CLINICAL QUALITY AND PATIENT SAFETY IN CHILD AND ADOLESCENT MENTAL HEALTH

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One may wonder why there is a need to have a chapter on clinical quality and patient safety in child and adolescent mental health. Surely, the very basis of medicine is to provide good clinical care which is safe. Yet, as reported in the landmark 1999 book by the Institute of Medicine, *To Err Is Human*, and later, in *Crossing the Quality Chasm* (Committee on Quality in Healthcare in America, 2001), much harm has unwittingly resulted from health interventions either directly through commission or indirectly by omission (Kohn et al, 2000). The landmark book quoted that up to 98,000 patient deaths in the US were due to medical errors every year, while James (2013) estimated that more than 400,000 premature patient deaths per year in the US were associated with preventable harm. Regardless of the actual figures, it is worth noting that widespread patient harm by medical interventions is an epidemic that must be taken seriously.

No estimates are available of children being harmed or having died as a result of medical errors. However, many anecdotal accounts certainly point to this occurring in children, who form a large proportion of any population. In Singapore, for example, paediatric beds are just over 5% of total hospital beds and at the Institute of Mental Health (IMH), Singapore's only psychiatric hospital, there are 20 out of a total of about 2,000 beds.

In spite of best intentions, harm often results from therapeutic interventions. As Donald Berwick (1996), a paediatrician who helped set up the Institute of Healthcare Improvement in the US loves to quote, "every system is perfectly designed to achieve what it was designed to achieve". Healthcare systems are driven by humans. The physician is the main driver of clinical assessment leading to diagnosis. This is followed by treatment based on that diagnosis, in some situations utilizing special skills led by clinicians, often a physician. These skills can be physical, such as the surgical dexterity needed to excise or correct problematic body parts, or analytic—helping patients understand their problems better and learn effective means of handling them, often the case in mental health—or, in developing a system, understanding the family and therefore helping the family work better, as is the case in child and adolescent mental health. The difficulty lies in the human element—humans are prone to error and errors are inevitable when humans are involved.

One problem is that physicians are trained to be perfectionists and may sometimes see themselves as incapable of error (Perper & Cina, 2005). Healthcare systems, because of the way they evolved, were never designed around this fact. Let us examine the simple matter of medication. Physicians prescribe many drugs; new medications are regularly developed, some have similar-sounding names and yet no attempt has been made to differentiate them. For example, the name clomipramine (used for obsessive compulsive disorder) is similar to chlorpromazine (used for psychosis). If the medication ordering system is not properly designed, mistakes when prescribing can easily occur. Some medications also look alike and patients and pharmacists can easily confuse them.

This chapter is designed to help professionals working in mental health to understand systems and how to improve them. It will introduce ideas about standardizing care and the use of measures to monitor and improve quality. It will also discuss culture of safety and innovation. As the county of Jonkoping in Sweden frequently articulates to its staff, health professionals essentially have two

- Do you have questions?
- Comments?

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Aims of High-Quality Healthcare*

- **Safe**: avoiding injuries to patients from the care that is intended to help them.
- **Effective**: providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit.
- **Patient-centred**: providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.
- **Timely**: reducing waits and sometimes harmful delays for both those who receive and those who give care.
- **Efficient**: avoiding waste, in particular waste of equipment, supplies, ideas, and energy.
- **Equitable**: providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.

*Committee on Quality in Healthcare in America (2001). *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press.

jobs, one is to do the work they are supposed to do, and the other is to improve it. With this mindset deeply ingrained in their staff, Jonkoping has one of the best-run healthcare systems in Sweden and an annual festival celebrating their systems approach to healthcare improvement.

SYSTEMS THINKING

People can foresee the future only when it coincides with their own wishes, and the most grossly obvious facts can be ignored when they are unwelcome.

George Orwell, *London Letter*

A system is a set of interdependent elements interacting to achieve a common result/outcome — a set of things that work together to achieve a goal. Quality is the result of successful work within a system producing a good outcome. It is achieved by individuals working in teams within well designed systems. Managing quality requires planning and should not be accidental. As Edward Deming, a quality expert who helped design manufacturing systems said, "You cannot inspect quality into the product, it is already there," meaning that quality is not something that inspection will produce; it is something that we must purposefully plan for.

Other processes within a particular system may be optimized (e.g., the car or airplane frames are built and assembled perfectly), but if one process fails (e.g., the engine-building process), this can cause the entire system to fail catastrophically. Yet we do not realize that unexpected, preventable adverse events—not due to illnesses—can occur in hospitals as often as 30% of the time (Chapman et al, 2014; Classen et al, 2011). The problem is not human error, which is inevitable; not having systems designed to prevent errors from occurring is the problem.

Another challenge is that we fail to recognize human error and mistakes as a systemic problem, instead we tend to blame the "culprits" for not being careful enough. One way to understand human error is through the science of human factors. According to the World Health Organization (2011), human factors science is a discipline, comprising anatomy, physiology, physics, and

biomechanics, to understand how people work under different conditions. It looks at three interrelated areas: the individual, the task, and the workplace. Human factors science recognizes that humans are inherently fallible and the individual (who may be stressed, fatigued, have inadequate knowledge, etc), while trying to complete the task, interacts with the workplace (environment, culture, people, equipment, etc) and these interactions may drive the human being to commit the error. Relying on the individual to be more careful is simply insufficient to prevent errors. Click **here** to learn more about this.

When we design a system, we need to recognize the importance of human factors. A good system is designed to eliminate or reduce human errors by making it easier to do the right thing and harder to do the wrong thing. For example, if a system allows medications with similar names to be prescribed without some checks, errors can occur easily. Let us go back to the earlier example of clomipramine and chlorpromazine. A well-designed system would warn the prescriber when chlorpromazine is incorrectly used for obsessive compulsive disorder. This additional prompting makes it harder for the prescriber to accidentally prescribe the wrong medication. This type of early warning is called *clinical decision support*. Such support can be in the form of team members who help physicians, such as pharmacists, or automation using information technology. By designing systems around potential mistakes that humans make, errors can be reduced.

Edward Deming also introduced the System of Profound Knowledge in his book *The New Economics,* where he viewed improvement through four lenses. One of the lenses—the "appreciation for the system"—highlights the importance of systems thinking. We shall examine his four lenses in the "improvement" section.

QUALITY AND SAFETY IN MENTAL HEALTH

Improvement begins with I
Arnold H. Glasgow

Medical errors in psychiatry had received relatively little attention until an investigative series published in the *Hartford Courant*, a US newspaper. The articles reported that between 1988 and 1998, 142 deaths had occurred in the US during seclusion and restraint in psychiatric facilities (Weiss et al, 1998). Those reports were greeted by the psychiatry profession with the same scepticism and assertions of inevitability that had characterized the reaction of other medical specialties to initial reports of medical errors (Leape et al, 1993). Medical errors are not limited to adults, they also occur in children but are underreported (Slonim et al, 2003).

Errors can happen anytime during the provision of healthcare and there are many different ways of classifying them, one is to categorize them into diagnostic, treatment, preventive, or other errors (Leape et al, 1993). Usually, errors are not isolated events but the result of ineffective systems, hence it is important to target the root causes and error-proof the systems.

