

Application of traditional indexes and adverse events in the ophthalmologic perioperative medical quality evaluation during 2010–2012

Yong-Na Bian¹, Jian Shi¹, Jun-Jun She¹, Jie Wu¹, Jian-Min Gao²

¹The First Affiliated Hospital of Medical College, Xi'an Jiaotong University, Xi'an 710061, Shaanxi Province, China

²Medical College, Xi'an Jiaotong University, Xi'an 710061, Shaanxi Province, China

Correspondence to: Jian-Min Gao. Medical College, Xi'an Jiaotong University, Xi'an 710061, Shaanxi Province, China. gaojm@mail.xjtu.edu.cn; Yong-Na Bian. The First Affiliated Hospital of Medical College, Xi'an Jiaotong University, Xi'an 710061, Shaanxi Province, China. byn1975@mail.xjtu.edu.cn

Received: 2014-12-11

Accepted: 2015-03-07

Abstract

• **AIM:** To evaluate the medical quality of ophthalmologic perioperative period during 2010–2012 in our hospital.

• **METHODS:** The relevant data of perioperative period were collected in our hospital during 2010–2012, and the medical quality of perioperative period was evaluated by using the traditional evaluation indexes and adverse events. Whereby, the traditional indicators include vision changes, improving of intraocular pressure, diagnostic accordance rate before and after operation, cure improvement rate, successful rescue rate, and incidence of surgical complications, *etc*. Adverse events are associated with ophthalmologic perioperative events including pressure sores, postoperative wound infection, drug adverse events, and equipment related adverse events.

• **RESULTS:** There were 1483, 1662 and 1931 ophthalmic operations in our hospital in the year 2010, 2011 and 2012, respectively. From traditional index analysis, the proportions of vision improvement for each year were 96.43%, 96.76% and 97.32%, respectively; the rates of intraocular pressure improvement were 87.50%, 85.72% and 90.17%, respectively ($P < 0.05$); the diagnostic accordance rates before and after operation were 99.86%, 99.94% and 99.90%, respectively; cure improvement rates were 99.73%, 99.93% and 99.84%, respectively; the successful rescue rates were 82.98%, 81.46% and 76.66%, respectively; the complications incidence rates were 18.44%, 17.52% and 17.97%, respectively. The negative factor analysis results showed that: among all the patients of ophthalmic surgeries in our hospital

during 2010 and 2012, only one case of postoperative wound infection was found in 2011, and also only one case of tumbling in 2010. The adverse drug events for each year were 1 case (0.07%), 2 cases (0.12%), and 4 cases (0.21%), respectively; the medical device adverse events for each year were 3 cases (0.20%), 5 cases (0.30%), and 6 cases (0.31%), respectively. Noticeably, only one case with postoperative infection of endophthalmitis was found in 2011. Moreover, no pulmonary infection or pulmonary embolism occurred during the three years. The perioperative adverse event rates for each year were 0.34% (5/1483), 0.48% (8/1662) and 0.52% (10/1931), respectively. Though incidence was rising during the three years, no statistical significance was observed ($P > 0.05$). It is the same case with drugs and medical devices adverse events ($P > 0.05$).

• **CONCLUSION:** Traditional indicators reflect an excellent operation of the perioperative ophthalmologic quality, whereas adverse events analysis indicates some underlying problems. Compared with the traditional indexes for medical quality evaluation, the index of adverse events is more reasonable and easier to make an objective evaluation for medical quality of ophthalmologic perioperation, facilitating further refine analysis. Reasonable application of the adverse events indicators helps hospital to make the detailed quality control measures.

• **KEYWORDS:** perioperative period; medical quality; evaluation index; adverse events; ophthalmology

DOI:10.3980/j.issn.2222-3959.2015.05.35

Bian YN, Shi J, She JJ, Wu J, Gao JM. Application of traditional indexes and adverse events in the ophthalmologic perioperative medical quality evaluation during 2010–2012. *Int J Ophthalmol* 2015;8(5):1051–1055

INTRODUCTION

The key to medical quality evaluation is that whether the index of medical quality evaluation can really reflect the medical quality [1,2]. We started to set up the hospital classification management and a standard hospital management system at the time, which would have a wide application. The perfect embodiment of many indicators is presented in the home page of medical records, which was revised in 2001 and is still used in activities such as the

