NHS
Institute for Innovation and Improvement

Improvement Leaders' Guide

Measurement for improvement

Process and systems thinking

Improvement Leaders' Guides

The ideas and advice in these Improvement Leaders' Guides will provide a foundation for all your improvement work:

- Improvement knowledge and skills
- Managing the human dimensions of change
- Building and nurturing an improvement culture
- Working with groups
- Evaluating improvement
- Leading improvement

These Improvement Leaders' Guides will give you the basic tools and techniques:

- Involving patients and carers
- Process mapping, analysis and redesign
- **Measurement for improvement**
- Matching capacity and demand

These Improvement Leaders' Guides build on the basic tools and techniques:

- Working in systems
- Redesigning roles
- Improving flow

You will find all these Improvement Leaders' Guides at www.institute.nhs.uk/improvementguides

Every single person is enabled, encouraged and capable to work with others to improve their part of the service

Discipline of Improvement in Health and Social Care

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1. Introduction

You are about to set off on your journey of improvement. You have agreed your overall aims and objectives and an outline plan. You have contacted key stakeholders and got their support. You may have produced your first process map, talked to users and carers and are beginning to really understand the whole patient's journey www.institute.nhs.uk/improvementguides

Before you do anything else, just take some time to imagine yourself at the end of your journey:

- along that journey, you will have made many changes, some which worked and some that didn't!
- how will you know which are the important ones?
- how will you know that the changes you have made have resulted in an improved service?

If you did not collect the right information to measure progress, you will not have the evidence to back up your gut feeling that things have got better. So how do you go about collecting the evidence to demonstrate the impact you've had? How can you impress colleagues with graphical representations of improvement?

The first step is to measure whatever can be measured easily. This is OK as far as it goes. The second step is to disregard that which can't easily be measured or to give it an arbitrary quantitative value. This is artificial and misleading. The third step is to presume that what can't be measured easily really isn't important. This is blindness. The fourth step is to say that what can't easily be measured really doesn't exist. This is suicide.

Charles Handy

Remember:
All improvements involve a change, but not all changes are improvements
Goldratt

2. Measurement for improvement

Measurement can be used in several ways:

Measurement for judgement: where measures are used to judge us against performance targets, other Trusts, etc. Improvement is not about judgement, however, you can use measures to judge and manage your own progress

Measurement for diagnosis: where data is gathered to understand the process, to see if there is a problem and how big it is. This is a useful technique, especially early in your work, for example, to really understand the demand and capacity at a bottleneck in the process

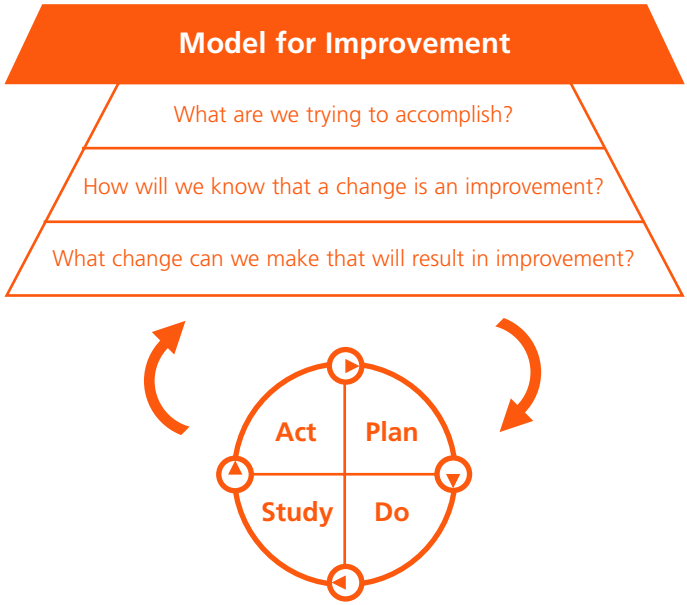
Measurement for improvement: where a few specific measures, linked to the your objectives and aims, demonstrate whether the changes are making improvements

Measurement for sustainability: to ensure the changes and the improved outcomes are maintained and are part of everyday practice. These are long term measures linked to organisational aims

Measurement for spread: specific measures to demonstrate the extent to which learning and change principles for improvement have been adopted

The basis of measurement for improvement falls naturally out of the Model for Improvement, opposite. This model asks three key questions and in answering them, you move towards improving your service. Measurement is fundamental in answering the second question: "How do we know a change is an improvement?"

Measuring is one part in the whole model. The Model for Improvement is a really useful framework for setting objectives and targets, as well as using Plan, Do, Study, Act (PDSA) for testing out ideas. This helps to ensure that the changes make the improvement you want, before you implement them.
For more information about the Model for Improvement refer to the Improvement Leaders' Guide: Process mapping, analysis and redesign
www.institute.nhs.uk/improvementguides



Reference: Langley G, Nolan K, Nolan T, Norman C, Provost L, (1996), The improvement guide: a practical approach to enhancing organisational performance, Jossey Bass Publishers, San Francisco

Tip:
If you have an aim, objective or agreed actions, you should be measuring the effects of your work.

3. Which measures to choose?

3.1 Key tips to remember when starting to measure

Think about the following:

- measurement should be used to speed improvement up, not to slow things down. Seek usefulness, not perfection. Remember, the goal is improvement, not the development of a measurement system
- key measures should clarify your team's objectives and make them more tangible
- examine each objective in turn, making sure each has a specific measure where possible
- link the measures for the improvement work with other initiatives in the health community, e.g. clinical and professional audit, clinical governance. It shows the contribution to corporate aims
- make sure you involve all your stakeholders in these discussions
- aim to integrate measurement into your daily routine, so it's not a chore but a key part of your work. To do that, you'll need a balanced set of measures to assure the team that the care process is being improved.
- it is very important to establish definitions of the measures you are going to use from the start of your improvement work. The definitions have to be clear and easily understood, particularly when a lot of people are involved in the collection of the data. You need a measurement process that will be consistent and reliable
- define the specific group of patients or users you are focussing on
- you may need to divide the overall measure into more manageable parts

You should distinguish between measures that are permanent, and measures that are temporary. Permanent measures are those that relate to the organisation's aims, e.g. time spent in A&E. Whereas, temporary measures relate to any actions taken to improve overall performance that are specific to the changes being tested, e.g. % patients discharged before 12 noon each day. Once improvements have been tested and shown to be effective and sustainable, you may decide to stop measuring so often or altogether.