The Swiss Cheese Model (Figure J.8.1) provides a visualization of how an error can occur. The stack of cheese slices represents an organization's safety system, with each slice of cheese denoting a defence layer (for example, policies, staff training, and environment) to prevent the error from passing through and

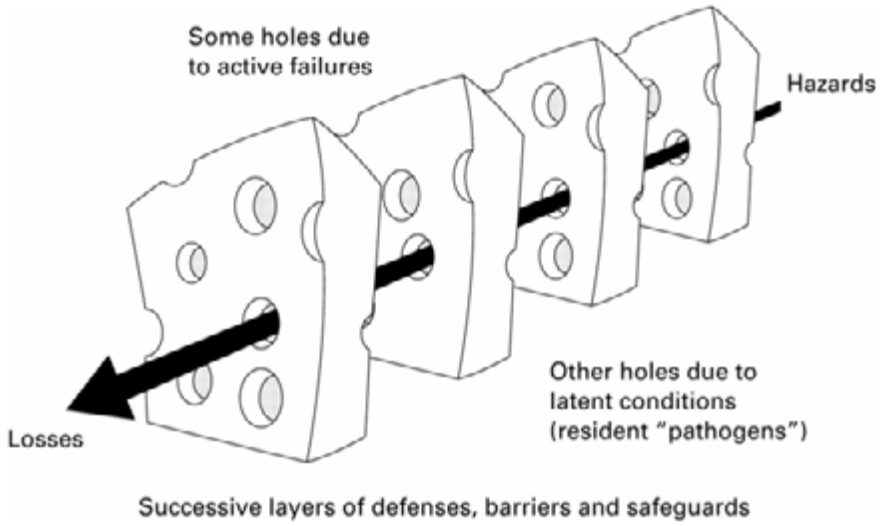
Ignaz Semmelweis
"the Saviour of Mothers"

Semmelweis was a Hungarian physician who worked at the Vienna General Hospital's maternity clinic 1846–1849. There, as elsewhere in European and North American hospitals, puerperal fever, or childbed fever, was rampant, affecting as many as 40% of admitted patients. He was disturbed by these mortality rates, and eventually developed a theory of infection, in which he theorized that decaying matter on the hands of doctors, who had recently conducted autopsies, was brought into contact with the genitals of birth giving women during the medical examinations at the maternity clinic. He proposed a radical hand washing procedure using chlorinated lime.

At the time however, the germ theory of infection had not been developed and Semmelweis' ideas ran contrary to medical beliefs and practices. His ideas were rejected and ridiculed by the Viennese medical establishment. Quite unusually, his contract was not renewed. He died as an outcast in a mental institution. Today, his memory is honoured by the name of the major institution of medical education in Hungary, Semmelweis University.

Wikipedia

Figure J.8.1* The Swiss Cheese Model



*Developed by James Reason; extracted from the Institute of Healthcare Improvement (IHI) Open School Patient Safety 101: From Error to Harm.

resulting in an incident. The holes in each slice represent either existing latent conditions or active failures. When these holes "line up", the error penetrates through all layers of defence, resulting in an undesirable event.

Latent conditions are inadequacies in the processes, systems, or culture of an organization. Possibly widespread across the entire organization, these "pathogens" in the healthcare safety system can be invisible unless we look thoroughly. For example, a gap in a hospital's nurse training leading to nurses being unfamiliar with operating infusion pumps because nurses "should have learnt that during nursing school."

Active failures are the unsafe acts of an individual leading to the incident. The impact of these errors is usually evident. Example: a nurse who sets the wrong pump settings for a patient.

It is important to note that when an error occurs, the conditions which allowed the nurse to commit the error have to be examined. A common response in healthcare is to punish the individual who committed the error. However, humans are inherently fallible and prone to error. In systems thinking, examining the systemic factors which allowed the human to commit this error is more effective at preventing the same error from recurring than punishing the individual who committed the error—especially if another nurse can make the same error. Click **here** if you want to learn more about this.

Root Cause Analysis

A root cause is a cause that once removed from the system prevents the final undesirable event from recurring. This is an internationally used method to identify systemic causes of errors and adverse events. Its use in patient safety incidents and near misses has been mandated by the Joint Commissions, an accreditation body for healthcare institutions originally from the US. Other countries in Europe and Australia have also adopted this methodology. The method is not a fixed risk analysis formula but a general approach to help identify means to deal with the risk identified.

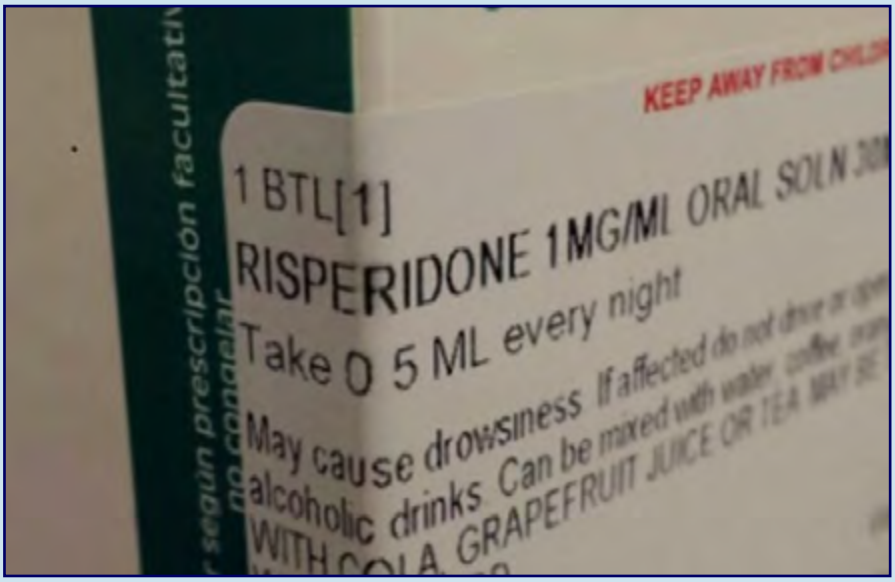
Adverse Events & Root Cause Analysis

An adverse event is an unintended injury or complication that results in temporary or permanent disability or death or increased length of stay in hospital that is caused by healthcare management rather than the disease process itself. In Singapore, a *serious reportable event* is an unexpected occurrence, which may

Dealing with an Error Administering Medication

A 10 year-old patient was prescribed 0.5mL of risperidone but was administered a dose 10 times higher by his caregivers in the step-down care facility. A root cause analysis found that this error had occurred because the first digit of the dosage was partially obscured on the medication label and there was a lack of communication of medication information to the caregivers in the care facility.

This problem could be mitigated by encouraging staff to be "more careful" in the future. However it was chosen to tackle the circumstances that made the error possible by establishing labeling guidelines and providing medication information via a memo or a copy of the prescription to the step-down care facility. In this instance, embracing systems-thinking helped to move beyond "blaming" and "shaming" to a more effective solution that is likely to prevent the recurrence of the same error.



involve death, major permanent loss of function, or major injury associated with treatment, lack of treatment, or delay in treatment of the patient's illness or underlying condition. Adverse events are usually detected through direct reports as the events occur. Every serious reportable event should be assessed using the root cause analysis methodology to identify causes or contributing factors which led to the incident and provide recommendations and solutions to prevent its recurrence. A good root cause analysis focuses on systems-related problems rather than on human error. Click **here** for more information on root cause analysis methodology.

Near-misses are variations that do not affect an outcome but for which a recurrence carries a significant chance of a serious adverse outcome. Near misses are worth measuring because they help identify worrying trends and are learning opportunities to prevent an actual adverse event from occurring.