Medical Quality Management and Quality Long March since 2006 [3]. In recent years, with the gradual improvement of medical quality management and the deep going of the theory and practice of medical management, many defects once hidden in the current medical quality evaluation system are gradually revealing themselves and drawing attention from the hospital's administrators. However, the system with its rationality, objectivity and accuracy *etc*; cannot meet the requirements of the current medical quality management. In 2011, appraisal standards of the grade III comprehensive hospitals in our country came out, which contained 36 articles of the monitoring index [4]. It is used for monitoring and chasing medical quality and safety criteria of evaluation, among which the index of adverse events is a key and particularly used for quality evaluation of surgical complications and patient safety. In this paper, traditional indexes and adverse events are applied to evaluate ophthalmologic perioperative medical quality based on data collected during 2010-2012 in our hospital department of ophthalmology in order to analyze their application value in medical quality management.

SUBJECTS AND METHODS

Source of Data The data of this study come from our hospital's information system, which contains all the electronic medical records of the ophthalmological homepage of medical eye record from 2010 to 2012.

Medical Quality Evaluation

Traditional indicators At present, three aspects are included about the medical quality evaluation indexes in our country, namely the efficiency index, benefit index and quality index. The indexes related to eye surgery quality mainly include vision changes, improving of intraocular pressure, diagnostic accordance rate before and after operation, cure improvement rate, successful rescue rate, and incidence of surgical complications, *etc*. The visual acuity record is judged with international standard chart and the detection is often during pre-operation and 7d post-operation. When the intraocular pressure reached 11-21 mm Hg, it means improved. The diagnostic accordance rate before and after operation refers to the rate of accordance for a patient's diagnosis before and after the operation, which is calculated as: diagnostic accordance rate before and after operation (%) = (no. of diagnostic accordance before and after operation/ total no. of operational patients) × 100%. Similarly, successful rescue rate (%) = (no. of cured patients/ total no. of discharged patients) × 100%; improvement rate (%) = (no. of improved patients/ total no. of discharged patients) × 100%. Successful rescue refers to the rescue by which acute and severe patients got improved or stabilized. Thus, successful rescue rate (%) = (no. of successful rescues/ total no. of rescues) × 100%. Complications include postoperative

inflammation, corneal edema, opacity, endophthalmitis, and intraocular pressure too low, *etc*. Complication rate (%) = (no. of complications/ total no. of operational patients) × 100%.

Adverse events Medical adverse event is referred to the damage that patients get in the hospital for diagnosis and treatment activities rather than the disease itself, and that caused by misdiagnosis or treatment, relevant facilities and equipments, *etc* [5]. Adverse events are associated with ophthalmologic perioperative events including pressure sores, postoperative wound infection, tumbling, drug adverse events, equipment related adverse events, and pulmonary infection. Postoperative wound infection rate (%) = (cases of postoperative wound infection/ total no. of operational patients) × 100%. Tumbling rate (%) = (perioperative tumbling cases/ total no. of operational patients) × 100%. Drug adverse events rate (%) = (cases of perioperative drug adverse events/ total no. of operational patients) × 100%. Equipment-related adverse events rate (%) = (cases of perioperative adverse events caused by medical equipment use/ total no. of operational patients) × 100%. Pulmonary infection rate (%) = (cases of perioperative pulmonary infection/ total no. of operational patients) × 100%.

Statistical Analysis The descriptive statistical methods were used to analyze ophthalmologic perioperative related traditional indicators such as diagnostic accordance rate, improvement rate, successful rescue rate, and operational complication rate, *etc*. The adverse events include postoperative infection, drugs or medical devices adverse events rate *etc*. The SPSS 17.0 software was used for statistical analysis. Statistical significance is defined when a *P* value is less than 0.05 in Chi-square test.

