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Targeted education for clinicians and clinical coding staff improves the accuracy of clinical coding: A quality improvement project

Shiva T Radhakrishnan[a,1,*], Robert Perry[a,1], Surabhi Misra[b], Sucharita Ray[c], Aruchuna Ruban[d], Bernard I. Quayson[e], Rishi Fofaria[f], Anita Hudovsky[g], Horace R.T. Williams[h]

[a] Clinical research fellow, Imperial College London, London, UK and gastroenterology specialist trainee, Imperial College Healthcare NHS Trust, London, UK
[b] Medicine for the elderly specialist trainee, Hillingdon Hospitals NHS Foundation Trust Uxbridge, UK
[c] Deputy head of clinical coding Imperial College Healthcare NHS Trust, London, UK
[d] Gastroenterology consultant, Imperial College Healthcare NHS Trust, London, UK
[e] Senior clinical coding specialist, Imperial College Healthcare NHS Trust, London, UK
[f] Gastroenterology consultant, West Hertfordshire Teaching Hospitals NHS Trust
[g] Head of clinical coding, Imperial College Healthcare NHS Trust
[h] Honorary clinical senior lecturer, Imperial College London, London, UK, and gastroenterology consultant Imperial College Healthcare NHS Trust, London

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ABSTRACT

The allocation of healthcare resources is reliant upon accurate information generated through clinical coding. Several factors contribute to coding inaccuracies, one of which is interpreting medical documentation. A lack of awareness among medical staff of the clinical coding process and the importance of detailed documentation exacerbates this problem. To investigate this further, 1 month of inpatient clinical coding data from a single hospital ward was reviewed by clinicians experienced in the coding and auditing process. If the reviewing clinician identified inaccuracies in the initial clinical coding, Healthcare Resource Group (HRG) codes were changed. Education sessions were then provided both to junior clinicians working on the hospital ward and to clinical coding staff and a further month of clinical coding data was again reviewed to assess for any difference after the sessions. HRG changes were made in 58.5% of 94 cases initially. Following the educational sessions, 20.5% of HRGs changed in 73 cases ($p<0.0001$), indicating more accurate initial clinical coding. There were also statistically significant reductions in the extent to which the primary and secondary diagnoses were changed. This study demonstrates that targeted education sessions for both junior clinicians and clinical coding staff can improve the accuracy of inpatient clinical coding.

Introduction

Background

Clinical coding is the process by which healthcare data, including diagnoses, investigations, and treatments, are transformed into alphanumeric code. In the UK, clinical information is translated into codes based on the ICD-10 classification of disease[1] and the Office of Population Censuses and Surveys Classifications of Interventions and Procedures, version four (OPCS-4).[2] These codes are then converted into Healthcare Resource Groups (HRGs), which are utilised to help organisations better understand the activities they undertake, both in terms of the types of patient cared for and the treatments delivered. They are also important for epidemiological studies and national healthcare resource allocation. HRGs were also previously used to determine the final tariff received by a hospital Trust in the 'payment-by-results' (PbR) system.[3] Although the PbR system was suspended during the Coronavirus 2019 (COVID-19) pandemic and replaced by a system of block contracts,[4] future proposed systems of payment will likely continue to rely on accurately coded clinical data.[5] The latest HRG tariff system, HRG4+, allows for greater detail to be recorded by introducing an interactive model of complexity and multiple health condition splits.[6]

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* Address for correspondence: Shiva T. Radhakrishnan, Division of Digestive Diseases, Department of Metabolism, Digestion and Reproduction, Faculty of Medicine, Imperial College London, Sir Alexander Fleming Building, London, SW7 2AZ, UK.
E-mail address: str06@ic.ac.uk (S. T Radhakrishnan).

[1] Joint first authors.