The international patient safety goals in the *Joint Commission International Accreditation Standards for Hospitals, 6th Edition (2017)* addresses some of the most problematic areas in healthcare (see box in page 7). These goals provide the framework and impetus for hospitals to measure safety in these areas and to make continuous improvements to processes to safeguard the safety of patients.

Near Miss: Mistaking the Heart for the Head

A patient was due to be started on tricyclic antidepressants. Because of the potential for affecting individuals with a heart block, an ECG was ordered prior to start taking the medication. However, the patient was mistakenly sent to the ECT suite.

Had the staff not checked that an ECT had not been ordered—it was an ECG instead—the patient would have undergone a treatment that she did not require, with its potential risks. It was noted that both ECG and ECT were consecutive entries in the order menu; a small misplaced tick could have sent the patient for an entirely different procedure.

Most common Serious Reportable Events in Mental Health Settings

Death or serious disability or injury:

- Associated with a fall
- Associated with an assault
- Contributed to by the use of restraint
- As a result of lack of treatment or delay in treatment
- As a result of suicide or attempted suicide

Mental health services have additional barriers to developing good quality improvement systems due to:

- Stigma
- Mind-body dualism, which makes it hard for quality improvement systems in general hospitals to be applied in a mental health setting as the two systems differ because, in some aspects, medical practice varies from psychiatric practice
- The role of the government in monitoring the work
- Legal and regulatory variations in mental health legislation regulating involuntary treatment
- The fact that multiple sectors are often involved (e.g., social services, criminal justice, education, etc.)
- Different diagnostic systems and separate care-delivery structures
- A more heterogeneous work force, greater solo practice, particularly in private practice settings
- Fewer procedures that can be standardized
- Different financing systems or different market structures
- Less developed quality improvement and performance measures
- Less linkage to information technology and innovations.

Serious Reportable Event:
Fall From a Height

A patient had missed his scheduled medical review and was not rescheduled for another. Two weeks later, he climbed up the partition in the day lounge and jumped over to the visitors' lounge, landing feet first before falling onto his bottom, sustaining multiple fractures.

Instead of blaming the staff for not keeping watch on the patient, the investigation team recommended establishing a process to prioritize the review of patients on a timely basis, including rescheduling the patient if the initial planned review was missed. The gap above the partition and the ceiling was also closed across all wards in the hospital to prevent similar incidents.

Failure Modes and Effects Analysis

While serious reportable event investigations and root cause analysis methodologies are retrospective in nature, the Failure Modes and Effects Analysis is used to prospectively look for potential failures ("failure modes") within newly-conceptualized systems or processes, their associated consequences ("effects"), and the elements which allow the failure to occur ("analysis"). An important feature of this tool is the managing of these elements—hence this tool itself can be thought of as a form of risk management. A Failure Modes & Effects Analysis comprises the following steps (adapted from the *National Healthcare Group Quality Resource Management Department, The Failure Modes & Effects Analysis Handbook, 2018*):

1. Define the focus and scope
2. Assemble a multi-disciplinary team
3. Describe the process and sub-processes
4. Identify the potential failure modes
5. Identify the potential effects

6. Identify the potential causes
7. Identify the current control measures
8. Conduct risk prioritization and criticality analysis
9. Formulate and implement new control measures
10. Conduct post-implementation review
11. Document Failure Modes & Effects Analysis and monitor.

Readers can find more information **here**. Examples of this tool in pediatrics can be found **here**.

Information Technology (IT) System Glitch

In 2018, a glitch with GPConnect – a clinical and administrative system that allows general practitioners to submit patient data to the Singapore National Electronic Health Record, resulted in more than 830 patients receiving wrongly-labelled medicine. One patient was instructed to take 10 bottles of cough mixture each time instead of 10mL, while another was told to take two strips of tablets instead of two tablets. As a result, some general practitioner clinics had to contact affected patients to inform them of the error. The error was caused by a planned system update that had gone wrong. This shows that despite the use of IT in preventing and mitigating errors, errors can still occur.

CULTURE OF SAFETY

Culture eats strategy for breakfast
– Peter Drucker

A nurse heard that a patient wanted to die. She did not tell the doctor who was going to discharge this young man because the doctor had previously scolded her for interrupting his work. Subsequently, the discharged patient committed suicide at home.

In this hypothetical example, the team's culture of safety had a large impact on the nurse's decision to keep quiet. Traditionally, physicians are trained to be leaders of the medical team, while nurses are seen as subordinate to physicians. As such, physicians are deemed more "powerful" compared to nurses. With this in mind, it is easy to understand our fictional doctor's and nurse's actions. As discussed earlier on systems thinking, we can design systems to make it harder for staff to do the wrong thing and easier to do the right thing. However, underpinning all these efforts is culture.

Culture points to a set of shared beliefs, values and goals. In the *Joint Commission International 6th edition (2017) Hospital Standards*, a culture of safety

Figure J.8.2* Culture of Safety Framework

*Adapted from James Reason, *Managing the Risks of Organizational Accidents*

Figure J.8.3* Code of Conduct for Safety. Guiding Principles for Each Sub-Culture

*Adapted from James Reason, *Managing the Risks of Organizational Accidents*

is defined as "a collaborative environment in which skilled clinicians treat each other with respect, leaders drive effective teamwork and promote psychological safety, teams learn from errors and near misses, caregivers are aware of the inherent limitations of human performance in complex systems (stress recognition), and there is a visible process of learning and driving improvement through debriefings." It is a mammoth task to create and sustain a safety culture that embeds all these elements but one way to start is to create a framework and code of conduct for safety to guide staff. An example of a Culture of Safety framework (Figure J.8.2) is adapted from James Reason's (1997) book *Managing the Risks of Organizational Accidents* and comprises five sub-cultures. Examples of desired behaviours are further illustrated in a *code of conduct for safety* (Figure J.8.3) for staff to relate to. The interdependent subcultures are:

1. *Informed*. Risks, hazards and the rationale of policies and procedures are understood by everyone. This translates into knowing why certain things are done in a certain manner and for what purpose.
2. *Just*. A just culture promotes fairness and accountability. This will be discussed in detail later.
3. *Reporting culture*. Near-misses, actual incidents, and unsafe conditions are reported by everyone without fear of reprisals. Data from near-misses are important, as they may indicate a gap within the current system which warrants investigation. For example, an incident reporting information system can be a one-stop portal for reporting.
4. *Flexible*. Everyone is encouraged to be adaptable and seek continuous improvement in their work. Decision-making processes may vary depending on how urgent the decision is and the expertise of the people involved.

5. *Learning culture*. Learning points from incidents and data are shared openly. For example, a quality department tracks and disseminates key incident reporting statistics throughout the hospital.

Speaking Up

A just culture is paramount to building a strong culture of safety. A just culture emphasizes accountability—everyone is held accountable for their actions. Indeed, Sammer et al (2009) conducted a literature review and identified just culture as key for patient safety; those intending to report an incident may avoid doing so if they perceive a potential punitive response or lack of due accountability after their reporting.

In hospitals, "non-punitive response to errors" is often identified as an area that needs improvement. To help address this, these hospitals may use the Incident Decision Tree (Reason, 1997; Figure J.8.4). This decision tree allows investigators to follow a structured track, ensuring that every incident is investigated in a fair, consistent, and unbiased manner. The decision tree helps to reinforce that staff can freely report incidents and, if they are involved in incidents, they will be treated fairly.

