Quality Improvement Hub

NHS SCOTLAND

Framework for developing a measurement plan

This paper lays out what questions regarding data and measurement need to be asked at each of the steps of the improvement journey (shown below).

Context | Culture | Leadership | Context | Culture | Leadership | Context | Culture | Leadership | Context | Culture | Leadership

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Aim and Vision **Discover**	Delve Deeper **Explore**	Innovate **Design**	Finalise **Refine**	Launch **Introduce**	Growth **Spread**	Capture Learning **Close**

Choice - Stop/Pause, Receive permission, engage, mobilise team, GO!

- Identify the Leadership Team
- Define the Problem
- Determine the Scope
- Future State
- Identify the Gaps
- Consider Spread and Sustainability Plan
- Set Up Expert Meeting

- Understand the Background
- Review Aims
- Redefine the Problem
- Identify the Stakeholders
- Project Plan Outline
- Facilitate Expert Meeting
- Consider Measurement Strategy
- Benefits Realisation
- Generate Ideas
- Consider Knowledge Management Requirements

- Create Ideas
- Design Ideal State
- Create Interventions
- Pilot and Test
- Communication Plan
- Change Package Development
- Design Measurement Strategy
- Design Implementation Plan
- Design Collaborative Approach

- Marketing Plan
- Launch Pilots
- Project Plan
- Prototyping Implementation Plan

- Communicate
- Make It Happen
- Refine
- Implementation Plan and Collaborative Approach
- Consider Spread Plan

- Spread Plan
- Roll Out
- Share Learning

- Capture Learning
- Share Learning
- Lessons Learnt
- Publish Outcomes
- Publish Case Studies

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Phase 1 - Discover: aim and vision

Phase 2 - Explore: delve deeper and consider measurement strategy

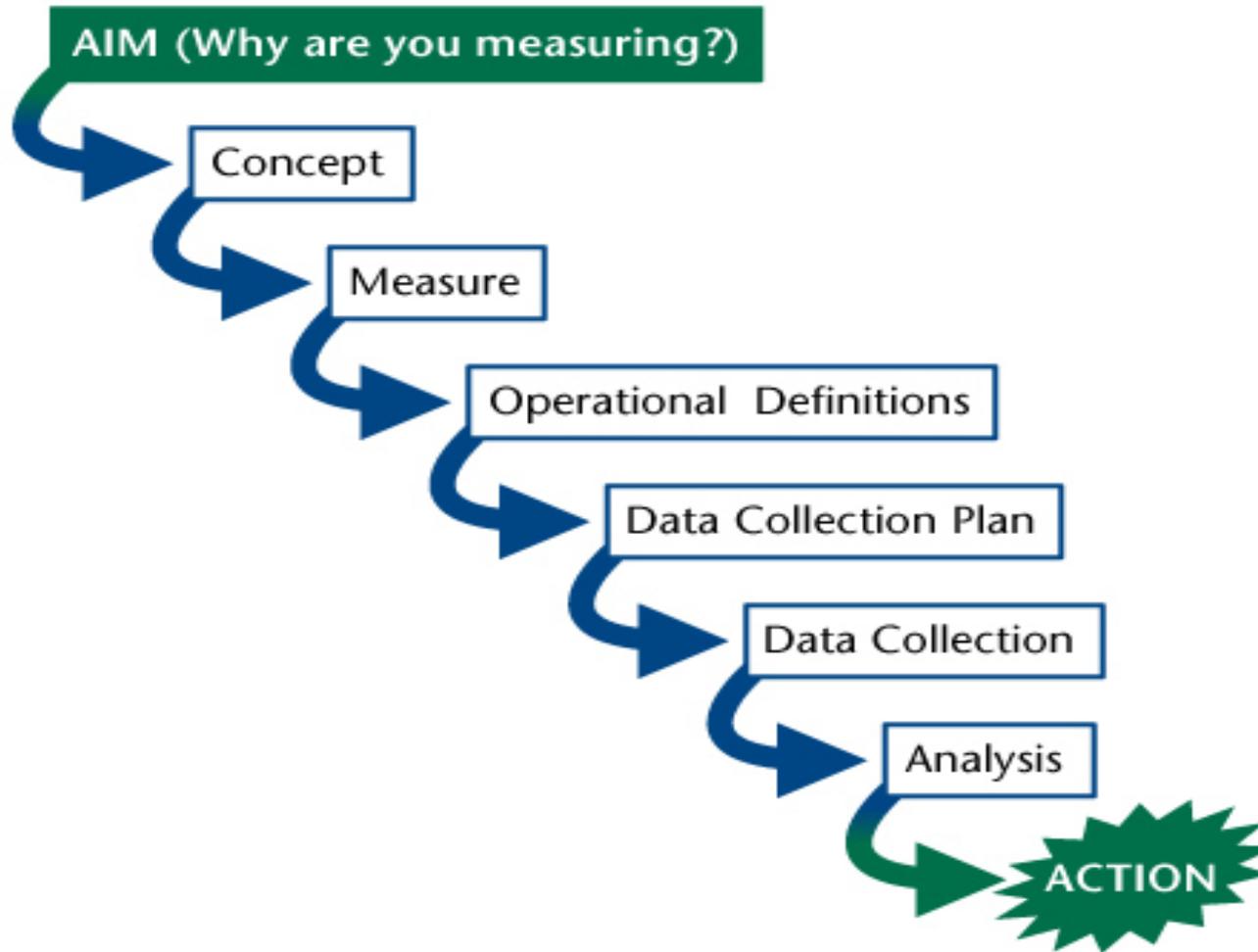**Phase 3 - Design:** design and initial test of measurement plan

