BMC Health Services Research

Meeting abstract

Quality monitoring in thyroid surgery by Shewhart control chart

Antoine Duclos*, Sandrine Touzet, Philippe Messy, Anne-Marie Schott and Cyrille Colin

Address: Hospices Civils de Lyon, 27 quai augagneur, Lyon, 69002, France

Email: Antoine Duclos* - antoineduclos@yahoo.fr

* Corresponding author

from 24th Patient Classification Systems International (PCSI) Working Conference
Lisbon, Portugal. 8–11 October 2008

Published: 27 November 2008

BMC Health Services Research 2008, **8**(Suppl 1):A1 doi:10.1186/1472-6963-8-S1-A1

This abstract is available from: http://www.biomedcentral.com/1472-6963/8/S1/A1

Introduction

The outcome of thyroid surgery is usually assessed according to two major complications: recurrent laryngeal nerve paralysis and hypoparathyroidism. The purpose of the study was to monitor the outcomes of thyroid surgery using Shewhart control charts, and then to identify possible ways to improve quality by exploring the special causes of variation in the observed complication rates. This study aims to assess the feasibility and usefulness of this method in the daily practice of a surgical team.

Methods

A prospective survey was conducted in a teaching hospital located in Lyon (France). The surgical team under control included three surgeons specialized in endocrine surgery who performed 700 thyroidectomies a year. The study population involved all in-patients who underwent thyroid surgery from January 1, 2006, to December 31, 2007.

The quality of thyroid surgery was monitored in the years 2006–2007, according to in-hospital rates of immediate postoperative recurrent laryngeal nerve palsy (RLNP, assessed by direct laryngoscopy) and hypocalcaemia (serum calcium level < 2 mmol/L). Indicators were extracted from the hospital information system and plotted each month on a longitudinal P-chart. The central line value was determined from the average rate of complications. The limits for detecting special causes of variations were calculated monthly from the corresponding binomial-based Standard Deviation (SD). Identification of these special causes was then based on: #1) the logbook in which all changes in the care process were continually reported by surgeons; #2) the interpretation of control charts by the surgical staff every four months.

Outcome of thyroid surgery was also assessed in the years 2004–2005 to compare the performance of the surgeons before (baseline period) and after (monitoring period) the control charts' implementation. Data were manually extracted from the medical records of 346 randomly selected inpatients. Baseline rates of immediate RLNP and hypocalcaemia were 6.4% and 32.3%, respectively.

Results

The outcomes of 1114 thyroid procedures were assessed in the years 2006 and 2007. Among these procedures, 84.4% were bilateral thyroidectomies, and 23.5% concerned patients with thyroid carcinoma. Median patient age was 51 years (range, 9 to 93), and 78.7% were women. Average rates of immediate RLNP and hypocalcaemia were 7.2% and 20.9% during prospective monitoring, showing a decrease in the hypocalcaemia rate after the implementation of control charts (Chi-squared test, $p < 0.0001$).

The process was under control except during the third quarter of 2007. The composite indicator of complications (immediate RLNP and/or hypocalcaemia) crossed the upper control limit (3 SD) in July, and then the upper warning limit (2 SD) in September, pointing out a special

cause variation. The logbook and chart-review meetings revealed that, over the summer, the surgeons had moved from their regular operating room, resulting in temporary changes to the organization of their surgical practice. This led to a substantial reduction in the operating room time slots available to the surgical team (from 7 to 5), accounting for a sudden switch from 42 to 32 hours dedicated weekly to endocrine surgery. Moreover one surgeon, who performed a high volume of procedures, was on vacation in July 2007, while the average monthly number of thyroid patients operated on by the surgical team remained the same: 55 thyroid procedures were done in July 2007 versus 47 in July 2006, while the average number of procedures per month was 54.8 in 2006–2007.

Conclusion

Monitoring quality and patient safety in thyroid surgery, using Shewhart control charts based on major complications of thyroidectomy, is feasible and useful in the daily practice of a 'high volume' surgical team.

Reduction in the rate of immediate postoperative hypocalcaemia may arise from a Hawthorne effect, and frequent indicators feedback to the staff, thus contributing to surgeons' motivation for improving their performance.

The poor performance highlighted by the control chart during the third quarter of 2007 was related to changes in the surgeons' work environment as well as the excessive workload that disrupted their habits, and possibly led to burn out. One way to prevent the recurrence of such problems is to maintain a rational operations schedule that guarantees no sudden increase in workload for surgeons.

More research is still required in the field of statistical process control when applied to thyroid surgery to develop the best chart to balance scientific and pragmatic needs.