Going back to our nurse, what if she had spoken up? Surely this additional layer in the Swiss Cheese Model would have reduced the likelihood of the patient committing suicide at home after discharge. The doctor may rebuke her for speaking up—in which case, according to our incident decision tree, he would be considered to have acted inappropriately and disciplined accordingly. So, why didn't she?

First, let us consider reasons for speaking up (respectfully, of course):

- To stop a medication error
- To explore a process for improvement ("flexible culture"), or
- To clarify the rationale for certain procedures ("informed/learning culture").

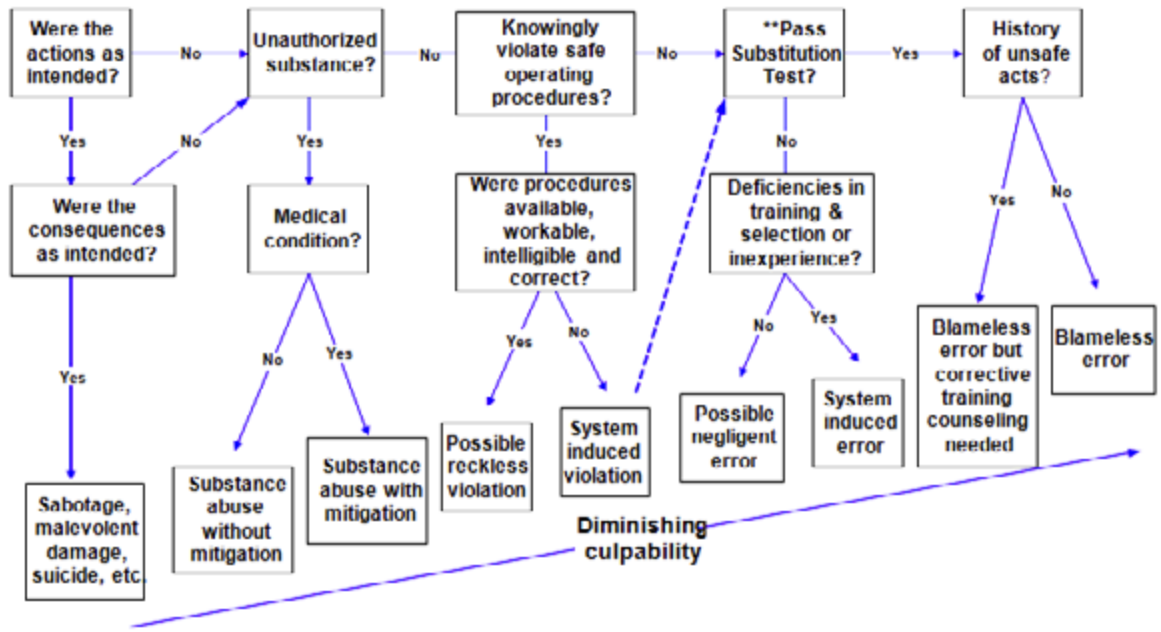
In any case, speaking up benefits the speaker, patients, peers, visitors, and the organization as a whole, and ultimately contributes to a strong culture of safety. Conversely, there are reasons why someone would hold back. For example, Sammer et al's 2009 study found that staff:

- Were afraid of speaking up because it would damage their relationships with others
- Feared negative repercussions after they had spoken up, or
- Felt the hierarchical relationships (for example, between doctors and nurses) impeded speaking up.

To address this, various languages that empower healthcare workers to speak up, so that the team can take a step back before they proceed, were created. They facilitate staff to speak up respectfully without coming across as overbearing. An example used by IMH clinical staff is "**CUS**":

- I'm **C**ONCERNED…"I'm concerned you did not change your gloves…"
- I'm **U**NSURE…"I'm unsure that what you are doing is appropriate hand hygiene…"
- **S**TOP!... "Stop! You really should change your gloves…"

Figure J.8.4* Incident Decision Tree



*Adapted from James Reason, *Managing the Risks of Organizational Accidents*. The decision tree examines the intent of the employee involved, considers if the system contributed to the employee's actions, and ultimately allocates the employee's culpability.

Burnout

Most of us are in the healthcare industry to help others. It is this sense of purpose and passion which drives us to provide the best care for patients. Despite this, 33% of newly registered nurses seek another job within a year (Lucian Leape Institute, 2013), while about half of physicians reported at least one symptom of burnout (Shanafelt et al, 2015). Burnout can be described as three inter-related symptoms: emotional exhaustion, depersonalisation (detached feeling of self), and a reduced sense of accomplishment, which leads to loss of purpose and meaning (Fung, 2018).

Burnout can be attributed to various causes. Stephen's team (Stephen et al, 2018) found that workload, work/life balance, cognitive dissonance, and clerical work contributed to physician burnout, while compassion fatigue, moral distress, and work environment issues contributed to nurse burnout. In addition, courtrooms (which focus on transparency) necessitate physicians' ethical dilemmas to be publicly debated. Since their decisions may be scrutinized, physicians become increasingly defensive in their practice, adding additional stress to their already demanding roles (Fung, 2018). In Singapore's context, healthcare providers face ever-increasing expectations: to promote healthy lifestyles to prevent disease, provide high-value care, and reach out to communities (encapsulated in Singapore's Ministry of Health's Three Beyonds) with an increasingly aging population. Moreover, workplace violence also contributes to burnout – 70% of local hospital staff had experienced physical abuse, and victims may suffer from physical and psychosocial effects including depression and burnout (Tan et al, 2015). Lastly, the stigma associated with mental illness often dissuades healthcare providers

themselves from seeking help due to fear of disclosing what they suffer from (Fung, 2018), further driving them to suffer in silence and eventually burnout (see also Chapter J.12 of the eTextbook).

Burnout has severe consequences. Lower staff engagement (correlated with worse patient experiences), decreased productivity, and an increased incidence of workplace accidents come to mind. In terms of patient care, lower staff engagement has been associated with lower quality of care and patient safety. Burnout itself undermines healthcare providers' empathy – which is crucial to deliver effective person-centred care (Perlo et al, 2017).

Joy In Work

One of the ways to address the burnout epidemic is the "Joy In Work" concept from the Institute of Healthcare Improvement. The concept hinges on the principle of leaders and staff co-creating and co-designing solutions, so everyone achieves their own joy in work (Perlo et al, 2017). It proposes four steps which leaders can undertake to foster and nurture joy together with their workforce:

1. Ask staff, "what matters to you?" Leaders have to first engage staff to find what truly matters to them in their work
2. Identify unique impediments to joy in work in the local context. Leaders have to then identify the processes, issues or circumstances which prevent staff from achieving these areas – the *pebbles in the shoes* (small impediments) and *boulders* (large systemic barriers)
3. Commit to a systems approach to making joy in work a shared responsibility at all levels of the organization. Systems approach means that everyone, from leaders to clerical staff, have a role to play. Here, the designing of solutions together with staff is strongly encouraged. Top-down approaches that neither consider staff's opinions nor involve their participation goes against the very notion of having joy in work.
4. Use improvement science to test approaches to improving joy in work in your organization.

