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Experience with coding accuracy for endophthalmitis

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Abstract

The Endophthalmitis Population Study of Western Australia aims to investigate the epidemiology of endophthalmitis, a potentially sight-threatening infection of the internal eye, in Western Australia in 1980–1998. Cases of endophthalmitis were identified from coded hospital discharge data, surgeon logbooks, and hospital microbiology and anaesthetic databases. This process uncovered not only widespread miscoding for endophthalmitis, but also systematic misuse of the endophthalmitis codes for external eye infections. The level of miscoding and code misuse has improved since the mid-1990s, and probably reflects the introduction of coding standards and trained coders into the Western Australian health system.

Key words: Endophthalmitis; clinical coding; medical audit

Introduction

Endophthalmitis is an infection of the internal structures of the eye. It occurs most commonly as a complication of cataract surgery, with estimates of the post-operative risk varying between one to three cases per 1,000 cataract operations (Montan 2001). This would translate into approximately 10–30 cases per annum in Western Australia (WA). Although it is not common, endophthalmitis is a devastating condition that often causes significant loss of vision and may even result in the loss of the eye. The aims of the Endophthalmitis Population Study of Western Australia (EPSWA) are to determine the true incidence of post-operative endophthalmitis; to identify potential risk factors, including the impact of recent changes in cataract extraction techniques; and to evaluate the effectiveness of various regimens to prevent endophthalmitis.

Methods

The Hospital Morbidity Data System (HMDS) of the WA Record Linkage Project contains details of all hospital admissions in WA since 1980. All coded cases of endophthalmitis from 1980 to June 1999 were identified using the ICD-9 codes 360.0 and 360 and the ICD-9-CM codes 360.00–360.04, 360.11–360.19. All coded cases of endophthalmitis were cross-referenced with external sources. These consisted of the surgical logbooks of the two surgeons responsible for treating most cases of endophthalmitis during the study period, as well as the microbiology and anaesthetic databases of the hospital in which most cases were treated until more recent times. All potential cases were validated by reviewing the hospital medical record.

Results

Of the 685,847 hospital admissions in the HMDS, 2193 (3.4%) were coded as endophthalmitis. Of these, 1474 patients had never had any eye surgery; 181 had had eye surgery after being coded with endophthalmitis; 123 were coded with endophthalmitis and had eye

surgery during the same admission; and 415 were coded with endophthalmitis after eye surgery. Given existing knowledge about the incidence of endophthalmitis, the total number of coded cases was markedly higher than expected. To determine the true incidence of endophthalmitis, and therefore the accuracy of coding, it was necessary to validate coded cases by reviewing hospital medical records.

Post-operative endophthalmitis

As post-operative endophthalmitis is the focus of EPSWA, all such cases in the HMDS were reviewed. These comprised all coded cases of endophthalmitis occurring either during the same admission (123 cases) or during admissions subsequent to cataract surgery (415 cases).

Cross-referencing with external sources revealed an additional 153 possible cases, of which 60 were not in the extracted HMDS file and 93 were in the extracted file but not coded as endophthalmitis. The external sources also suggested that seven cases, classified in the HMDS file as occurring before eye surgery, may in fact have been post-operative cases.

In total, 698 records were reviewed, comprising the 538 cases coded in the HMDS and 160 possible cases suggested by external sources. Of these, 357 (51.1%) were confirmed as true endophthalmitis cases. The majority of valid cases ($n=274$, or 76.8% of 357) were correctly coded in the HMDS. However, 13 valid cases of endophthalmitis were not in the HMDS file, and 49 were in the HMDS file but not coded as endophthalmitis as they should have been.

In order to determine why 62 cases were either missing from the extracted HMDS data file or not coded as endophthalmitis, all hospital admissions for these patients between 1980 and 1999 were examined. The vast majority ($n=55$, or 88.7%) were not coded as having endophthalmitis and would only have been identified with less specific procedure or external cause codes, such as "infection or complication due to internal prosthetic device", "cause of complication due to operation with implant of artificial internal device", "vitrectomy", "therapeutic evacuation", "diagnostic aspiration of anterior chamber" and "staphylococcus (organism isolated)". Seven cases were correctly coded in the hospital records but were not in the HMDS file, possibly reflecting a translational error from paper to electronic record.

