost-effectively.”

Etter: Ackoff

Connectedness

Wisdom

Knowledge

Human interaction/intervention

Information

Data

Understanding

Etter: Ackoff

14. november 2013