Phase 4 - Refine: test further

Phase 5 - Introduce: implement

Phase 6 – Spread: roll out

Phase 7 – Close: capture learning

The approach laid out in this paper is based on Bob Lloyd's measurement journey model:

Source: Lloyd, R. Quality Health Care: a guide to developing and using indicators. Jones & Bartlett Publishers 2004

Phase 1   Discover: aim and vision

The objective at this stage is to:

- **Set an improvement aim**: what do we want to improve? This addresses the question: why are we measuring? This is the first, diagnostic step.

Questions	Reason for asking	Data/ action required
What data already exists from this service?	To understand the context	Discover available data by asking around & mapping info flows
Where are the opportunities for improvement?	To identify where to concentrate efforts	Existing data from service – what does it tell us? [likely partial picture] – Pareto charts are helpful
Can we describe current demand, capacity, activity & backlog in the service?	To understand how efficient and timely the service is	Use Demand, Capacity, Activity and Queuing (DCAQ) tools[1]
Can we describe the current process(es) and results of them?	To determine how good our understanding of systems of care to deliver desired outcomes is	Identify existing performance measures (on relevant processes and outcomes) [may be minimal]
Is the performance of current process(es): • *Stable[2]* • *Predictable* • *Capable (of delivering desired outcome)*	Stable processes only show random variation To improve outcomes we often aim to stabilise or replace an unstable process Reducing variation in a process is often desirable Only if a process is stable is its future performance predictable If a process is stable but not capable, change will be required	-- Data over time to show existing process performance and associated outcomes [this data may be missing]
What is the specific improvement aim?	To provide a purpose for our measurement actions: why are we measuring?	Develop an improvement **aims statement** that is: • specific, measureable, not achievable merely by hard work, realistic, timed; and • includes how much, by when [may need further baseline data collection to understand current performance and set a target, so may need to revisit]

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[1] See http://www.scotland.gov.uk/Publications/2010/05/27100618/0, http://www.scotland.gov.uk/Publications/2010/05/27100646/0 and http://www.qihub.scot.nhs.uk/knowledge-centre/quality-improvement-tools/demand-capacity-activity-and-queue-(dcaq).aspx

[2] For further discussion of types of variation, stability, predictability and capability see http://www.qihub.scot.nhs.uk/knowledge-centre/quality-improvement-tools/statistical-process-control.aspx and The Health Care Data Guide: Provost & Murray: Jossey Bass.

Phase 2   Explore: delve deeper and consider measurement strategy

The objective at this stage is to:

- Describe what aspects of quality (which concepts) we wish to develop measures for.