The Institute of Healthcare Improvement's framework for improving "Joy In Work" summarizes nine components where senior leaders, middle managers, and individuals can work together to achieve enjoyment (Perlo et al, 2017). Details of this framework are available **here**. Briefly, the nine components are:

1. *Physical & psychological safety*. Individuals feel physically safe in their workplace. They also feel psychologically safe enough to openly admit mistakes, seek honest feedback, and are provided with support should they be involved in an adverse event
2. *Meaning & purpose*. Individuals know their daily work contributes to the organisation's mission
3. *Choice & autonomy*. Individuals have the flexibility to complete tasks the way they deem best
4. *Recognition & rewards*. Not limited to monetary rewards, leaders recognise colleagues' contribution and celebrate team accomplishments
5. *Participative management*. Leaders take into account inputs and suggestions from colleagues when making decisions

6. *Camaraderie & teamwork*. Leaders create conditions for teams to bond through social cohesion (i.e., team members feel supported, appreciate each other, and feel part of the team)
7. *Real-time measurement*. There are feedback systems in the organisation to monitor improvement efforts
8. *Wellness & resilience*. Individuals are able to "bounce back" after setbacks, stress management, and general well-being
9. *Daily improvement*. Quality improvement methodologies are used to test and implement daily improvement efforts.

IMPROVEMENT

Not all change is improvement but all improvement is change

Anonymous

Deming (2000) introduced the "system of profound knowledge" in his book *The New Economics*, where he viewed improvement through four lenses:

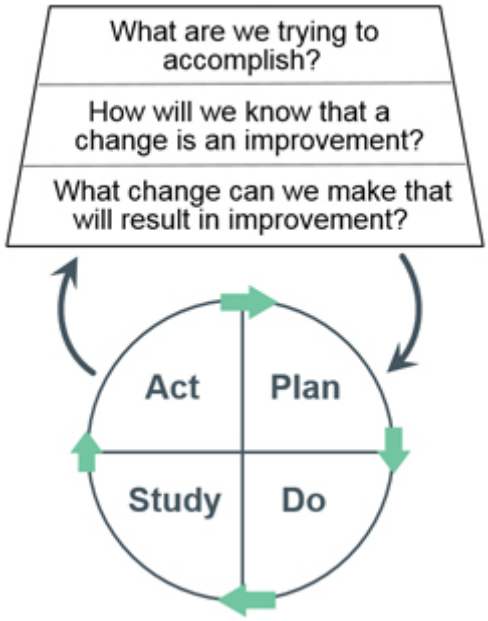
1. Appreciation of the system (discussed in the systems thinking section)
2. Understanding variation (more on this in the variation section)
3. Psychology. Understanding and managing people's motivations, intrinsic and extrinsic needs is key to driving efforts towards a common goal
4. Theory of knowledge. A body of knowledge is formed with lessons from "Plan-Do-Study-Act" (PDSA) cycles. This knowledge allows to predict future tests which involve other theories or hypotheses (more on this in the Plan-Do-Study-Act section).

Deming's lenses allow us to view improvement holistically. All four parts must work together to achieve improvement. For example, a team may schedule family meetings in the morning because it is the most convenient time to get the team together, but it may be very inconvenient for families because of work and school commitments, which may add to family stress. In this example, the team's psychology was addressed (intrinsic motivation for the team as it is convenient for them), but the systemic viewpoint, or wider picture, was neglected.

The model for improvement shown in Figure J.8.5 provides a simple framework for quality improvement (QI) practitioners. It asks improvement leaders:

- What are we trying to accomplish? ("What is the aim or purpose of the project?")
- How will we know that a change is an improvement? ("What measures or indicators need to be measured so we know if there is a change?")
- What change can we make that will result in improvement? ("What interventions can be made to effect the desired improvement?")
- The "Plan-Do-Study-Act" (PDSA) cycle for continuous testing, analysis and refinement follows these questions.

Figure J.8.5* A Model for Improvement.



*Reproduced from *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance, 2nd Edition*. 2009. John Wiley and Sons (Langley et al, 2009), available **here**.

Plan-Do-Study-Act (PDSA) Cycles

To improve healthcare, it is not enough to have good treatments that work—what we often call evidence-based treatments. These treatments should be applicable in the real world in a safe, affordable, accessible, timely, and effective manner. This kind of evidence-based delivery system can be evaluated using improvement methodologies.

One of the basic improvement methodologies is the Plan-Do-Study-Act model (for more information please click **here**). It provides a framework for improvement, allowing teams to test changes on a small scale before implementing them on a larger scale or in other services:

- *Plan*: identifying a problem, why practices need to change to solve the problem, how this is to be achieved, how to implement and measure change and when to start
- *Do*. This is the action phase in which the plan is carried out, data is collected and observations made
- *Study*: analysing the data, comparing it with expectations and summarizing findings
- *Act*. Adapting the changes and implementing them. A new cycle would then start.

In the case example in page 15, the team used the Plan-Do-Study-Act cycle. A flow chart of progress was constructed to identify key gaps. A patient focus group was held to obtain feedback from 15 patients who had witnessed disruptive

PDSA, a quality improvement methodology

- **P**lan the improvement
- **D**o the improvement process
- **S**tudy the results
- **A**ct to hold the gain and continue to improve the process.

Case Example

Johnny is a 10-year-old boy with an aggressive streak. He was admitted to hospital for nine days after staff at the children's home where he was living were unable to contain his angry outbursts. One morning Johnny decided he wanted to leave the ward. He took his bags, walked to the locked door and began kicking, banging and shouting at the door. Ahmad, another inpatient, was annoyed by Johnny's behaviour and punched Johnny in the face.

Over a 21-month period, the child psychiatric ward had reported 206 patient-related incidents. The ward had one of the highest assault rates, five times higher than the rest of the hospital. A clinical practice improvement team was set up to find ways of reducing disruptive behaviours in the ward by 50% within six months. Disruptive behaviour was defined as aggression towards self, others, property, and the environment, which resulted in injury or significant damage to objects. The team hypothesized that a reduction in patients' disruptive behaviour would lead to a reduction in assaults and self-harm (hospital quality indicators).

behaviours. A cause and effect diagram (click **here** to learn more about the cause and effect diagram) and a Pareto diagram were constructed with three root causes identified:

- Inability of patients to regulate their emotions when triggered
- Lack of staff training in managing disruptive patients
- Prolonged hospital stays due to lack of community support.

With the root causes identified, the team brainstormed and piloted various interventions. For the first identified root cause (patients' difficulty regulating their emotions):

- Individualized behavioural modification programs were provided for the disruptive children
- A "cool down corner" was implemented to give patients alternative ways of coping with stressors. This was a special place that promoted de-escalation and regulation of emotions. The room contained items to distract, soothe, and calm patients through sight, sound, and visual aids. The goal was to help patients develop practical skills that could be used in other settings and after being discharged. The use of the room also enabled staff to de-escalate situations without the need to resort to restraint or seclusion. Unlike seclusion rooms, which are often sterile environments devoid of any stimulation, this room offered adaptive activities.

For the second identified root cause, members of the team who had experience in managing disruptive patients shared strategies with the rest of the staff and selected staff members attended external training in this area.

For the third identified root cause, discussions and case conferences were conducted with step-down agencies to understand and address their needs, and training was provided for community partners to upskill them to better manage patients following discharge.

With this multipronged approach, the ward saw an 80% reduction in disruptive behaviour incidents. Beside cost savings, patients, caregivers and staff reported an increase in satisfaction in the hospital stay.

Figure J.8.6 Pareto Diagram is a type of chart whose purpose is to highlight the most important factors that can cause a problem. Individual factors are represented in descending order by bars, and the cumulative total is represented by the line.