RESULTS

Curative Effect and Complications The total cases ophthalmic-surgery in our hospital each year from 2010 to 2012 respectively were 1483, 1662 and 1931. Selected ophthalmological diseases include senile cataract and disinsertion, with no statistical difference in patients constitution between the two selected diseases. For patients suffering from senile cataract, cataract extraction and intraocular lens implantation are performed. While for patients suffering from disinsertion, glaucoma filtration is performed. The traditional index analysis revealed that the proportions of vision improvement were 96.43%, 96.76% and 97.32% respectively, the rates of intraocular pressure improvement were 87.50%, 85.72% and 90.17% respectively (*P* < 0.05), the diagnostic accordance rates before and after operation were 99.86%, 99.94% and 99.90% respectively, cure and recovery rates were 99.73%, 99.93% and 99.84% respectively, the successful rescue rate were 82.98%, 81.46% and 76.66% respectively, the incidence of complications was 18.44%, 17.52% and 17.97% respectively (Table 1).

Table 1 Effect and complications in the ophthalmologic perioperation in 2010-2012

Years	Operation (n)	Vision improved (%)	Diagnosis coincidence rate pre and post (%)	Intraocular pressure improved (%)	Cure and recovery (%)	Perioperative rescue (%)	Complications (%)
2010	1483	96.43	99.86	87.50	99.73	82.98	18.44
2011	1662	96.76	99.94	85.72	99.93	81.46	17.52
2012	1931	97.32	99.90	90.17	99.84	76.66	17.97

Table 2 The adverse events of ophthalmologic perioperative patients in 2010-2012

Years	Operation (n)	Postoperative wound infection (n/%)	Fall the down bed (n/%)	Drug adverse reaction occurred (n/%)	Devices adverse reaction (n/%)	Lung infection (n/%)
2010	1483	0/0.00	1/0.07	1/0.07	3/0.20	0/0.00
2011	1662	1/0.06	0/0.00	2/0.12	5/0.30	0/0.00
2012	1931	0/0.00	0/0.00	4/0.21	6/0.31	0/0.00

Medical Quality and Adverse Events From 2010 to 2012, among the ophthalmologic perioperative patients in our hospital, the incidence of adverse events in the order is 0.34% (5/1483), 0.48% (8/1662) and 0.52% (10/1931). With no statistical significance (Chi-square=0.65, $P=0.72$) between them, but a rising trend is demonstrated. The perioperative patients with drugs and medical devices adverse events increased year by year, failed to reach a statistical significance (Chi-square=1.28, $P=0.53$; Chi-square=0.44, $P=0.80$). In these three years, no case with lung infection or pulmonary embolism among all surgery patients was observed (Table 2).

Negative Factor Analysis In the ophthalmic patients in our hospital, from 2010 to 2012, only one patient received postoperative wound infection in 2011, one tumbling case occurred in 2010. Cases of adverse drug events are respectively 1 (0.07%), 2 (0.12%) and 4 (0.21%), medical device adverse events are respectively 3 (0.20%), 5 (0.30%) and 6 (0.31%), and in 2011, and one case with postoperative endophthalmitis of infection. Moreover, no pulmonary infection or pulmonary embolism occurred during the three years. The perioperative patients with drugs and medical devices adverse reactions increase year by year, without statistical significance, either ($P>0.05$).

DISCUSSION

Medical quality evaluation is an important content of medical quality management, and this study adopts the traditional quality indexes and adverse events to evaluate our medical quality of perioperational period of ophthalmology in 2010-2012. The occurrence of adverse events is closely related to the management of medical service [6]. Adverse events are an important part of the international medical quality index system, as well as the medical safety information system [7]. The concept of adverse events was proposed for the first time in China around the year 2011. Although more attention to adverse events has been gradually paid in recent years, its application in clinical medicine management remains to be further analyzed [8,9].

Analysis based on traditional medical quality indexes and related data showed that the eye care quality goes well. The rate of vision, intraocular pressure period, diagnostic accordance rate before and after surgery and cure are increasing year by year, with basically showed a trend of decrease of the incidence of surgical complications.

Though we didn't found any obvious problems in the adverse factor analysis of our eye care quality in the past three years ($P>0.05$), the incidence of adverse events was on the rise, which hinted that some problems still existed in the management of medical service. What the more prominent is about medical instrument and drug adverse events, while patients with pulmonary embolism and pulmonary infection was rather rare. This may be related to the characteristics of eye surgery. The application of ophthalmic medical instruments such as surgery medication and intraocular lens implantation increased the medical risk of patients with adverse events. Moreover, postoperative patients should avoid the reduction of activity, which could cause pulmonary infection [10].