Questions	Reason for asking	Data/ action required
What aspects of the service do we wish to improve?	Decide what drivers of change we need to work on	Develop **project charter** and **driver diagram**
How have other related services defined quality?	Others may have already developed useful **concepts** which could be borrowed	Literature and database[3] review – how have other similar services demonstrated quality? Allows preparation of 'straw man' **draft list of measures** for discussion (see rows below)
What would better care look like?	Determine which dimensions of quality (person-centred, safe, effective, efficient, timely, equitable) to consider and how quality would be more specifically recognised in the service in question – essential to establish **outcome measures** that will allow us to assess whether there has been improvement	Gather subject matter expertise through clinical/ patient engagement (**stakeholder meeting**) to consider **draft list of measures** (concepts stage) and establish **outcome measures** **It is essential that the team who are improving their processes have ownership of the measures**
What changes do we wish to test?	Determine which processes we plan to test changes in, and therefore which processes we need to develop **process measures** for. Process measures commonly monitor reliability of change adoption (percentages/ rates) or process activity	Gather subject matter expertise through clinical/ patient engagement (**stakeholder meeting**) to consider **draft list of measures** (concepts stage) and establish **process measures**
How do the proposed measures relate to the proposed aim and changes?	To ensure we are measuring the things that will tell us if the changes are improvements	Link measures to changes by adding measures to **driver diagram**

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[3] For example NHS Institute for Improvement & Innovation (England; http://www.institute.nhs.uk/), Institute for Healthcare Improvement (US; http://www.ihi.org), National Quality Measures Clearing House (NQMC at AHRQ database; US) - http://www.qualitymeasures.ahrq.gov/

Phase 3   Design: design and initial test of measurement plan

There are three objectives at this stage:

- Turn the concepts of quality developed in phase 2 into actual **measureables** (counts, values, percentages or rates).

Questions	Reason for asking	Data/ action required
What will we count or measure to be able to demonstrate improvement?	Need to develop each concept into something we can count or measure, either as a: • number of events (or value e.g. blood glucose concentration) • percentage of all possible events • rate of events per number of some population at risk of the event Do not underestimate how challenging this, often overlooked, step can be and build time to have the necessary discussions into your project plan.	Develop each concept into a measureable. See Appendix 3 for some examples Need subject matter expertise to determine what sorts of events are in fact countable, or which continuous variables are measureable – hold **stakeholder meeting**
Do we have a balanced family of measures including: • *process measures* • *outcome measures* • *balancing measures*	More than one measure will be needed but too many risks diluting ability to collect. Concentrate on the vital few but include several process measures, at least one outcome measure and a balancing measure (which will show whether the change is resulting in an unintended consequence elsewhere in the system). Subject matter expertise is often essential to understand what unintended consequences there might be	Prepare **list of measures** (measureables stage)

- Develop **operational definitions** for each measure (for each measure a clear and unambiguous description, in quantifiable terms, of what to measure and the steps to measure it consistently).

Questions	Reason for asking	Data/ action required
What method of measurement and what equipment will be required to collect data on this measure?	Need to understand how we will measure – do we need special tools or equipment?	Assessment of what tools are needed (if any – more detailed work as part of following (data collection plan) phase)

How will we recognise the (un)desired event?	For consistency in data collection need to have shared understanding of:
	
	• what criteria need to be satisfied for inclusion; and
	
	• what criteria would result in exclusion for both:
	
	  • numerator - (un)desired events; and
	
	  • denominator - all possible events (%) or population at risk (rate)
		Prepare draft **definitions statements** for each measure and consult on these with subject-matter experts
		
		(use existing national definitions whenever possible to minimise confusion)
		
		Complete **measure plan form** for each measure (see appendix 1)