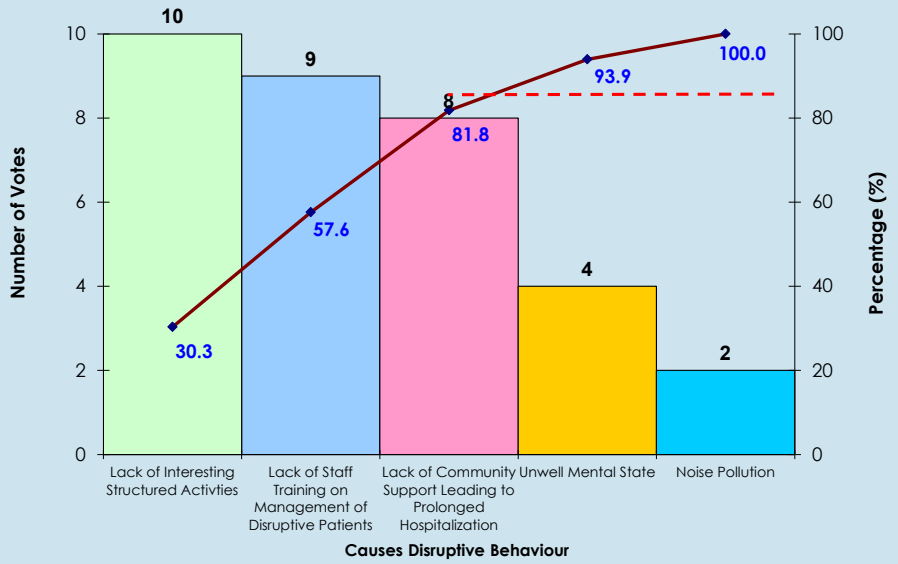
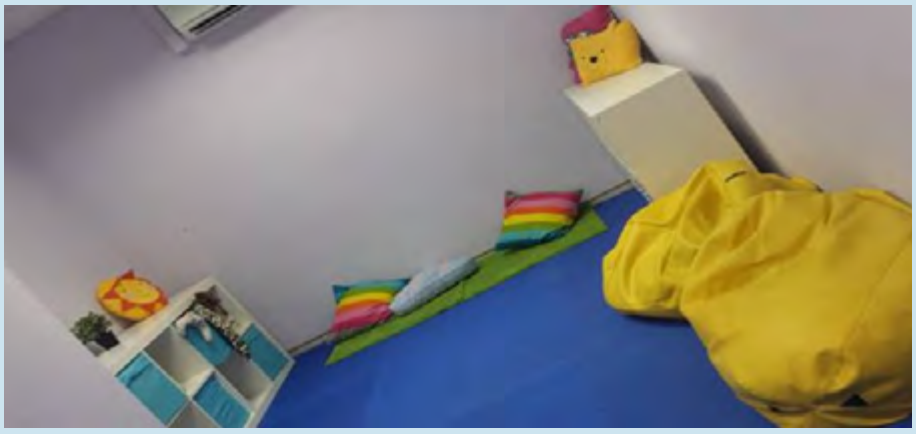


Figure J.8.7 Cool Down Room



Measurement

We must be clear about what we want to accomplish and how we will know that improvement has occurred (meaning that results should be measured). Measurement should be used to learn about the system rather than for reward or punishment. There are three types of measures:

- *Outcome*, which measures the variables the project or system aims to achieve
- *Process*, which measures if certain processes are on track to drive the desired outcome
- *Balance*, which measures if interventions to one part of a system are impacting other parts within the system. Balance measures are useful when employing a system-thinking approach to avoid "patchwork" solutions.

Figure J.8.8 Driver Diagram outlining the strategies used to reduce disruptive behaviour incidences in IMH's child ward. The primary drivers drive the specific aim, while the secondary drivers contribute to the primary drivers. Change ideas are specific interventions which contribute to the secondary drivers.

Aim	Primary Drivers	Secondary Drivers	Tertiary Drivers (Change Ideas)
Reduce disruptive behaviour incidences in child ward	Incident prevention & management	Occupy patients with meaningful activities	Update ward time-table with interesting activities
			Develop individualized behaviour modification plan
			Engage more volunteers to conduct activities
		Train internal staff to manage incidents	Share knowledge and skills within the multi-disciplinary team
			Attend internal and external lectures, workshop & courses
	Patient support	Provide community support to patients	Organize conferences with external partners to discuss discharge plan/date
			Participate in field trips to other welfare organizations
			Train external staff to manage patients

We can make use of a driver diagram to determine which measures to track. Figure J.8.8 depicts a driver diagram, using our case example as reference. It shows the causal links between the aim, primary drivers, secondary drivers and the change ideas. There are various ways this tool can be used. For example, the outcome measure can track the aim, while the process measures can track the primary and secondary drivers. Alternatively, if we were to embark on a smaller-scale QI project which tests one change idea, the aim of that QI project itself could be an outcome measure – whereas the various interventions being tested to drive the aim could be tracked as process measures. For more information on driver diagrams click **here**.

Data

Data is captured in a number of ways. It can be in the form of outputs (such as number of patients seen), or outcomes (such as whether patients are getting better), or in the form of complications (such as medication side effects) or adverse events. Trends can then be examined and compared over time. Comparing (or benchmarking) consists of taking these data and comparing it either with similar data in a different period or with data from other services, locally or internationally.

Data can be a collection of facts and figures that have little utility or, if properly used, can be informative. Let us take the example of the number of patients seen in a clinic. One could use this as output data. A simplistic way of interpreting it would be to assume that seeing more patients would indicate that a team is doing well because it has increased output. But whether patients are getting better is unknown. Therefore, having a set of measures may be useful: have they improved? Are there adverse outcomes?

Employing data as an indicator of performance is starting to be used widely in psychiatry and behavioural health. Some commonly used indicators include the rate of falls, suicides, assaults, choking episodes, adverse events, readmissions to hospital (within a specified time frame, usually 30 days), and mortality per hospital days. Some common indicators and their use can be found at the following websites (click on the name to access):

- The Joint Commission International (JCI). International Library of Measures
- Organization for Economic Co-operation and Development (OECD). OECD Health Statistics
- The Australian Council on Healthcare Standards. Australasian Clinical Indicators Report
- National Health Service (England). Statistics
- Ministry of Health Singapore. Statistics

The following indicators are used in child and adolescent psychiatry services in Singapore:

- Falls
- Assaults
- Episodes of restrain
- Readmissions to hospital
- Average length of stay
- Adverse events
- Bed occupancy rate

Regular and continuous measurement of important indicators specific to psychiatric practice is the best method to obtain accurate data. Data collection can be done in a number of ways. One way is to embed these indicators as part of regular practice. This can be done by including relevant rating scales or forms in everyday practice or using technology to capture data in systems, automating measurement and analysis. A more traditional form of data collection is via audit, to measure outcomes through sampling. Feedback from patients and families is also useful data. In many hospitals, adverse events and near misses are reported and captured. A newer approach to identifying adverse events is through the use of "trigger" tools that are part of auditing electronic medical record systems. Click **here** to view a tool developed by the Institute for Healthcare Improvement.

Once data are regularly measured and monitored, problems worth addressing can be identified. Problems worth solving are those that:

- Occur frequently
- Result in severe adverse outcomes such as death or disability
- Significantly concern staff and patients.