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Study rationale and aims

Clinical coders rely on accurately and clearly documented clinical records to produce clinical codes that reliably reflect clinical activity. Previous studies have suggested wide variability in clinical coding accuracy, particularly in acute medicine, where there is often uncertainty surrounding the correct diagnosis.[7,8] Clinicians may be employed to support clinical coders to improve accuracy but, because of workload pressures, this approach is not universally used.[9]

Coding inaccuracies can be caused by many different factors. The first is unclear or very brief medical documentation. This often occurs because junior medical staff are under time pressure when producing important medical documents, such as discharge summaries (DSUMs). Therefore, these documents can lack pertinent information: this might also be because junior doctors (JDs) are unsure as to what information needs to be included.[10] Both DSUMs and clinical notes are relied upon by clinical coders to produce HRGs that accurately reflect a patient's hospital admission. In addition, many JDs are relatively unaware of the clinical coding process and, therefore, do not appreciate the importance of producing documentation from which non- clinicians can easily elicit information. Second, although they undergo a rigorous process of education and assessment, clinical coders themselves might struggle with complex cases where multiple diagnoses are considered during a patient's hospital stay.[9] Previous data showed the utility of collaboration between coders and JDs to increase the number of codes in a sickle cell disease population; however, this study focussed on increasing the number of codes rather than on the accuracy of coding and was in a single disease cohort.[11]

Our hypothesis is that, following review by a senior clinician, there will be fewer changes required to diagnostic codes after training interventions targeting junior clinicians and clinical coders (the review of the clinical coding by a senior clinician being treated as the reference standard). These training interventions would first focus on ensuring that JDs are aware of the importance of accurate clinical documentation to enable clinical coders to accurately code the healthcare activity occurring during a hospital episode. They would also ensure that coders are aware of where and how important clinical information might be documented in patient notes.

By providing this targeted education to both JDs and coders, we hope to highlight a potential means of improving clinical coding accuracy.

Methods

Baseline data collection

This was a single-centre quality improvement project. All medical discharges from a gastroenterology/general medical ward at St Mary's Hospital, Imperial College Healthcare NHS Trust were analysed for the month of December 2020. All admissions were initially assessed by coders and, following normal practice, each patient encounter was assigned a primary diagnosis, secondary diagnoses (including multiple health conditions) and, if relevant, primary procedures/ secondary procedures. HRG codes were then produced for each patient admission, based on the results of the ICD-10 and OPSC-4 codes using 'LiveAudit' software.[12]

These initial coding results were then jointly reviewed by coding auditors and senior clinicians familiar with the clinical coding process. Senior clinicians were defined as any doctor at a seniority of registrar or above with at least 6 months' experience of working with the clinical coding team. If indicated after this audit, ICD-10 codes were changed, added, or removed for each patient encounter to ensure that the coding accurately represented the inpatient stay. All reviews were performed within 4–6 weeks of the patient discharge date, in keeping with the timeline for submission of results for financial reimbursement.[13] All data, including ICD-10 codes for changes or additions to primary and secondary diagnoses, OPCS-4 codes for procedures, and HRG codes, were extracted for further analysis.

Intervention and further data collection

Targeted education sessions were then delivered to all JDs working on the selected medical ward, after the first month of data collection. These included all non-consultant grades, specifically specialist registrars (SpRs), senior house officers (SHOs) and foundation year trainees (FY1s), who were responsible for documenting in patients' notes as well as completing DSUMs.

Multiple educational sessions occurred to ensure that all JDs attended a session and each session lasted 1 h at lunchtime. These education sessions covered the role of clinical coders and the information they needed to extract from medical notes.

Advice was given, such as how to make notes easier for coders to interpret; for example, by avoiding abbreviations, such as 'low K', instead of 'hypokalaemia', accurately documenting procedures (such as urinary catheterisation) and interpreting blood results within the notes. JDs were taught that clinical coders are unable to interpret clinical findings, illustrating that effective documentation is paramount to elucidating the correct clinical codes from each patient encounter.

Sessions also emphasised the importance of documenting the diagnoses made during an admission in the DSUMs, rather than simply the patient's presenting symptoms. The education sessions also highlighted the significance of accurate clinical coding as a means of understanding NHS activity on a local, regional and national scale.