Once you have mapped the process, diagnosed and understood any problems, you and your improvement team will be in a better position to identify opportunities for improvement and agree on what measures should be used.

Then you need to do three things as soon as possible:

- define the starting point or baseline. Ensure your baseline covers sufficient time before the improvement work begins. This way you will be able to show that your work has had a positive impact
- agree a target that you and your colleagues want to achieve
- set up a system to monitor your progress regularly on a line graph (run chart) and feed back to your stakeholders

Case study
The Cancer Services Improvement Partnership

Previously the Cancer Services Collaborative

One of the objectives of this national initiative is to reduce the number of days between date of GP referral to first definitive treatment. This is the measure that is reported. However the data collected is the time between different stages of the patient's journey including:

- date of GP referral
- date of first visit to hospital
- date of referral to specialist team
- date of first visit to specialist team
- date of first diagnostic test
- date of histiological test results being available
- date of decision to treat
- date of admission for first treatment
- date of first definitive treatment

This makes it more manageable and meaningful for the different teams involved along the whole patient journey allowing the improvement team to see where there may be major hold-ups for patients.

TIP

Specify each measure very precisely in writing so that you avoid confusion over meanings.

Objective	Suggested measures
Improve waiting time in clinic / surgery / department	• total waiting time from arrival in clinic and registering to leaving the department
Improve rate of response to referrals	• number of days from date of referral to date of response
Improve access for patients	• number of days or hours between two defined points in the patient's journey
Provide a comprehensive pre-operative assessment service	• % of patients receiving a pre-operative assessment
Improve theatre utilisation	• % of patients who DNA at admission • % of hospital and/or patient cancellations
Place patients on the right route of care	• % of patients who follow an agreed protocol
Provide certainty and choice for patients	• % of patients having a booked appointment at defined stages in the patient journey
Improve patient and carer experience	• everything we do should be focused on patients and their carers. So they must be involved in our improvement work from the very beginning. The Improvement Leaders' Guide: Involving patients and carers offers advice on how to involve patients and carers and how to measure the effects of changes on their experiences www.institute.nhs.uk/improvementguides

3.2 Measuring capacity and demand

In our experience, the process of truly matching capacity and demand at a 'bottleneck' in the system has led to some of the most exciting changes in a healthcare process. One of the first things to do is to map the process and identify the bottlenecks in the system which often cause patients to wait. Then look for ways to reduce or eliminate these queues and waiting lists for patients. The Improvement Leaders' Guide: Matching capacity and demand www.institute.nhs.uk/improvementguides is specifically on this topic.

3.3 Collecting data

Whatever your measures are, you will be collecting data. For quantitative measures, that means numbers of patients, of events etc. For qualitative measures, it means more descriptive information in text form. When collecting your data, ask yourself these questions:

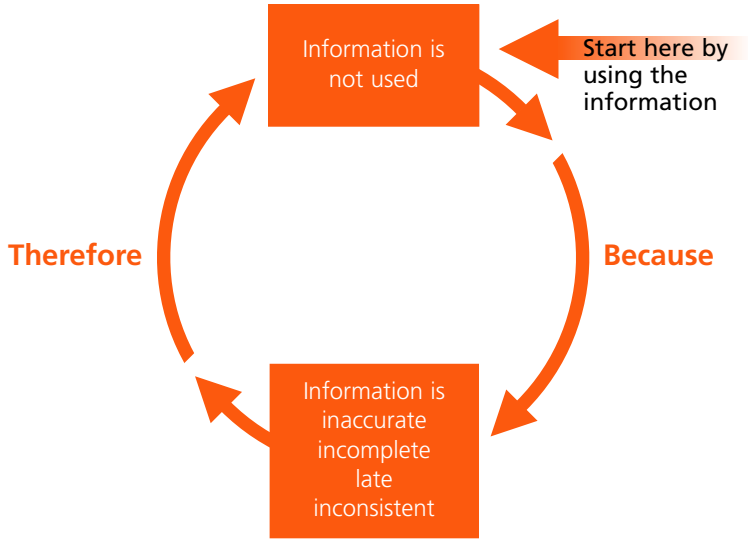
- have I defined the data so that I get exactly what I want?
- how accurate is it and does it matter?
- how can the data help me?
- can I rely on it being consistent?
- do I have to trade off the quality of the data for the time taken to collect it?
- what will I do with the data?

We are concentrating here on numerical data that can be:

- counted and plotted as distinct events, such as numbers or answers of 'yes' or 'no' that are right or wrong etc.
- plotted and measured on a continuous scale like weight, time, volume and length

It is this second type of data that will give you information about the effectiveness of your improvements because it shows change over time more easily.

The information vicious circle



Poor quality data leads to the information vicious circle shown above. We are reluctant to use the information because we're worried about the quality. If the quality of the data is poor we won't use it. The best way to improve data quality is to start using it. It's only then that the quality of the data will start improving.

> Crude measures of the right things are better than precise measures of the wrong things.

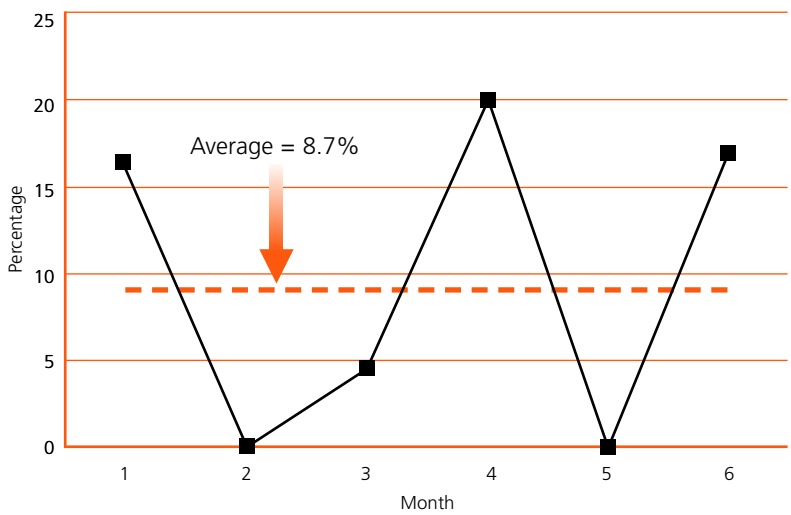
3.4 Establishing your baseline

It is very important that the period you choose for your baseline is representative. In the figure below, the DNA rate is very variable from month to month. Taking the whole six month period, the average in our example is just under 9% but it had been as little as 0% and as high as 20%. You will get very variable rates when the actual numbers involved are small.