Variation

Moving on to Deming's second lens (understanding variation), continuous improvement in healthcare systems requires measuring and understanding of process variation. Variation is always present in any measurement – it can be

variation from one period to the next, or between different instruments. A key concept in quality improvement is that variation comes from two sources:

- *Common cause variation*. This is the "background noise" that is inherent in the system and cannot be eliminated. It affects all outcomes. For example, the average length of stay of patients discharged from a child psychiatry facility typically exhibits random month-to-month variation, even in the absence of any significant change in system performance or patient profile.
- *Special cause variation*. This is the part of variation that is unusual, and typically not part of the system. For example, in manufacturing this could be related to a defect in raw materials, or equipment breakdown. Special cause variation can represent both process improvement or deterioration. For example, during a period of bed shortage, physicians are compelled to discharge patients sooner, resulting in a decline in length of stay.

A system that has only common cause variation is said to be stable and in control. A system with both common and special cause variation is said to be out of control. However, a system which is out of control is not necessarily a bad thing. This is because in improvement work, when interventions are tested, there are three possible outcomes:

- The intervention does not produce significant change (i.e., system remains stable)
- The intervention produces undesirable change, or
- The intervention produces desirable change.

In order to reduce common cause variation, the process can be examined. For example, establishing clinical guidelines for specific psychiatric conditions may lead to a reduction in variation in length of stay. To better visualize the changes and its associated variations, QI practitioners typically plot control charts to track their measures.

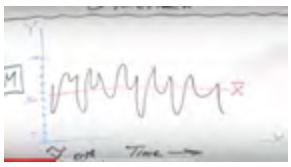
Control Charts

A control chart is a chronological plot of measurements of a variable over time – the most common examples in healthcare include waiting times, medication error rate, number of falls, readmission rates, number of adverse events, length of stay, etc.

Control charts can alert us when a significant shift in the process occurs and when actions need to be taken. This prevents over- or under-reaction to the data. There are many types of control chart, depending on whether the measure is discrete (also called "attribute" data) or continuous (also called "variable" data). They differ in how the standard deviation is estimated. Nevertheless, the same rules apply to all control charts. Interested readers may refer to the texts by Montgomery (2009), Murray & Provost (2011), Ryan (2011), and Woodall et al (2012).

In summary, control charts can yield much insight into the performance of a process, and can tell us if the tested intervention produces a desirable change (i.e., improvement) with minimal mathematical complexity. However, how do we determine the value of interventions?

Click on the image below to go to IHI's video library. Control charts are described in the section "Whiteboard Videos"



Value

Assessing the impact of a new intervention will eventually, regardless of the evaluation method, lead to questions of value—does this new program add value to our services? This often goes beyond mere cost because advances in healthcare tend to be more effective but also more expensive. As a result, health economists usually consider the degree to which society assigns value to a given outcome to justify the added expense.

Unlike cost, which can be derived quite objectively, assigning value is more difficult. Estimating value is largely subjective and various stakeholders may have different opinions, leading to different valuations. An entire branch of health economics is devoted to the concept of value, preferences, and the greater public good.

Dartmouth Medical School developed the idea of a value compass for healthcare (Nelson et al, 1996). This compass is similar to a directional compass that has four points—four aspects of healthcare processes that measure quality:

- North: functional status, risk status, and wellbeing
- South: costs (both direct and indirect)
- East: satisfaction with the care. In children and adolescents, satisfaction may be tempered by what the caregivers and other responsible adults want, and this is usually a balance between the patient, the family and their concerns
- West: clinical outcomes.

These four aspects provide a balanced yet comprehensive measure to monitor quality in healthcare.

Cost Effectiveness

Clinical trials of mental health interventions often prove efficacy without providing information about real world effectiveness. Analysis of cost effectiveness takes into account the cost of the intervention in relation to the clinical benefit. Quality of life in mental disorders is an important aspect, beyond improvement of clinical symptoms. However, most mental health outcome measurement focuses on symptom amelioration with little consideration of its impact on functioning. Measurement of the quality of life is therefore necessary. Additionally, with the rapid advances in modern medicine, most people recognize that no healthcare system in the world is able to commit to every intervention available. Needless to say, governments and policy makers are constantly faced with difficult decisions about the allocation of scarce financial resources. Hence, it makes sense to focus on interventions that will improve individuals' quality of life the most.

Economic evaluation of healthcare interventions is one of the tools that help guide decision making in this challenging environment. The concept of Quality Adjusted Life Years was originally developed to measure effectiveness or improvement for cost effectiveness analysis (Weinstein & Stason, 1977). This approach takes into account both *quantity* and *quality* of life. The former is expressed in terms of life expectancy or, alternatively, whether the individual is dead or alive. The latter embraces the entire spectrum of an individual's life, not only their health status, and consists of a range of components such as an individual's

physical, social, and cognitive wellbeing. Several instruments have been developed to measure Quality Adjusted Life Years in the young such as:

- EuroQol-5-Dimensional-Youth (EQ-5D-Y) (Wille et al, 2010)
- Assessment of Quality of Life (AQoL)-6D (Moodie et al, 2012)
- Child Health Utility 9D (CHU9D) (Stevens, 2012).

Economic evaluations are now well documented in a range of populations and healthcare systems. For example, the use of EuroQol-5-Dimensional-Youth to assess cost effectiveness in mental health conditions such as depression, psychosis, and severe and complex non-psychotic disorders in adults (Subramaniam et al, 2013); the Self-Reporting Questionnaire 20 items in adult community mental health services (Harpham et al, 2003); SF-6D and EQ-5D in a study of adults with schizophrenia (McCrone et al, 2009); Youth Outcome Questionnaire 30.1 (Y-OQ-30.1) in children with ADHD, adjustment disorder, bipolar, post-traumatic stress disorder, and psychotic disorders (Dunn et al, 2005); and EQ-5D for severe dyslexia in children (Hakkaart-van Roijen et al, 2011).

While recognizing the usefulness of economic evaluations in allocating scarce resources, it should be emphasized that such measurements are seldom available for mental health populations, especially in children and adolescents. This is surprising given that more than half of mental disorders start in childhood or adolescence and persist through adult life, affecting individuals' functioning and productivity over the lifespan (Kim-Cohen et al, 2003).

Patient Reported Outcome Measures

Patient reported outcome measures include a vast array of self-reported tools. These measures have not been used consistently in psychiatry because patients may lack insight. As such, an external assessment of an individual's state has conventionally been considered to hold more merit than the individual's self-report. However, greater efforts are being made to expand routinely collected data to include patients' judgements of their own condition.

Patient reported outcome measures have been shown to be more robust predictors of future psychiatric rehospitalisation than more "objective" forms of data (Shadmi et al, 2018). Quality of life scores, as reported by psychiatric patients, self-reported functional ability, and symptom interference have been shown to significantly predict the risk of future psychiatric hospitalization.

Interest in obtaining patients' perspective has extended into various paediatric disciplines (Bevanset al, 2010; Edbrooke-Childs et al, 2017). Children as young as five have been shown to be able to complete accurate reports of their quality of life, when given age appropriate tools (Varni et al, 2007).

QI BY INDIVIDUAL PRACTITIONERS

Individual practitioners can use the above-mentioned QI principles in their daily work. Referring to the IHI Model for Improvement in Figure J.8.5, once a target has been established, individuals must measure their work in order to test interventions using the Plan-Do-Study-Act model. For example, individual clinicians can measure patient outcomes or satisfaction over time to determine if their work or changes in their practice are leading to the desired outcomes.

These activities are increasingly being used in some countries for re-certification purposes.