Targeted sessions were simultaneously delivered to the coding team in similar 1-h lunchtime teaching sessions to those delivered to the JDs. These focussed on educating the coders as to where useful information might be found in the medical notes and highlighting sections, such as nursing documentation, that were not routinely being scrutinised. The general principal of reviewing all stages of a patient's hospital stay methodically was emphasised.

Data were collected again in January 2021, after the teaching sessions had been delivered: again, every medical discharge under the same team was reviewed by senior clinicians and a coding auditor.

Ethical considerations

This study was classified as a quality improvement project and did not meet the NIHR criteria for research ethics committee (REC) review. All patient data were anonymised before analysis.

Analysis

The accuracy of coding was assessed by the extent to which certain variables within the coding data were changed following review by the senior clinician and coding auditor. The following outcome measures were assessed:

- Primary outcome: percentage (%) of patient admissions for which HRG changed.
- Secondary outcomes: percentage (%) of clinical episodes for which primary diagnosis changed; percentage (%) of clinical episodes for which secondary diagnosis changed; percentage (%) of clinical episodes for which primary procedure changed; and percentage (%) of clinical episodes for which secondary procedure changed.

Given that the HRG code refers to an entire patient admission, HRG changes were expressed in percentage terms according to the number of admissions for which the overall HRG changed. Total tariff changes as a result of any HRG changes, based on the HRG4+ system, were also reported. The coding software divides each patient admission into clinical episodes, which might have different primary or secondary diagnoses. Therefore, data for primary diagnosis, secondary diagnosis, primary procedure, and secondary procedures were analysed in terms of

Table 1
Summary of changes before and after targeted education.

Category	Pre-targeted education	Post-targeted education	p-value
Clinical episodes for which primary diagnosis changed	39/229 (17.3%)	10/194 (5.2%)	**<0.0001**
Clinical episodes for which secondary diagnosis changed	86/229 (37.6%)	54/194 (27.8%)	**0.03**
Clinical episodes for which primary procedure changed	16/229 (6.9%)	3/194 (1.6%)	**0.008**
Clinical episodes for which secondary procedure changed	24/229 (10.5%)	5/194 (2.6%)	**0.001**
Patient admissions for which HRG changed	55/94 (58.5%)	15/73 (20.5%)	**<0.0001**

HRG = Healthcare Resource Group.

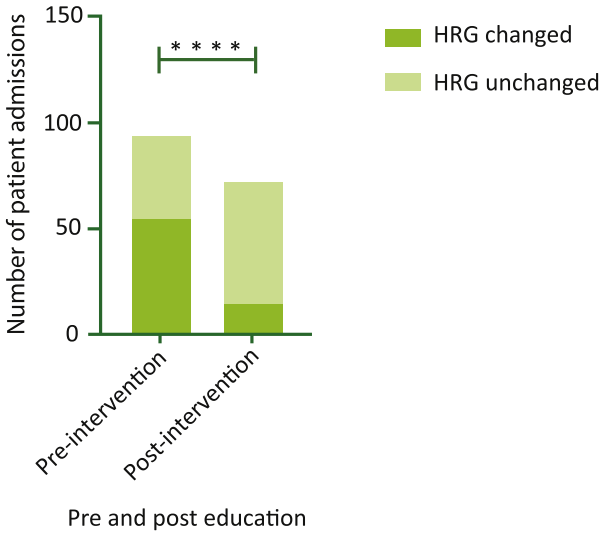

Fig. 1. Changes in Healthcare Resource Group (HRG) pre- and post-education sessions. Fisher's exact test 2-tailed, ****p<0.0001.