This graph below shows the danger of making a measure for judgement. Measuring at month 1 and then at month 5, it would be easy to conclude, wrongly, that there had been a vast improvement in the DNA rate.

A good way to establish a robust baseline is to use SPC (section 4.5). For this you will need 20-25 data points. If you are collecting data yourself, and have not got any historical data, start measuring as soon as you can and use the points up to the first change as your baseline.

Example of DNA rates with large variation



3.5 Setting a target

Spend some time at the start of your improvement work setting a target with your stakeholders that is both realistic and ambitious:

- make sure your targets are linked to your aims and objectives
- be realistic in your expectations, don't think you can totally eliminate all inappropriate admissions or DNAs
- express the target as a value, not as an improvement. For example, if baseline throughput in a clinic is five patients per hour and you want to improve by 10%, then state your target as 5.5 patients per hour
- avoid confusion over percentages. For example if the baseline is 10% DNA rate and you want to improve (reduce) by 25%, then state the target as wanting to achieve a 7.5% DNA rate

Remember that targets are not set in stone:

- set a time at some early stage to reassess the targets in light of problems you have found, willingness of those involved to try new things, etc.
- if the target is too ambitious, agree a more realistic one that still stretches the team
- if the target is too easy, encourage the team to set a more ambitious one
- reassessment of targets must be agreed with your stakeholders

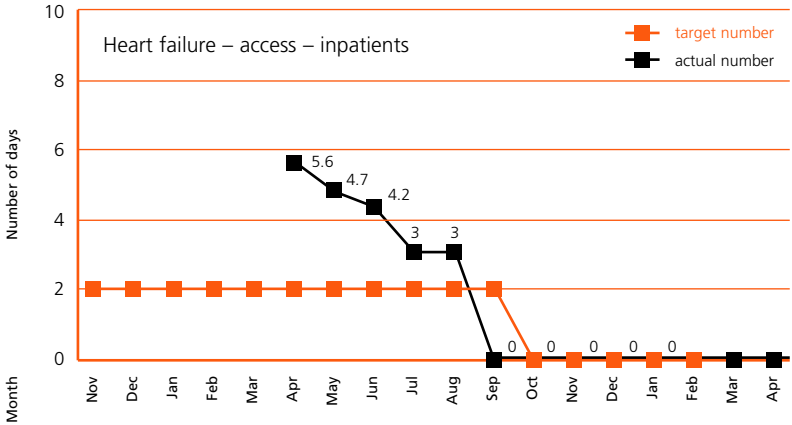
We had finished the project and achieved our target of reducing the waiting time for the patients. We were looking at our run chart (graph) on the wall and someone said, 'if we can reduce the waiting time from 30 weeks to 16 weeks then why can't we reduce it to 10 or even 6 weeks?' No one could think of a reason why we could not do it - so we did!

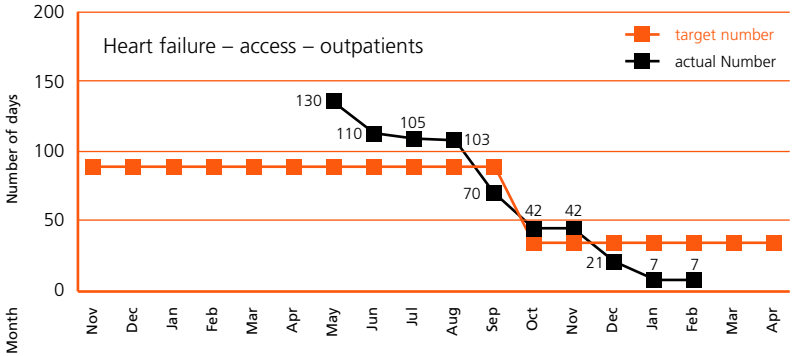
Improvement Leader - Eastern England

Establishment of a baseline position for measuring and communicating the improvements can be an exciting and motivating factor for teams.

Case Study
Echocardiography service in London

The team measured the time in days from requesting echocardiography to the time the results became available for the clinicians. There was a great difference for inpatients and outpatients. The team worked hard and drastically reduced the delay for both groups of patients.





3.6 Establish channels for getting data on a regular basis

Use existing data if you can
Much is already being collected, so your job is to uncover what already exists. Remember, if there has been an input of data, it can be extracted. Invite the information manager to the department and explain your specific needs. Ask them about data that has been inputted, what already exists and whether you can use it. Remember, you need to ensure as much accuracy, completeness and consistency of the data as possible for it to be used effectively.

Collect it yourself
You may find that you need to collect the information manually at first. This is the case in many improvement initiatives and gives you the chance to learn about the data collection process. Introduce the data collection system and monitor it to ensure that it can be maintained. Neither you nor the team should be disheartened: it does not take long before people adapt it into their daily routines and it becomes mainstream.

3.7 Sampling

If the population is the entire number of patients, objects or events you are looking at, such as all patients with diabetes, a sample is a proportion or subset of the total. Sampling is the process of selecting a small representative group in order to draw conclusions about the population as a whole.

When you're collecting a sample, for example of patient data, knowing the overall patient volume will allow you to work out whether your sample is 0.01% or 10%. The former is probably too small a sample to be representative, the latter is probably more acceptable.

Some of your numeric data will be census data, which is collected at a particular day or time of day. Other data will be measured continuously over a period of time, e.g. 24-hour period.

The main thing is to be consistent. If your target is a census number, then measure progress at fixed points in time too. Do not suddenly change your sample size and method half way through the reporting period.

TIP
Make your information manager your best friend! They can be an invaluable source of help and advice.

