Monitoring of Operating Times in Hip Surgery

M.F. Fischmeister

Trauma Centre
Unfallkrankenhaus Linz der
Allgemeinen Unfallversicherungsanstalt
Blumauerplatz 1
A 4010 Linz

Introduction:

Techniques of process control are seldom used in surgery. This study describes the monitoring of operating times with control charts.

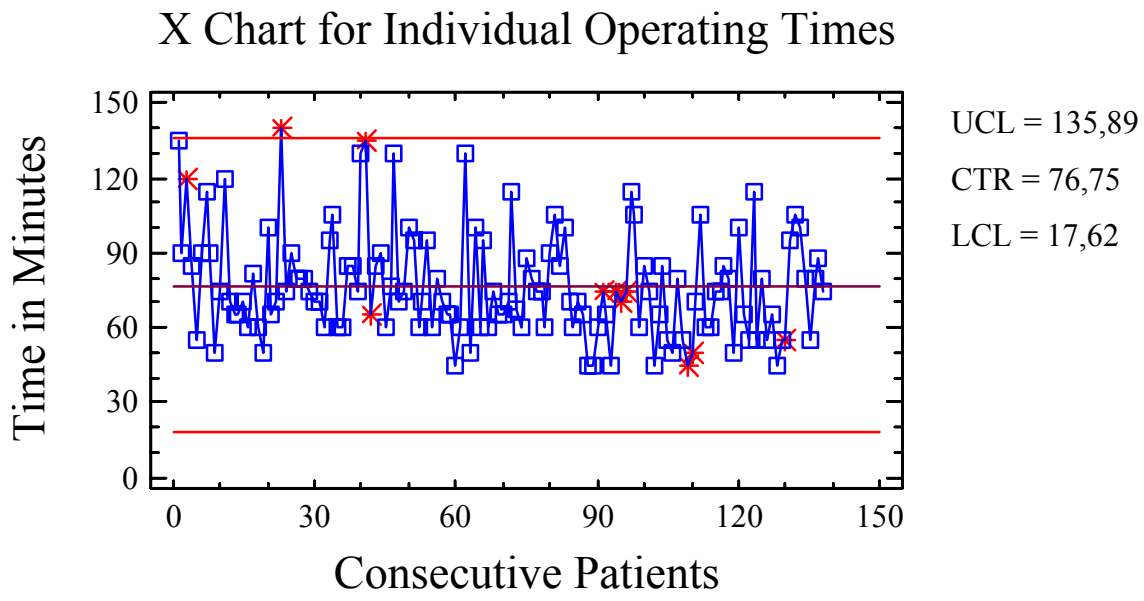
Methods and Results:

1 Plot the Data

In 138 consecutive implantations of a hemiprosthesis of the hip joint in 138 patients with femoral neck fractures operating times have been documented. Data fit to a normal distribution and are plotted on a control chart for individuals.

2 Is the Process in Statistical Control?

First one should look at individual points beyond the control lines. Then one searches for and tries to identify unusual patterns in the data (Runs Tests).



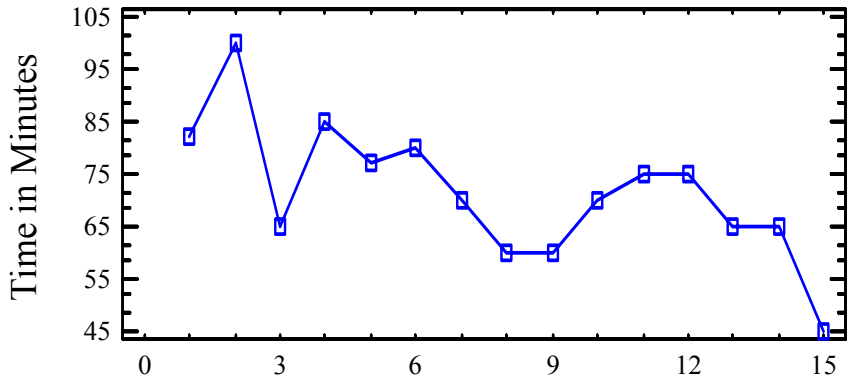
One point is beyond the upper control limit. Several unusual patterns can be detected. The process is out of control at the 99% confidence level.

3 Identify and minimize assignable causes of variation

There are five operations with prolonged operating times (beyond 120 minutes). All were caused by technical difficulties during the procedures in the learning curves of young surgeons.

Example of a learning curve in a young surgeon performing the operation:

