

# Patientsikkert Sygehus: Measurement Strategy

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## Introduction

*Patientsikkert Sygehus* is a project which aims to show that it is possible with a targeted effort, to reduce unnecessary deaths and harm to patients in Danish hospitals. In order to meet these goals, the participating hospitals must implement 12 change packages, which have been shown to collectively contribute to a reduced number of deaths and harm. For each change package, one or more process measures have been identified to continually measure the degree to which the package has been implemented and spread throughout the organization. For most of the change packages there is also an outcome measure to document that the implementation of the packages has had the desired effect for the patients (e.g. fewer cardiac arrests).

Based on recent experiences from both Danish and international hospitals which have shown significant improvements, aims for each outcome measure will be established. For instance, today we know that it is possible to practically eliminate certain hospital-acquired infections which previously were seen as inevitable complications of a hospital admission. We also know from hospitals that have achieved these and other improvements, that it is possible to reduce deaths and harm.

## Overall Aims

The overall aims are to reduce: (1) mortality (as measured with the hospital standardized mortality ratio) by at least 15%, and, (2) the occurrence of harm (as measured with the Global Trigger Tool) by at least 30% in the participating hospitals. The related outcome measures include:

- The hospital standardized mortality rate is reduced by at least 15%
- The number of patient harm per 1,000 in-patient days is reduced by at least 30%
- The number of cardiac arrest calls is reduced by at least 30%
- Central Line infections are eliminated
- Ventilator associated pneumonias are eliminated
- The proportion of patients to develop pressure sores during hospitalization is reduced by at least 50%
- The proportion of patients with newly diagnosed heart failure who are readmitted within 28 days is no more than 10%
- The proportion of operated patients who die during hospitalization is reduced by at least 20%
- The proportion of operated patients who are readmitted within 30 days is reduced by 20%

## Measurement Strategy and Methods

The measurement strategy for this work consists of the following steps:

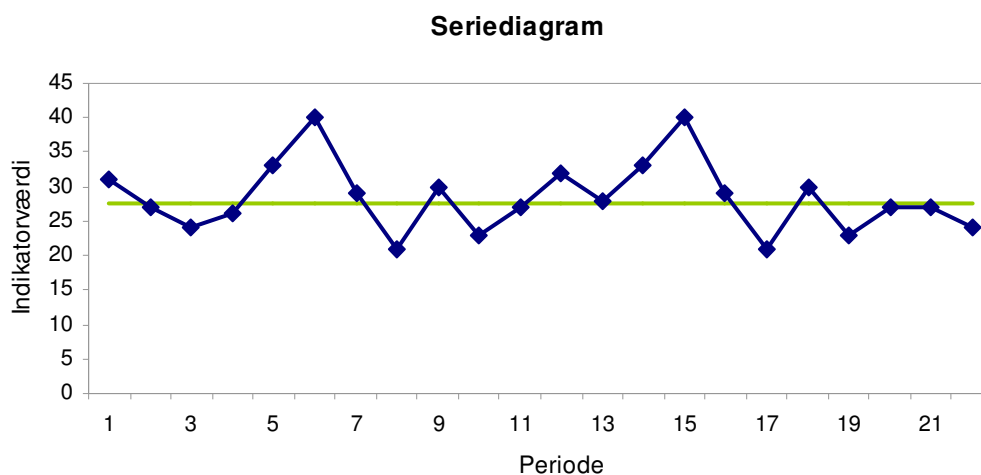
1. Selecting process and outcome measures
2. Developing a precise operational definition for each measure
3. Establishing a data collection plan for each measure
4. Analyzing each measure statistically to determine if a change actually occurred
5. Linking the data findings to improvement strategies

Improvement in any process or outcome measure can be expressed either as an absolute goal, (e.g. zero ventilator-related lung infections or 100% compliance with hand hygiene), or as a relative change, such as an at least a 30% reduction in the cardiac arrest calls. A determination of improvement (whether as an absolute goal or relative change) can only be made in relation to a baseline, which is defined as the most recent stable period before or immediately after the project start.

Ideally, it is desirable to have a year's worth of data on a particular measure prior to starting the improvement work. This will provide a clear picture of how the process and outcome measures varied over time and the type of variation inherent in the process. In some cases, however, it may not be possible for *Patientsikkert Sygehus* participants to provide historical data on a specific measure because it is a new measure that has not been tracked before. When this happens, alternative approaches will be used to build baselines. Finally note that if the volume of data is sufficiently large, data may be collected and tracked more frequently than monthly (e.g., weekly, bi-weekly or even daily).

As point of reference, all measures are calculated at the level for which the data are recorded. For example, mortality, cardiac arrest calls and patient harm are counted at a hospital level, while pressure ulcers can be tracked at a ward or department level.

The stability of data is assessed, wherever possible, on the basis of at least 12 (preferably 15 to 20), consecutive data points which essentially exhibit random (or common cause) variation with no signs of abnormal (or special cause) variation. Random and non-random variation will be determined with a statistical process control (SPC) tool known as a run chart.



**Fig. 1: Run Chart**

A run chart is a plot of data over time. The measure of interest (e.g., ventilator pneumonia rate) is plotted on the vertical or Y axis. The unit of time being monitored (e.g., week or month) is plotted on the horizontal or X axis. The data value for each time period is placed on the graph, the data points are connected and the median is calculated and placed on the chart as the centreline. Once the run chart is prepared the number of “runs” on the chart must be calculated. A run is one or more data points on the same side of the centreline. When the number of runs is determined, four run chart rules are then used to determine the type of variation in the data. There are basically two types of variation: (1) random (or common cause) variation and, (2) non-random (or special cause) variation.

The four run chart rules that are used in the *Patientsikkert Sygehus* programme to determine if non-random (special cause variation) exists are as follows:

1. A **shift in the data** is defined as 6 or more consecutive data points on the same side of the median (points on the median are ignored)
2. A **trend in the data** is defined as 5 or more consecutive data points constantly increasing or decreasing (points with the same value as the previous point are ignored)
3. **Too few or too many runs** in relation to the number of data points (found by reference to a standard statistical table)
4. One or more **extreme data points** (this is a judgment decision not a statistical decision)

Non-random or special cause variation can be due to two primary reasons: (1) an outside or unexpected factor has influenced the process performance, or (2) you have intentionally introduced a change concept that is designed to influence the process performance. In either case, detecting a special cause is a signal that the process is changing. Special cause variation in the desired direction is considered an improvement. Special causes not related to improvement strategies, on the other hand, need to be investigated and the underlying reason(s) why the special cause occurred need to be addressed.

## Determining Improvement

Improvement can be transient or permanent. For an achieved improvement to be considered permanent, the process must adapt to a new stable and better level than baseline. Throughout the *Patientsikkert Sygehus* monthly reviews of the measures will be performed by the faculty and the participating organisations will receive feedback on their progress to date.

The final determination of performance in the *Patientsikkert Sygehus* will be assessed at the completion of the project in late 2012. At this time, the baseline performance on the nine overall measures (see the Overall Aims at the beginning of this paper) will be compared with current performance to see if there is evidence of special cause variation in the desired direction. The achieved improvement will thus be the percent change between the baseline median and the most recent period (most likely the last 6 months of data). In addition, the run chart rules will be applied to the data to make sure that the data at the end of the program reflect stable and predictable variation that has been sustained over time. For measures where the goal is zero incidents (such as Central Line

Blood Stream Infections), the aim will be considered achieved if no incidents have appeared for at least 300 days.

Questions and comments on this Measurement Strategy should be directed to:

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