4. Presenting your data: turning data into information

4.1 Keep the presentation simple

You have carefully set up your measurement strategy and diligently collected the data. Don't ruin it by sloppy or unimaginative presentation! Remember that a picture is worth a thousand words and much easier to read than tables.

You should aim to make your charts or diagrams easy to understand. The main point to remember is one graph, one message.

Use line graphs (run charts) and simple bar charts when creating your charts in Excel. Avoid stack bar charts and any sort of three-dimensional graphs. There is a place for three-dimensional graphs; it's on the front cover of your report to make a pretty picture. Use pie charts sparingly and, ideally, have between three and six slices. Look at the data below: presented as a table, it is difficult to see the trend.

Example of data poorly presented:
number of days between GP referral and appointment with specialist

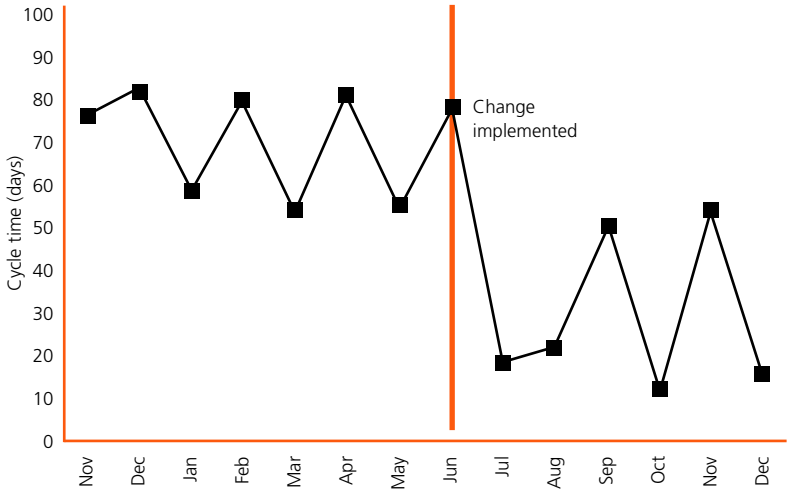
Date	Cycle time *(days)*	Date	Cycle time *(days)*
Nov	76	Jun	78
Dec	83	Jul	19
Jan	58	Aug	22
Feb	80	Sep	51
Mar	53	Oct	11
Apr	82	Nov	54
May	55	Dec	16

Change implemented in June

TIP
Using the drawing toolbar in Excel, you can add a note about where you've made changes so the impact on the measure is highlighted.

However, the same data presented as a line graph (run chart) shows the impact of an implemented change on the cycle time.

Same data presented as a run chart:
number of days between GP referral and appointment with specialist



4.2 Run charts

A run chart is a line graph. It is used when you want to show performance over time, when you want to look for trends and patterns over time, or if an implemented change is making things better, worse, or having no effect.

Look at the example of the run chart above. If just two points, January and September, were considered in isolation, you may be tempted to say that the cycle time has hardly changed, but with at least six points it is clear that the cycle time goes up and down. This is due to variation. From June onwards, there is still variation in the system but the implemented change has improved the system overall.

To ensure that run charts are interpreted correctly, keep a record of external factors and events that may influence the outcomes such as when a clinician is absent because of illness.

4.3 Reporting

The best way to demonstrate improvement is on run or SPC charts (section 4.5). They are a powerful visual aid to keep your team, service and health community informed of any progress.

If the improvement project is not part of a national or local initiative where the reporting system is specified, you should set up your own weekly or monthly reporting system. It may help you to consider the following points:

- who should the measures be reported to? Consider the Chief Executive, management team, key stakeholders, steering group and all those involved in the work
- how often should the reports be made? A weekly or monthly reporting regime helps to keep the momentum going
- what else besides the measures on run charts could be reported?

Consider including in your reports:

- aims statement, so that everyone knows exactly what you and your team are trying to achieve
- definition of measures with target, baseline and measure achieved each month
- the change ideas you have tested that month (PDSA cycles) and changes implemented. People reading your report may want to test these useful ideas in their area of work
- the changes you have implemented. These should be marked on the run chart, so you can clearly see the relationship between the change and the effect it has had
- other progress you have made such as arranging a meeting for a group of people who have previously never worked together
- any issues and challenges you have had and how you are going to address them
- key actions for the following period

Make sure you and the improvement teams use the reports to help to your work:

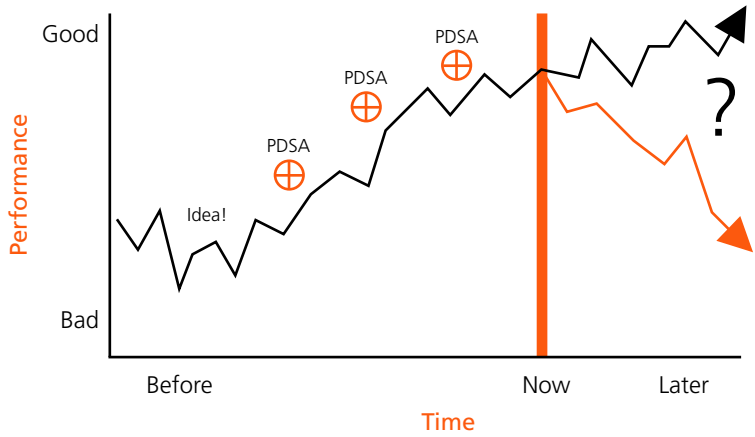
- take them to meetings to highlight issues, gain support and agree actions
- celebrate when the run charts start to show improvements!
- learn when things don't go according to plan

Be aware of the consequences of a positive improvement in one patient process having a negative impact in another part of the system. See the Improvement Leaders' Guide: Working in systems www.institute.nhs.uk/improvementguides

4.4 Measuring for sustainability

As illustrated by the run chart below, sustainability is the challenge that lies in your future. At some point in the past, an improvement opportunity was identified because performance was not as good as it could have been.
You and your team tested various ideas for improvement, using the Model for Improvement and PDSA cycles described in section 2. After several successful cycles of change you achieved a better level of performance and your measurements show the improvement. The question now becomes which of the two graphs will represent your path going forward? Will the measures continue to show improvement or not?

Sustainability: what does the future hold?