Traditional indicators could only reflect the general situation of hospital medical quality, such as successful rescue rate and cure rate index which is the evaluation of medical quality in cross-sectional aspect. Adverse events are about the analysis of some specific events and the medical treatment quality control points of evaluation. In addition, according to the analysis of judgment standard, some traditional indexes such as successful rescue rate and cure rate need the success of subjective judgment, while adverse events need to determine whether a particular event occurred. As a result, part of the traditional indexes, due to its difficulty in objective assessment, decreased the accuracy of hospital medical quality evaluation to some extent [11].

In the view of the continuous improvement of medical quality, it is more objective to reflect "positive event" using the indicators about adverse events or highly related with adverse events instead of cure rate and the pre- and post-surgery diagnostic accordance rate index [12,13]. In 2011,

the index system of the tertiary general hospital evaluation standard was issued, in which some subjective judgment of the traditional indicators were eliminated, replaced by objective quantitative indexes^[14]. Adverse events including the incidence of pressure ulcers, surgical infection in patients and the like objective standards had been widely used in international medical quality index system. Noticeably, this also needs to strengthen medical adverse events report system of good use^[15]. Domestic hospitals should motivate hospital medical application of adverse events report system, increase the focus on negative factor index and promote its application in the medical quality evaluation.

Medical quality management to control the quality plan in the past was according to the result of hospital quality evaluation and the means for medical quality management was how to strengthen the core system implementation, strengthen training and improve the quality of medical record writing and so on. At the beginning of the medical quality management, it could improve the quality of the general level, but the pertinence in this way of department management is not strong. Therefore, the further improvement of the quality of medical effect is not significant. In fact, the analysis of the adverse events evaluates medical treatment based on the data from treating results^[16].

Once the weak links in the evaluation of hospital management were found, the relevant departments can formulate corresponding quality control measures according to specific indicators. As for reducing the occurrence of postoperative infectious endophthalmitis, we had a lower incidence of postoperative infectious endophthalmitis which was close to other domestic hospitals around 0.07%-0.40%^[17]. Because the disease could cause serious consequences, to which relevant departments should pay more attention in future practice. Before operation, doctors should meticulously screen patients, strictly grasp the operation indication, strengthen the management of disinfection, standardize the perioperative treatment and improve the operation skills. Once the endophthalmitis occurs, we should actively perform injection of antibiotics into vitreous body cavity and vitrectomy excision as soon as possible to save the patient's visual acuity^[18]. Quality control department should strengthen the cohesion and cooperation with the various departments, formulating specific measures to standardize management of the details of the clinical application of antibacterial drugs to patients. These measures are more specific than traditional quality management. Measures can focus on and track the problems of individual departments to understand the effect of management. Adverse events can be used in the medical quality management for the target control and the measures of quality control could be more detailed^[19].

To sum up, data from traditional indexes analysis showed ophthalmologic perioperative medical quality in good condition, while analysis of adverse events still reminded the existence of certain problems. Compared with the traditional indexes for medical quality evaluation, the adverse event index is easier to make an objective evaluation and facilitates further refine analysis. Reasonable application of the adverse events indicators helped hospital to make the detail quality control measures and promote further improvement of the management level in terms of medical quality and management effect.

ACKNOWLEDGEMENTS

Conflicts of Interest: **Bian YN**, None; **Shi J**, None; **She JJ**, None; **Wu J**, None; **Gao JM**, None.