- Develop a **data collection plan (Appendix 4)**

Questions	Reason for asking	Data/ action required
Who will collect data?	Someone needs to do it, and they need to know it's them (or when it's them)	Appoint (a) data collector(s). Good if it's the people who are actually delivering the care but recognise the opportunity costs
What data will they collect?	Need clarity on what is needed (operational definitions need to be available and understood)	Operational definitions to be agreed and accessible
Where will they collect the data?	Need to know where in process data will be gathered and in which locations	Agree location for data collection. Good if can be integrated into daily routine of delivering care.
When will they collect the data?	Need to agree frequency of data collection. This depends on process throughput and cycle time. In general there needs to be enough data to reduce random variation but frequent enough time points to be able to assess quickly whether changes are in fact improvements	Agree frequency of data collection
How will the data be recorded?	Sometimes existing information systems can be adapted. Don't wait for this to pilot measurement - paper and pencil are very	Agree where data will be recorded

Is there an existing source? (be specific)	powerful tools at early stages.	
Will we count every event or take a sample?	For improvement we only need limited (just-enough) data so frequent sampling is often useful	Need to agree a sampling methodology (if appropriate) Judgement sampling sometimes sufficient but random sampling sometimes required
Are there obvious stratifiers?	Sometimes it's useful to separate (stratify) the data into mutually exclusive categories, to discover patterns obscured by aggregation For example you may wish to separate the data by diagnostic group if care processes for them differ. Or, for example, by shift (day v night), ward, season, day of week (week v weekend) if you already know there are differences caused by this.	Need to use subject matter expertise to consider these and other possible stratifiers
Have we clearly documented the rationale for measures and how we plan to collect data?	Shared understanding of how measures were developed and how data collection connects to the aims	Complete **measure plan form** for each measure (Appendix 1) and **measurement plan summary** (Appendix 2)
What analytical and data presentation tools do we plan to use?	Need to understand how the data will be analysed and presented so we can see if changes are improvements. What statistics (e.g. median, mean, range, standard deviation) and graphical tools: histogram, Pareto chart, line graph (run chart, control chart) will we use?	Select appropriate analytical tools and charts for each indicator: • Descriptive (enumerative) statistics –line and column charts • Analytical (predictive) statistics – run and control charts
Who will do analyses and create charts	Someone needs to do it, and they need to know it's them. Is it same person for both analysis and chart creation?	Secure necessary analytical support to process and present data that is meaningful to the improvement effort
Who (or which group) will receive and review the results? *How often will they receive and review them?*	Important that someone is reviewing outputs and able to take action on them	Identify who should receive outputs and how often
Have we tested the data collection plan?	How easy is it to actually fit the data collection in? Do the operational definitions make enough sense to those collecting data?	PDSA of data collection: what do we predict are going to be the challenges? How do those predictions compare with actual experience?

Sample timeline of phases and time periods to complete each phase

	0-30 days	31-60 days	61-90 days	91-120 days	121-150 days	151-180 days	181-210 days
Discover: aim and vision							
• Catalogue existing data							
• Identify opportunities for improvement							
• Assessment of process							
• Set **improvement aim**							
Explore: delve deeper and consider measurement strategy							
• Develop **project charter**							
• Develop **driver diagram**							
• Develop **draft list of measures** (concepts stage– outcomes, process, balancing)							
• Hold **expert meeting** to consider list of measure concepts							

	0-30 days	31-60 days	61-90 days	91-120 days	121-150 days	151-180 days	181-210 days
Design: design and initial test of measurement plan		▓	▓				
• **Stakeholder meeting** – concept to measureable		░	░				
• Prepare **list of measures** (measureables stage - outcomes, process, balancing)		░	░				
• Prepare draft **definitions statements** for each measure & consult with subject-matter experts		░	░				
• Complete **measure plan form** for each measure			░				
• Develop **data collection plan**		░	░				
• Complete **measurement plan summary**			░				
• Test **data collection plan**			░				
Refine, introduce, spread				▓	▓	▓	▓
• Consider what modifications are required to initial measurement plan (**measure plan**; **data collection** & **measurement summary forms**)				░	░	░	░
• Collect data (as you test, implement & spread) for each measure				░	░	░	░
• Analyse data				░	░	░	░
• Present and review data				░	░	░	░

Phase 4   Refine: test further

There are two objectives at this stage:

- Consider what refinements are required to the initial measurement plan to support testing the (process or service) change (to see if it's an improvement).