There are many reasons why a poor level of performance may return:

- the change is seen as an isolated project with a start and end date, resources such as protected time, project management and funding come to an end
- sustainability is seen as something that you do after the project is completed. It is an afterthought rather than something that must be taken into account from the very earliest stages of the improvement effort
- not all of the stakeholders (secretaries, clinicians, managers, patients, etc.) understand and own the benefits of the change
- infrastructures for ongoing sustainability have not been put into place, for example continued measurement structures, inclusion in business planning process, etc.

- the change has not been implemented with a whole system view, looking for knock on effects to other areas such as radiology or pathology
- when introducing the change, the state of the 'local receptive context' or improvement culture has not been considered
- insufficient training and development of new skills for staff
- insufficient alignment with the core values and objectives of the organisation

It should also be noted that not all changes necessarily deserve to be sustained. It sometimes happens that we become enamoured of a new idea simply because it is new; so-called innovation bias. In all the excitement we might get the idea to work for a while but because of lack of fit with the wider context, values, existing systems, etc. It might not be the best way to do things in your organisation. Remember that all improvement requires change, but not all change is an improvement. For example, a primary care practice may test out a new medication review process that is based on a paper form. It appears there are some benefits so the improvement leader tries to embed this form into the daily routine of the practice. Whilst this was a useful test, the practice may find that the principles underlying the medication review would be better served if the form were integrated into the practice computer system.

Some questions to consider of your improvement before you try to sustain it:
- is it near the final state of development? If there were room for further changes, would these completely alter the way the solution has been implemented?
- are the measurements demonstrating real improvement?
- who cares about this improvement? Is the solution representative of the wider views of those involved?
- what policy or technological changes may render this solution redundant? When might this happen?

Measurement communicates that something is a priority and the phrase "we manage what we measure" often rings true. If teams do not have a mechanism to identify ongoing improvement or slippage they will be unable to celebrate or take action to resolve the slippage. On-going measurement of important improvement or performance outcomes will maintain a focus and provide teams with not only information about their progress but the impetus to maintain or extend the improvement. Statistical Process Control (section 4.5) will help you to be more sure.

4.5 Measuring variation with Statistical Process Control (SPC)

We use the principles of control charts in everyday healthcare: monitoring temperature, pulse and respiration (TPR) charts. Here the data is collected regularly. Small amounts of variation are acceptable, but if a measure such as temperature, were to go beyond an acceptable limit, you would recognise it and take action.

You can use a similar method to ensure that all the improvements you have made are continued. Control charts are basically run charts, with two distinct differences:

- a line showing the average values of the measure
- two lines showing the upper and lower process control limits. These show the the typical extent of the variation over time. If the entry falls outside these limits, you and the team should find out what has caused it and possibly take action to bring the measurements back within acceptable levels

This is the principle of Statistical Process Control (SPC). SPC is a statistical tool based on a scientifically proven robust methodology that uses data to help us understand the variation inherent within processes and systems.

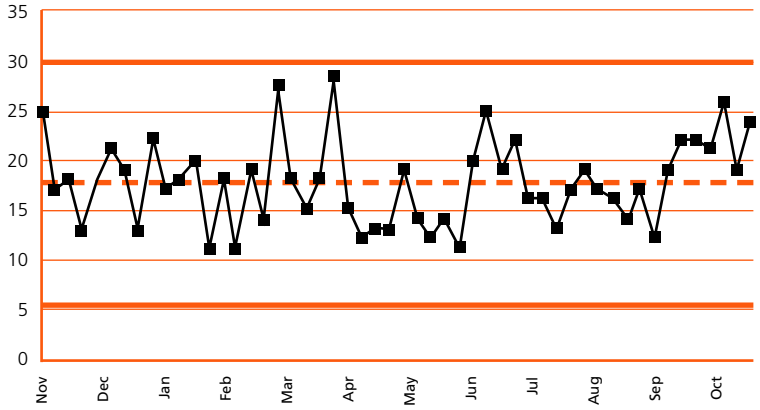
Understanding a process and the variation within that process will help us not to react unnecessarily to causes of variations that are natural and common. SPC is a more reliable way of making decisions, supports evidence based management and a really good measurement tool for improvement and sustainability.

Opposite are two typical SPC charts:

- SPC 1 is looking at weekly GP referrals to outpatients, with referrals varying from 11-28 per month. You can see that there are upper (29.9) and lower (5.4) control limits. These process control limits are set mathematically based on the data collected (number of GP referrals) over the period shown

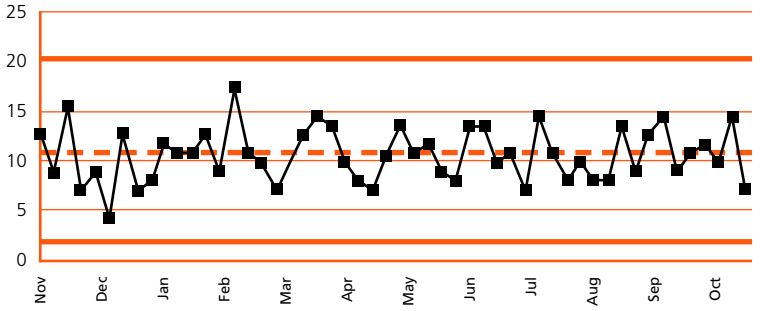
- SPC 2 is looking at weekly totals for inpatient admission with admissions varying from 3–18 per week. The extent of the variation is well within the control limits of 1.4 and 20.2

SPC1: Weekly totals for outpatient GP referrals



Outpatient GP referrals
Average (17.7)
Lower limit (5.4)
Upper limit (29.9)

SPC2: Weekly totals for inpatient admissions



Inpatient admissions
Average (10.8)
Lower limit (1.4)
Upper limit (20.2)

Further reading on SPC

- Carey RG Lloyd RC (1995) Measuring quality improvement in healthcare: A guide to statistical process control application, Winsconsin, Quality Press
- Hart MK, Hart R (2002) Statistical process control for healthcare Duxbury Thompson Learning
- Shewhart WA, Edwards Deming W (1986) Statistical Method from the Viewpoint of Quality Control, Dover Publications
- Wheeler DJ, (1995) Understanding Variation: The Key to Managing Chaos (2nd Edition) Knoxville, SPC Press inc
- Wheeler D, (2003) Making sense of data. SPC for the service sector, Knoxville, SPC Press inc