A significant number of reviewed records ($n=293$, or 42.0% of 698) were incorrectly coded as endophthalmitis, despite there being no mention of endophthalmitis on the diagnosis sheet of these miscoded cases. Miscoded cases were mainly cases of external eye infections, such as conjunctivitis, red swollen eye, or corneal ulceration.

Records were not available for review, or the diagnosis was uncertain, in 48 cases (6.9% of 698).

Non-surgery-related endophthalmitis

From the HMDS, 1474 (67.3% of 2193) patients who had never undergone eye surgery were coded with endophthalmitis. A sample (158 records) of these was selected from six hospitals for validation by record review. In these six hospitals, only 2.6% to 12.9% were actual cases of endophthalmitis, with causes including penetrating eye injury and endogenous seeding from systemic infection and

other causes. The remainder (88% of 158) were external eye infections, such as conjunctivitis, corneal ulcers or other diagnoses unrelated to the eye.

Since 1987, there has been a marked decline in the number of coded cases of endophthalmitis in the under-50 years age group. This probably reflects improved coding accuracy, with increasing awareness of the differences between endophthalmitis and other external eye infection.

Discussion

Over the past 20 years there has been systematic misuse of the endophthalmitis codes for external eye infections. There has also been a failure to code many true cases of endophthalmitis. There are a number of possible reasons for this. Coding standards were introduced into WA only in 1989, when the Health Department of WA (HDWA) began using ICD-9-CM, a clinical modification by the American Hospital Association of the World Health Organization's *International Classification of Diseases, 9th Revision* (ICD-9). Since 1994, the HDWA and hospitals have used Australian versions of ICD-9-CM ([National Coding Centre, 1995](#)) and ICD-10-AM ([National Centre for Classification in Health, 2000](#)). In parallel with the introduction of coding standards, there has been employment of trained coders. The main WA teaching hospitals began to employ trained coders in the mid-1980s, with other hospitals following in the early 1990s. Both of these measures have contributed to the observed improvement in coding accuracy since the mid-1990s.

The likely misunderstanding between endophthalmitis and other external eye infections, such as conjunctivitis and unspecified red eye, was further compounded by the design of the ICD-9 and ICD-9-CM coding manuals. In those editions, the codes for endophthalmitis were listed well before other, more common conditions such as conjunctivitis. Furthermore, "infection, eye" is indexed to the endophthalmitis code. While it is true that endophthalmitis is infection of the eye (meaning the globe or eyeball), in common usage the eye is taken to mean not only the globe but also the surrounding orbital structures. Regrettably, this problem also exists in the current editions of ICD-10. Revision of the index to divide infection of the eye into either that of the globe or external ocular structures would overcome this problem.

There has also been a failure to code many post-operative cases of endophthalmitis. This is because, while coders have correctly followed current guidelines by coding associated complication codes as the principal diagnosis, they have not been coding the actual condition (endophthalmitis) as a secondary diagnosis.

Conclusion

The systematic miscoding observed as part of this study can be attributed to a number of factors. Despite structural improvements with formal coding standards and trained coders, errors still occur. This highlights the need not only for well-designed, unambiguous coding resources but also the essential role of continuing education. Accurate coding is important not only from a research perspective with the increasing use of aggregated data in health services research and epidemiological studies. Increasingly, the results of coded data are forming the basis of health policy formulation and resource allocation.

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Related topic presentations by the authors

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Li J, Semmens JB, Morlet N (2002). Trends of cataract surgery and post-operative endophthalmitis in Western Australia (1980-1998): A population-based study. Paper presented at the Symposium on Health Data Linkage, Sydney, NSW, 20-21 March.

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