    Key questions are:

    1. What did we learn from testing the data collection process?

    2. What do we need to do differently? You may wish to refine measures and measurement based on experience from initial testing. However consider when it is appropriate to stop refining data definitions and collection plans. If we change definitions this will impair our ability to monitor performance of the same indicator over time.

- Collect data from the test site(s), analyse it and present it for review so it can drive action.

    Key questions are:

    1. What's the best way to present the data?

        i.   The presentation method should be summarised on the measure plan form – and this should include which run and control charts (as appropriate) to think about using

        ii. For further guidance on visual display of quantitative data see a companion paper from the NHS Scotland Quality Improvement Hub – "*Making the numbers meaningful for quality improvement: Visual display of quantitative data*"

    2. What does the data tell us? Can we see improvement in the test site(s)?

    3. Is improvement sustained over time in the test site(s)?

Phase 5   Introduce: implement

There are two objectives at this stage:

- Consider if the measurement plan used in the testing phase needs refined in order to support implementation of the change/ improvement.

    Key questions are:

    1. Is there anything we need to do differently? You may wish to refine measures and measurement for implementation based on experience from testing. However beware of continuing to refine data definitions and collection plans. If we change definitions this will impair our ability to monitor performance of the same indicator over time.

    2. Can the measurement be mainstreamed? Can the data be obtained as a by-product of a (clinical) process? Is the method of measurement sustainable? Manual processes for measurement may not be.

- Collect data from implementation site(s), analyse and present for review so it can drive action.

    Key questions are:

    1. Do those who need to act on the data understand the presentation methods?

    2. Does the data show improvement in the implementation site(s)?

    3. Is improvement sustained over time in the implementation site(s?)

Phase 6   Spread: roll out

There are two objectives at this stage:

- Consider if modifications are required to the measurement plan to support spread of the change/improvement to new areas.

    Key questions are:

    1. How much adaptation should be allowed for use in different areas? There will be a trade off of ownership/ applicability to local situations versus comparability among teams and over time, and ability to aggregate data from different sites.

    2. Can the measurement be mainstreamed? Can the data be obtained as a by-product of a (clinical) process? Is the method of measurement sustainable? Manual processes for measurement may not be.

    3. What management scorecards/ dashboards are in place? Which indicators need to be carried across from testing and implementation into spread across the system?

- Collect data, analyse it and present it for review so it can drive action.

    Key questions are:

    1. Does the data show improvement in the new areas as the change is spread?

    2. Is improvement sustained in the existing areas?

    3. What's the best way to present for review by further teams?

Phase 7   Close: capture learning

There are two objectives at this stage:

- Establish what modifications are required to the measurement plan as the change/improvement is embedded into routine practice across a site/ organisation.

    Key questions are:

    1. What prevents the 'mainstreaming' of the measurement approach across (an) organisation(s)? Is data available from routine data capture? What mechanisms and IT investment are required?

    2. What management scorecards/ dashboards need to be put in place?

    3. Which indicators need to be carried across to ongoing monitoring to ensure the change has stuck? Not all measures in place for quality improvement will be suitable for quality assurance/ scrutiny/ performance monitoring.

    4. What differences in frequency of data collection are contemplated as quality improvement activities shift to quality assurance and monitoring of sustained improvement? It is likely that you will want to maintain monitoring to make sure that a change sticks/improvement is sustained but you need to be alive to the opportunity cost of data collection at the expense of care delivery.

- Collect data, analyse it and present it for review so we can continue to confirm that the change/ improvement has been sustained across multiple locations.

    Key question is:

    1. Does data show sustained improvement as the change is embedded?

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Measure plan form (for each measure)

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Measure name	
Type	___ Outcome ___ Process ___ Balancing
Why is this measure needed in our project?	
Operational definition*	
Exclusions	
Useful stratifiers	
Data collection and sampling method	(summary of data collection plan, or refer to it)
Display: how?	
Baseline data available?	
Goal or target	
Source	

* Describe the specific components of this measure, plus numerator/denominator if a % or rate. If an average, define the calculation. If a score (e.g. patient satisfaction), define the scoring system. If conceptual (e.g. 'accurate', 'complete', 'timely'), define the criteria to be satisfied to determine how criteria are met.