There is a lot more about understanding and reducing variation in the Improvement Leaders' Guide: Improving flow
www.institute.nhs.uk/improvementguides

Also look at the clinical systems improvement e-learning activities at www.wise.nhs.uk click on cross cutting themes and Clinical Systems Improvement

5. Activities

The messages of run charts

Objective
- to improve the understanding of the use of run charts in measuring for improvement

Benefit
- easy to do, but you need to be quite clear about the measures and the details behind the run charts for discussion

Time required
- 30 minutes

Preparation
- collect a selection of run charts, some showing improvement, some showing things getting worse, some showing fluctuating results, some showing targets already being met, and some with inadequate labels
- paper and pens for all participants
- participants work in small groups of 5-8, preferably on round tables in cabaret style
- each group has a selection of run charts

Instructions to participants
- consider each run chart in turn
- consider the following questions:
  - what does the run chart tell you about the process?
  - is this run chart demonstrating improvement? Yes or No
  - what are the reasons for the improvement, or the reasons why no improvement is being demonstrated?
  - how could the run chart be improved?

Learning points
- the use of run charts to show improvements
- the need to measure over time
- the impact of the data on the run charts
- the importance of correct labelling on a run chart
- the importance of using the correct scales

6. Frequently asked questions

Question
Where do we start?

Answer
First you have to decide what you want to improve, and then decide how you can best measure that improvement. Involve the whole team. This will help people to own the measures, especially as they may well be measuring manually to begin with. It's good to have a mixture of both qualitative and quantitative measurements.

Question
We have no baseline data. Can we still start to measure?

Answer
Yes, you still need to collect data and it is best to start as soon as possible. Use all the data points up to the first real change as the baseline. This way you can see what things are like before you started to make changes.

Question
How will all this really help us?

Answer
It will show when changes introduced begin to make improvements for patients: a great boost for the team. The combination of measurement, along with process mapping, and analysis with all the redesign ideas behind matching capacity and demand and improving flow, will help to show other areas for change. They will also provide support in business cases for extra resources, as you can show that all other options have been considered and tested.

Question
How do we get our clinicians on board?

Answer
Find out what it is that will make their lives easier: such as no longer having to vet referral letters because all patients will be seen in two weeks, or not having to deal with regular complaints from patients who have been waiting hours. Make sure you work on these areas from the start.

Question
How can I collect all this data when we are up to our eyes in data collection already?

Answer
It is difficult, but a good starting point is to contact the information department of your healthcare organisation. They may be already collecting the data you need. Meet with the information manager, discuss your data requirements and agree a plan for how that information will get to you: in what format, agreed timescales, etc.

If the data is not already available, you will have to set up your own system. The best way is to bring the administration staff in on the act. If they are involved in the process mapping exercise initially, they can often see the need for shortening the process time for patients. After all, they have to deal with most of the complaints. Involve them in the design of the data collection, and ask them to test it out in one clinic and see how easy it is to use. PDSA the data collection process.

Question
How can you justify making changes with such an unscientific method?

Answer
Statistical Process Control (SPC) is a scientific method developed by a statistician, Shewhart, in the 1920s. The statistical method behind measuring for improvement in an environment in which one cannot do a double blind trial is different from the statistics we learn for judgement in our professional training.

Also, the improvement method recommended is not about creating new knowledge, but testing change ideas that already exist. Just make sure you collect the right data and involve as many people as possible. That way you should have the evidence and the support to make the right changes.

See the table in Section 7 showing the difference of improvement with traditional clinical research.

Question
Why do you say we need to report so regularly? Can't we report every three months?

Answer
Reporting regularly is essential for measuring improvements. The more often you take your measure, the more quickly you can see if you have made a difference. A lot can happen in three months and by measuring weekly or at least monthly, you are more aware of the situation. Then you can intervene and take action if things are not improving as quickly as you would like them to. To make a valid assessment of impact, you need seven to eight points showing a sustained improvement after the implementation of the change.

Question
The measures in this guide tend to be based on quantitative measures. How can we make sure that we involve patients and their carers and measure their experience?

Answer
This is so important that there is an Improvement Leaders' Guide dedicated to this topic. Everything we do should be focused on patients and their carers, so they must be involved from the very beginning. We are able to offer advice based on current thinking and experience of how to involve patients and carers, and measure their experience in the most effective way.
www.institute.nhs.uk/improvementguides

Question
We have set up all our improvement initiatives as projects. Should we carry on measuring after the end of the project?

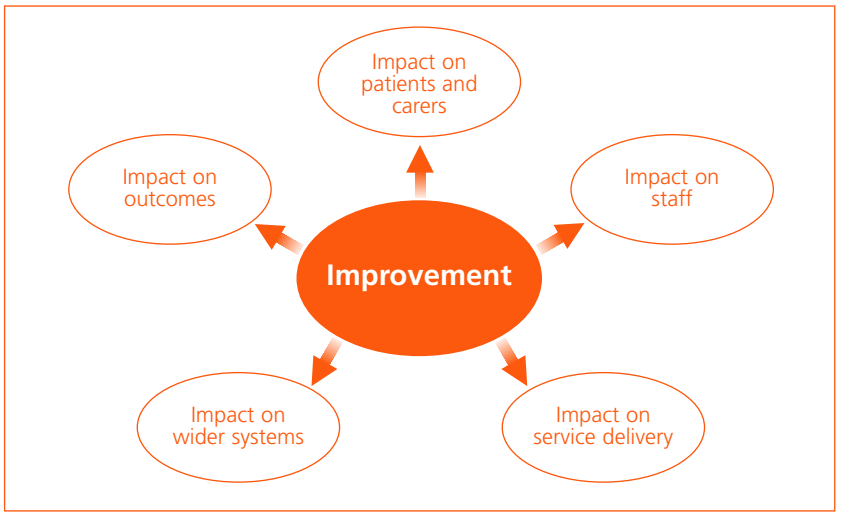
Answer
Yes. This is where the permanent measures come in linked to organisational aims. You can stop your project specific measures but these long term ones act as a security that the changes have been sustained.

Question
What is a Balanced Scorecard? I have heard the term used when talking about measures.