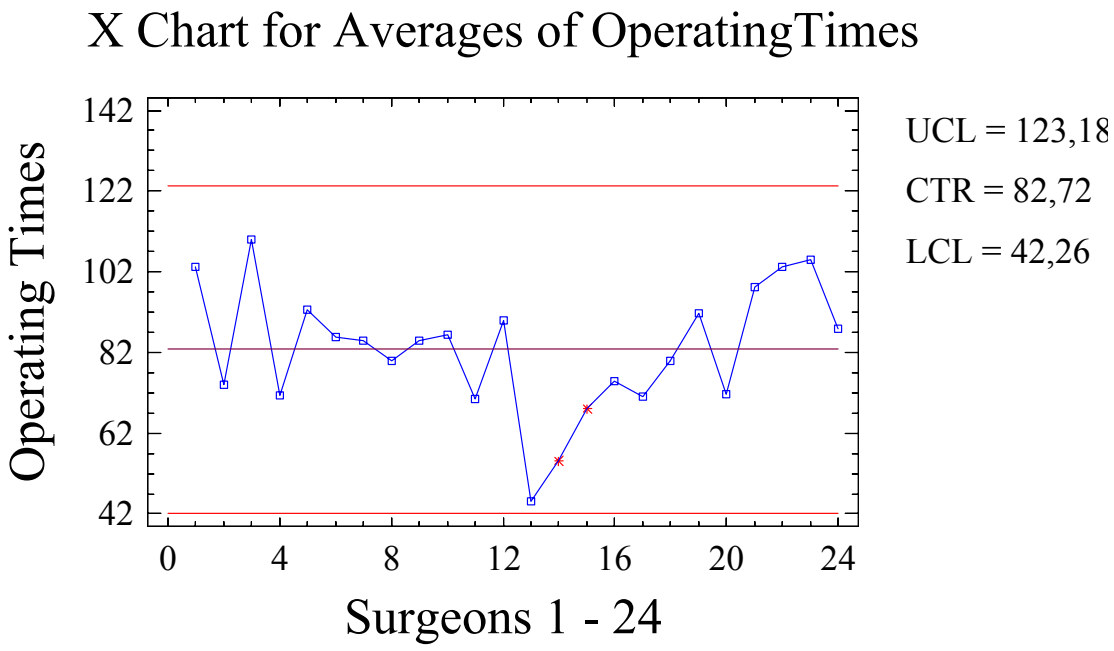
Time Sequence Plot of Individual Operating Times of Surgeon No 20



4 Improve the Process

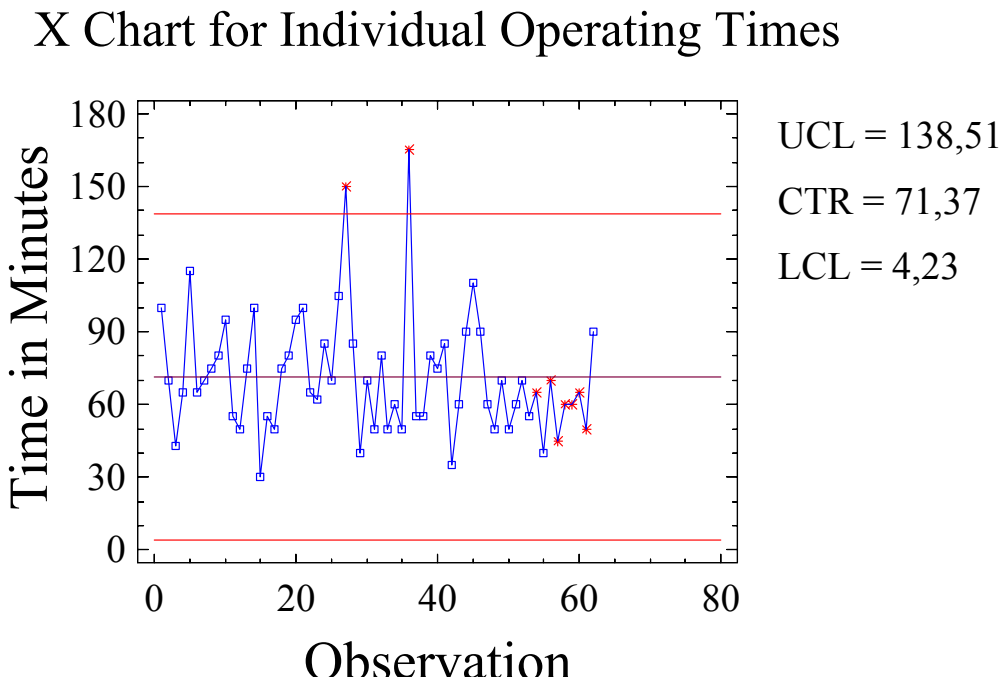
Processes can be improved in statistical terms by changing of level (e.g. mean or median) or reduction of variation, or both.

The process monitored above can actually be seen as a mix of 24 processes - according to the number of working surgeons. The next plot gives the average operating times of the individual surgeons. The data fit to a normal distribution.



The average operating times of none of the surgeons is out of statistical control.

Improvement of the process could easily be obtained by reducing the number of operating surgeons as can be seen from a different set of data.



Discussion:
Control charts are useful tools for analysing processes of care. They apply to a variety of data already available in most departments of orthopaedic or trauma surgery as for example rate of postoperative infections or length of stay. They provide rapid information about changes in the data and the related processes and allow early reaction to the emergence of problems.

Summary:
Monitoring of operating times using control chart techniques has been done in 138 consecutive patients undergoing hip replacement with hemiprosthesis after femoral neck fracture. The use of this tool can be recommended.

Recommended Reading:

Out of the crisis:
W.E. Deming, MIT Press edition, Cambridge Massachusetts 2000

Modern Methods for Quality Control and Improvement:
Wadsworth HM, Stephens KS, Godfrey AB
John Wiley & Sons, New York 1986

Post scriptum:

I would enjoy it very much to discuss these subjects with you!
email: m.fischmeister@utanet.at