SPREADING AND SUSTAINING IMPROVEMENT

The success of a QI project will provide the impetus for wider implementation of the changes at other departments or units. Spreading the changes yields greater returns on initial investment and creates a renewed sense of satisfaction and pride when changes are being adopted elsewhere.

There are various components to consider when spreading. The Institute of Healthcare Improvement's Framework for Spread (Figure J.8.9) describes them. In essence, leaders have to ensure that spread efforts are aligned to organizational goals and appropriate "sponsors" identified to drive such improvement.

Once the improvement has been spread, the improvement team should ensure that the improvement is sustained. Unfortunately, teams are often set up to temporarily work on a problem and the initial gains achieved are lost when the team disbands. An improvement process that pays no heed to creating conditions for spreading and sustaining the changes will be unable to hold the gains; sustainability does not happen automatically after the improvement is made. Instead, sustaining improvement requires planning to change the backbone of the process after the project has come to an end. This may involve standardization of processes, documentation of associated policies, procedures and guidelines, measurement and review to ensure changes become incorporated into daily practice, training and education of staff, and sharing of measurement and status of initiatives (National Healthcare Group Quality Resource Management Department, 2017).

Figure J.8.9 IHI's Framework for Spread.

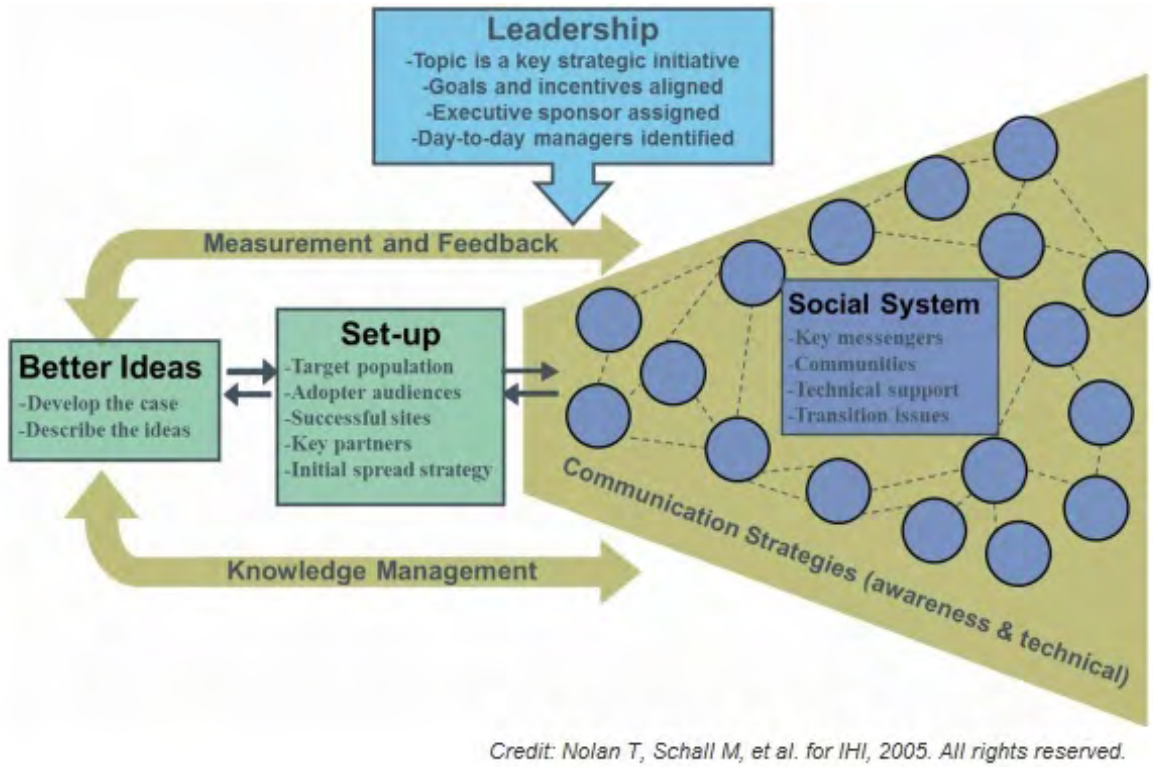


Table J.8.1 In his book *Diffusion of Innovations*, Everett Rogers (2013), wrote that changes are adopted by different individuals at different speeds. He introduced the following categories of "adopters"

Category	Characteristics	Engagement strategy
Innovators	• Risk-takers open to new ideas and concepts or who may themselves be the originators of such ideas and concepts • May not have sufficient influence over the general population to serve as change champions	• Minimal persuasion
Early Adopters	• Not as open as innovators, but are still willing to try out new ideas with a bit of convincing • Possible opinion leaders, useful for propagating change as change champions	• Explain and provide packages to spread new ideas • Minimal data to assure
Early Majority	• Wait for confirmation of the idea's effectiveness from the early adopters • Willingly adopt the idea once they are convinced	• Share successful stories of how the idea helped others • Show evidence of the idea's effectiveness
Late Majority	• Sceptical of new ideas • Tend to stick to the old ways of doing things since they are already "good enough"	• Utilize change champions for peer influence • Show evidence of the idea's effectiveness • Share statistics on how many people have already embraced the idea
Laggards	• Traditionalists who take time to accept new ideas, they will only adopt the new idea when there are no other alternative • Possible opinion leaders, who can shut down ideas quickly	• Utilize change champions for peer influence • Eliminate existing processes to 'force' them to adopt the new idea

INNOVATION

Innovation can be defined as "the intentional introduction and application within a role, group, or organization, of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, or wider society" (West, 1990). This definition encompasses the three key components of innovation: novelty or new idea, an application that can be implemented, and that it is beneficial. In healthcare, the need for innovation is complicated because it needs to be safe and beneficial in ways that are ethically acceptable. Because innovation involves risk, this balance is important. When looking at innovation in healthcare we refer for the most part to biomedical innovation, new treatments and technologies that achieve better outcomes. There is also health systems innovation that targets improvements in efficiency and cost reduction, resulting in better use of resources (Ellner et al, 2015). These innovations are particularly important in creating better value for patients.

One example of innovation is the tele-dermatology service introduced to IMH patients in 2006. This joint collaboration with the National Skin Centre

meant that IMH patients need not travel for their dermatology consultations, instead they are reviewed by dermatologists via webcam in the comfort of their wards. By combining technology and innovation, this managed to bring value to patients and staff alike.

Another example of innovation is RegnaTales—a series of six mobile game applications developed to motivate, engage, and equip children and youths with anger management, problem-solving, and social skills through interactive and gamification elements. RegnaTales was developed based on the Social Problem-Solving Skills Training Program for anger management (Ooi et al, 2015), which follows closely the cognitive-behavioural framework. Through RegnaTales, a much larger population—both clinical and non-clinical—can be reached. More details on the effectiveness of RegnaTales can be found **here**.

CONCLUSIONS

Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skilful execution; it represents the wise choice of many alternatives

William A Osler

Improvement science is new to healthcare largely because healthcare is generally resistant to change. This is the unfortunate effect of the noble tradition of medicine where physicians are taught early that there is a specific way in which to do things that has been handed down for many years. Some of these methods are supported by little evidence. For example, doctors are traditionally taught to take a good history, perform a physical examination and then conduct investigations. With the advent of new technologies, this may not necessarily be the most efficient or cost-effective method, yet few studies have explored this. Quality improvement has moved many industries towards achieving perfection by error-proofing systems rather than relying on flawed human approaches. We are not proposing radical change, without concern for safety, but to study the systems we have today and to improve them.

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