Answer
The term 'balanced scorecard' describes an approach that aligns the improvement measures with strategy. A balanced scorecard is basically a 'family' of measures to provide information in relation to different perspectives.
In business the measures are often grouped around:

- customer perspective
- financial perspective
- internal business perspective
- innovation and learning perspective

When the 10 High Impact Changes for Service Improvement and Delivery were developed, they were initially assessed against five categories. This set of measures would make an excellent 'balanced scorecard' by which to assess your improvement initiative www.institute.nhs.uk/highimpactchanges
There is more in the Improvement Leaders' Guide: Evaluating improvement www.institute.nhs.uk/improvementguides



Question

I have heard about Six Sigma. Is this something else I should be doing?

Answer

Six Sigma has been around for some time. It is a statistical measure of variation within a process, and uses a specific methodology to reduce variation. When a process is operating at a six sigma level there is very little variation within that process. Although it is widely used in industry, we do not know yet as to how it is best applied across health and social care. For this reason it is better to use the approaches described in this guide with SPC but watch out for more information as our knowledge grows in this area.

7. Case study
Developing measurement for improvement

Cancer Services Improvement Partnership Phase 1 (CSIP)

previously known as the Cancer Services Collaborative

As improvement leaders you will probably find that measurement is one of the most challenging areas you will face. It is not easy to choose what to measure or collect good data. So we have included this case study to explain the development of one of the first systems to measure improvement for the Cancer Services Improvement Partnership (CSIP) Phase 1. We are telling the story because we have to see measurement as part of a bigger picture. We cannot look at measurement in isolation from other aspects of improvement.

The case study starts with the background to CSIP, explains how it was set up, goes on to discuss the science underpinning the programme and explains how teams were asked to prepare for the programme. The last three sections summarise some of the learning that came from this early national improvement programme and makes recommendations which you, as improvement leaders should consider before starting out. We hope you find it useful and that it links together the advice given throughout this guide.

Key lessons

As the case study demonstrates, we rarely get measurement systems 'right first time'. We have to start somewhere but we must keep reflecting, learning and improving our systems of measurement for improvement.

Background

Phase 1 of CSIP involved 51 project teams in nine cancer networks across the NHS. They worked intensively for 18 months until March 2001.

Each participating cancer network undertook projects focusing on patients with a specific cancer: bowel, breast, lung, ovarian and prostate.

The goal was to improve the experience and outcomes for patients with suspected or diagnosed cancer by optimising care delivery systems. This was to be achieved by:

- providing certainty and choice for patients across the process of care
- predicting patients' requirements in advance and pre-planning and pre-scheduling their care at times to suit them
- reducing unnecessary delays and restrictions on access
- improving patient and carer satisfaction by providing a personalised consistent service

- ensuring the patient receives the best treatment, in the best place, by the best person or team

Another aim was to provide learning for the wider NHS about improving healthcare systems.

The basis for the methodology was the collaborative improvement method developed by the Institute for Healthcare Improvement (IHI) in the USA. It has been tested in more than 100 improvement programmes around the world. The collaborative improvement method is an approach that relies on spread and adaptation of existing knowledge to multiple settings to accomplish a common aim.

The key ingredients of the approach are:
- a flexible approach to testing, adapting and implementing changes
- packaging of specific evidence based subject matter and knowledge (best practice)
- small scale testing to create momentum for making big changes to the system
- effective use of data for learning
- collaboration with other teams and experts in the subject matter

The programme tested improvements with small groups of patients before sharing the learning and the most effective improvements to other cancer networks, other groups of patients with cancer and the wider NHS.

The science underpinning CSIP

By improvement science we mean the disciplines of quality assurance and improvement, which includes such things as process analysis, design, statistics, customer needs, research, and so on. These concepts and methods have been formally developed and studied in manufacturing and other industries for over 70 years and have become more widely known, studied, and applied in healthcare around the world in the past decade. We use the term science here because we want to emphasise the deliberate use of cycles of observation, hypotheses or theory generation, testing, measurement and reflection as the means for building knowledge for improvement.

The following table contrasts the methods of improvement science with traditional clinical research.

Standard research methods/ traditional clinical research	**Improvement Science**
Aim: new healthcare knowledge	Aim: improvement in healthcare practice
Methods: • blinded tests • eliminate bias • collect large amounts of data • fixed hypothesis • one large study	Methods: • observable tests to build a will to change • stable bias over time • collect 'just enough' useful data • continual adaptation of the changes • many sequential tests

Standard research methods were not considered appropriate for a number of reasons. These reasons are outlined below:

Standard research methods	**Cancer Services Improvement Partnership Phase 1**
• research studies are usually designed to avoid the technical difficulties caused by complex social situations	• recognition that the journey of a patient with cancer through a healthcare system is extremely complex
• new knowledge from clinical trials is often slow to be adopted to standard practice	• the emphasis was to accelerate the testing and implementation of changes to make improvements in line with the programme and project aims
• opportunities for learning and improvement from observation are not usually incorporated into research design	• this was an innovative programme designed to test, learn and make improvements not only in the care of patients with cancer but also in the methodology used
• the number of changes identified would require an extensive number of clinical trials	• each project started from a different basis to any other project even when considering patients with the same cancers. Therefore each project identified and tested changes relevant to that system of care

Preparation of teams for phase 1, November 1999

Identifying a patient 'slice' for each project

Each project focused on redesigning the system of care delivery for a specific group or 'slice' of cancer patients across the total process of patient care. The slice approach was chosen because there are typically too many patients within a cancer network to pilot new ways of working. The slice approach concentrates on a specific group of patients and follows them through every stage of their healthcare journey. We wanted to transfer the learning from the initial 'slice' of patients to all the other patients in the network over a period of time.

Writing an aims statement and targets

Each project team was expected to develop a written aims statement related to the group of patients or slice, stating what the team expected to achieve over the 18 months of the project.

Developing measures for improvement

Each team was expected to develop a set of measures to reflect improvement against their project aims. There were five categories of measurement and teams were expected to adopt at least one measure from each category. The categories of measurement were:

- access
- patient flow
- patient and carer satisfaction
- clinical effectiveness
- capacity and demand

Establishing the baseline situation

Each project team was asked to establish the baseline situation for their measures using a sampling system. This enabled the teams to work out their starting point.