REFERENCES

- 1 Rowell KS, Turrentine FE, Hutter MH, Khuri SF, Henderson WG. Use of national surgical quality improvement program data as a catalyst for quality improvement. *J Am Coll Surg* 2007;204(6):1293-1300
- 2 Zeeshan MF, Dembe AE, Seiber EE, Lu B. Incidence of adverse events in an integrated US health-care system: a retrospective observational study of 82,784 surgical hospitalizations. *Patient Safety in Surgery* 2014;8:23
- 3 Ministry of Health. Hospital Management Appraisal Guide (trial version) 2008 <http://www.nhfpc.gov.cn/mohbgt/pw10807/200806/36242.shtml>
- 4 Ministry of Health. Notice of issuance of appraisal standards of the grade III comprehensive hospitals (2011 Edition) 2011 <http://www.nhfpc.gov.cn/zyzgj/s3585u/201104/c6fa4cc981d4429ba8caa7666aa13710.shtml>
- 5 Basch E. New frontiers in patient-reported outcomes: adverse event reporting, comparative effectiveness, and quality assessment. *Annu Rev Med* 2014;65:307-317
- 6 Kivlahan C, Sangster W, Nelson K, Buddenbaum J, Lobenstein K. Developing a comprehensive electronic adverse event reporting system in an academic health center. *Jt Comm J Qual Improv* 2002;28(11):583-594
- 7 Milch CE, Salem DN, Pauker SG, Jundquist TG, Kumar SK, Chen J. Voluntary electronic reporting of medical errors and adverse events: an analysis of 92,547 reports from 26 acute care hospitals. *J Gen Intern Med* 2006;21(2):165-170
- 8 Farley DO, Haviland A, Champagne S, Jain AK, Battles JB, Munier WB, Loeb JM. Adverse-event-reporting practices by US hospitals: results of a national survey. *Qual Saf Health Care* 2008;17(6):416-423
- 9 Liang MH, Jiao YH, Zhao MG, et al A comparative analysis on the incidence of adverse events in five hospitals. *Chinese Health Quality Management* 2010;17 (1):1-4 <http://lib.cqvip.com/qk/98273X/20101/32827803.html>
- 10 Zegers M, de Bruijne MC, de Keizer B, Merten H, Groenewegen PP, van der Wal G, Wagner C. The incidence, root-causes, and outcomes of adverse events in surgical units: implication for potential prevention strategies. *Patient Saf Surg* 2011;5:13
- 11 Hall BL, Hamilton BH, Richards K, Bilimoria KY, Cohen ME, Ko CY. Does surgical quality improve in the American College of Surgeons National Surgical Quality Improvement Program: an evaluation of all participating hospitals. *Ann Surg* 2009;250(3):363-376
- 12 Coldiron B, Fisher AH, Adelman E, Yelverton CB, Balkrishnan R, Feldman MA, Feldman SR. Adverse event reporting: lessons learned from 4 years of Florida office data. *Dermatol Surg* 2005;31 (9 Pt 1):1079-1092; discussion 1093

- 13 Martinez EA, Shore A, Colantuoni E, Herzer K, Thompson DA, Gurses AP, Marsteller JA, Bauer L, Goeschel CA, Cleary K, Pronovost PJ, Pham JC. Cardiac surgery errors: results from the UK National Reporting and Learning System. *Int J Qual Health Care* 2012;23(2):151-158
- 14 Liang MH, Shu T, Jiao YH. American international medical service quality indicator project. *Chinese Hospitals* 2009;13(4):14-17 <http://lib.cqvip.com/qk/84022X/20094/29987090.html>
- 15 Michaels RK, Makary MA, Dahab Y, Frassica FJ, Heitmiller E, Rowen LC, Croteau R, Brem H, Pronovost PJ. Achieving the National Quality Forum's "Never Events": prevention of wrong site, wrong procedure, and wrong patient operations. *Ann Surg* 2007;245(4):526-532
- 16 Chang A, Schyve PM, Croteau RJ, O'Leary DS, Loeb JM. The JCAHO patient safety event taxonomy: a standardized terminology and classification schema for near misses and adverse events. *Int J Qual Health Care* 2005;17(2):95-105
- 17 Huang MG. Prevention of postoperative endophthalmitis in the department of ophthalmology operation. *Nei Mongol Journal of Traditional Chinese Medicine* 2012;12:133-134 <http://www.cnki.com.cn/Article/CJFDTOTAL-NZYY201212149.htm>
- 18 Schilling PL, Hallstrom BR, Birkmeyer JD, Carpenter JE. Prioritizing perioperative quality improvement in orthopedic surgery. *J Bone Joint Surg Am* 2010;92(9):1884-1889
- 19 Zhang YK, Guo Y, Zhang J, Li J, Yang YY, Zhao WJ. Clinic analysis of infective endophthalmitis after cataract surgeries in Sight Care No. 1. *Int Eye Sci* 2013;13(6):1260-1263