Adapted from form produced by Institute of Healthcare Improvement

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Measurement Plan Summary form (one row for each measure)

Measure Name	Identifier	Operational Definition	Data Collection Guidance
Example: Percent contaminated blood cultures Observational	BCO1	1. Determine the numerator: the number of contaminated blood culture sets taken 2. Determine the denominator: the total number of blood culture sets taken 3. Calculate the percentage of blood cultures contaminated by dividing the numerator by the denominator and then multiplying this figure by 100	The sample should consist of only patients with a blood culture taken. A sample of 5 patient observations can be reviewed in one day or 20 per week at the early testing stage of compliance with the checklist. The frequency of measurement can be reduced to 5 per week or 20 per month once the process has been tested and implemented. When measuring monthly, if the sample size will be less than 5 per week or 20 per month, then review all patients with a blood culture taken at the time of the data capture. The monthly sampling approach is to select a random day each week to capture the data. This will ensure that the sample captures practice from all staff working within that area. (summary of data collection plan, or refer to it)

Adapted from form produced by Institute of Healthcare Improvement and used in their Improvement Advisor Professional Development Course

Appendix 3: from concept to measureable – examples

Further examples on pp 69-71 of **Lloyd, R. Quality Health Care: a guide to developing and using indicators. Jones & Bartlett Publishers 2004**

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Data Collection Plan form (for each measure)

Who will collect data?	
What data will they collect? Are these data <u>attributes</u> (yes/no, categories) or <u>variables</u>? (measured numerical data)	
Where will they collect the data?	
When will they collect the data? (frequency (daily, weekly, monthly) and if part of existing process at what step)	
How will the data be recorded? Is there an existing source? (be specific)	
Will we count every event or take a sample? *If sampling how will we choose the sample?*	
What are the stratifiers? (if any)	
What analytical tools do we plan to use?	
How will data be presented? – types of tables and charts	
Who will do the analyses and create the charts? (Same person?)	
Who will receive the results? How often will they receive them?	

(Based on p103-p107 of Lloyd, R. Quality Health Care: a guide to developing and using indicators. Jones & Bartlett 2004)

Guidance notes for data collection plan form

Questions	What to consider
Who will collect data?	Someone needs to do it, and they need to know it's them (or when it's them)
	Good if it's the people who are actually delivering the care but recognise the opportunity costs
What data will they collect?	Need clarity on what is needed (**operational definitions** need to be available and understood)
Are these data <u>attributes</u> (yes/no, categories) or <u>variables</u>? (measured numerical data)	
Where will they collect the data?	Need to know where in process data will be gathered and in which locations
When will they collect the data?	Need to agree frequency of data collection. This depends on process throughput and cycle time. In general there needs to be enough data to reduce random variation but frequent enough time points to be able to assess quickly whether changes are in fact improvements
How will the data be recorded?	Sometimes existing information systems can be adapted. Don't wait for this to pilot measurement - paper and pencil are very powerful tools at early stages.
Is there an existing source?	
Will we count every event or take a sample? If sampling how will we choose the sample?	For improvement we only need limited (just-enough) data so frequent sampling is often useful
	Need to agree a sampling methodology (if appropriate)
	Judgement sampling sometimes sufficient but random sampling sometimes required
Are there obvious stratifiers?	Stratifiers are subdivisions of data that reflect known differences in the process (for example by diagnostic group, day v night shift, week-day care and weekend care?)
	Use subject matter expertise to identify known differences in processes of care.
What analytical tools do we plan to use?	Need to understand how the data will be analysed and presented so we can see if changes are improvements.
	What statistics (e.g. median, mean, range, standard deviation) will we use?
How will data be presented? – type of chart or table	What tables and graphical tools: histogram, Pareto chart, line graph (run chart, control chart) will be used
	• Descriptive (enumerative) statistics –line and column charts
	• Analytical (predictive) statistics – run and control charts
Who will do analyses and create charts?	Someone needs to do it, and they need to know it's them. Is it same person for both analysis and chart creation?
Who (or which group) will receive and review the results?	Important that someone is reviewing outputs and able to take action on them
How often?	