Reporting data

Each project team was expected to submit a monthly report including run charts of their selected measures.

Learning from phase 1

Much was learnt about measuring for improvement during the programme and at the same time, the teams made many impressive improvements for patients with cancer.

Identifying a patient slice for each project

The concept of a patient slice was new to all project teams. Some teams initially identified a slice, which was later realised to be far too 'thick' and complex, difficult to manage and extremely difficult to measure. This was often due to the motivation of clinical staff and their wish to be involved. Examples of slices:

- a slice that is too thick: all referrals for patients with suspected bowel cancer, to several consultants in several different hospitals who in turn refer to one oncology centre
- a slice that worked: all patients with suspected bowel cancer referred from one PCT, to one surgeon in one Trust and on to one oncology centre and back to primary care

Writing an aims statement

Initial attempts at writing aims statements were often too vague. This was due to unfamiliarity with the rigorous approach used in setting aims statements and the reluctance of some teams to be tied down. There was also confusion, especially when the patient slice was not clearly defined and when measures were still evolving. Examples of aims statements:

- poor aims statement: to improve the experience and care for patients with bowel cancer by implementing booked appointments and reducing the time from referral to treatment
- good aims statement: to improve access, speed of diagnosis, speed of starting appropriate treatment and patient and carer experience for those with suspected or proven bowel cancer. This will be achieved by:
  - introducing booked admissions and appointments: target - more than 95% of patients will have a booked appointment
  - reducing time from GP referral to first definitive treatment: target: less than 50 days
  - ensuring patients are discussed by the multidisciplinary teams: target - more than 80% of patients
  - efforts and measurements will be concentrated on a defined slice of patients, at four key stages of care: GP referral, first specialist appointment, first diagnostic test and first definitive treatment.

Agreeing targets, measures for improvement, baseline measurements and methods of reporting data

These four factors are directly linked together with the aims statement. This caused understandable confusion and frustration in the early stages of the programme:

- if teams had not defined the slice, they could not measure the baseline
- if teams did not know what the measures for improvement were, they could not measure the baseline
- if teams did not know what the baseline was, they could not set a realistic target
- if teams did not know what the target was, their aims statement was incomplete

Without an agreed slice, measures, baseline, targets and aims statement, it was very difficult to complete the monthly report in a way that was meaningful for the teams.

When trying to start measuring and identifying the baseline situation, teams found that there were few data collection systems in place to record process data. This meant they had to set up their own systems, which took a lot of time and effort.

Reporting the data, which was difficult to collect, caused more frustrations. Many found the monthly report to be an added chore and few teams considered it a valuable tool for themselves, particularly in the first half of the collaborative. Teams were also frustrated that much of the valuable progress being made did not show on monthly run charts, e.g. achieving a regular meeting between two different groups of clinicians who previously had never met, or developing a multidisciplinary care protocol.

Recommendations for improvement leaders

The rich learning from CSIP Phase 1 has been incorporated into many subsequent improvement initiatives. As improvement leaders it would be useful for you to consider each of the following recommendations for your improvement initiative.

Slice

As the aim is to improve the care delivery system, it is vital to identify a system to test improvement ideas on. If you want to make improvements to a patient's journey that go across agencies, organisations and departments, we would advise you to use a slice. An all inclusive approach is not the best foundation for systems improvements and makes measurement even more difficult.

Recommendation about the slice

Be clear about what you mean by a slice:

- if the improvement initiative were for a group of patients that goes across multiple organisations and departments, then your slice would be one group of patients whose process goes across all those agencies, e.g. all patients with suspected bowel cancer referred from one PCT to one surgeon in one trust and on to one oncology centre and back to primary care
- if you were looking at the whole of the histopathology service, your slice would be very different. You would identify a number of slices within histopathology, including patients needing cytology tests, biopsy tests, post mortem examinations etc.

The key is to keep the slice as small as possible to make it manageable but big enough to be informative. You should help your improvement teams to be very precise in defining their slice but make sure you find ways to keep others, not in the slice, motivated and engaged.

Measures

It is a fine balance between encouraging local ownership and setting a direction for the improvement initiative.

Recommendation about measures

As leaders of improvement you should discuss measures with all your stakeholders and team members. You need to define and agree common measures at the earliest possible stage. Leaving teams to develop their own measures, even within certain parameters, creates too much variation.

Baseline assessment

All teams need to accurately assess the baseline of their measures.

Recommendation about the baseline

Encourage your teams to get at least six but preferably 20-25 data points on the run chart to make an assessment of the baseline and begin to understand the inherent variation in the system.

Reporting

Some teams consider the reporting systems to be a method of performance monitoring for someone else, not a tool for their own use.

Recommendation about reporting

Encourage your teams to see the benefit of regular reporting and the use of Statistical Process Control as a means to improvement and help them to use the weekly or monthly reports as a means of local communication with all team members and stakeholders.

Conclusion

The basis of the methodology described in the Improvement Leaders' Guide: Measurement for improvement is to study variation in one system. This is followed by making small incremental change and noting the effect that the change has on the variation in performance. It is not an easy approach to take and this national programme was the first opportunity to learn how to do it.

One of the initial aims was 'to provide learning for the wider NHS about improving healthcare systems'. This aim was achieved, especially with respect to learning about measuring for improvement. All the Improvement Leaders' Guides are strongly influenced by this learning, and from subsequent improvement initiatives.

For a glossary of process and thinking systems terms see Improvement Leaders' Guides: Process mapping, analysis and redesign and Improving flow
www.institute.nhs.uk/improvementguides

The Improvement Leaders' Guides have been organised into three groups:
General improvement skills
Process and systems thinking
Personal and organisational development

Each group of guides will give you a range of ideas, tools and techniques for you to choose according to what is best for you, your patients and your organisation. However, they have been designed to be complementary and will be most effective if used collectively, giving you a set of principles for creating the best conditions for improvement in health and social care.

The development of this guide for Improvement Leaders has been a truly collaborative process. We would like to thank everyone who has contributed by sharing their experiences, knowledge and case studies.

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To download the PDFs of the guides go to www.institute.nhs.uk/improvementguides

We have taken all reasonable steps to identify the sources of information and ideas.
If you feel that anything is wrong or would like to make comments please contact us at
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