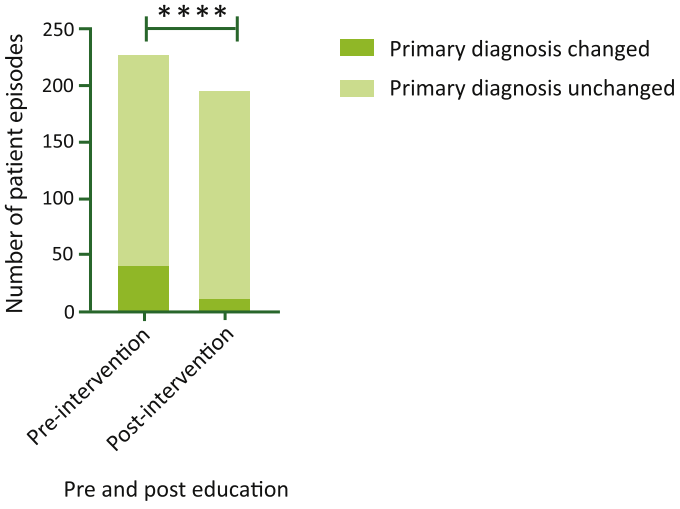

Fig. 2. Changes in primary diagnoses pre- and post-education sessions. Fisher's exact test 2-tailed, ****p<0.0001.

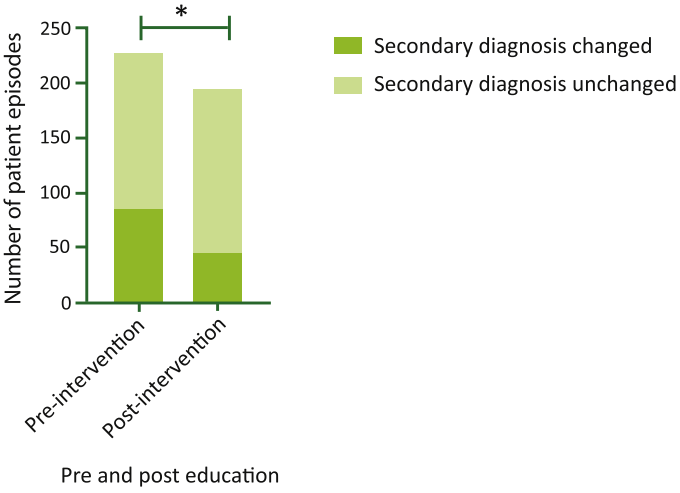

Fig. 3. Changes in secondary diagnoses pre- and post-education sessions. Fisher's exact test 2-tailed, *p<0.0383.

the proportion of clinical episodes that were changed before and after the educational sessions. Data after the intervention were analysed in a contingency table with Fisher's exact test applied (Table 1). A two-sided p-value (<0.05) was used to determine whether trends were statistically significant.

Results

Before the teaching sessions, the number of patient admissions for which the overall HRG changed following review was 55 out of a total of 94 (58.5%). This reduced after the teaching sessions, to 15 out of 73 patient admissions (20.5%), an overall attributable risk reduction (RR) of 37.9% (95% confidence interval (CI) 22.4–50.8%, p<0.0001) (Fig 1).

The proportion of patient episodes for which the primary diagnosis was changed also significantly reduced after the education sessions, from 17.3% to 5.2%, an overall attributable RR of 11.9% (95% CI 5.6–18.1%, p<0.0001) (Fig 2). After the intervention, the percentage of episodes in which a change was made to the list of secondary diagnoses (which includes all multiple health conditions) reduced from 37.6% to 27.8%, an overall attributable RR of 9.7% (95% CI 0.38–18.2%, p=0.03) (Fig 3). The percentage of episodes for which the primary procedure changed decreased from 6.9% to 1.6%, an overall attributable RR of 5.4% (95% CI 1.1–9.9%, p=0.008) (Fig 4) and secondary procedures decreased from 10.5% to 2.6%, an overall attributable RR of 7.9% (95% CI 2.8–13.1%), p=0.001) (Fig 5).

Before intervention, HRG changes led to total tariff changes of £100,777, an average of £1,072.09 per patient. Post intervention, the total tariff changes reduced to £22,744, an average of £311.56 per patient.

Discussion

This study shows that targeted teaching to both junior clinicians and clinical coders can improve coding accuracy. Following the targeted sessions, the need to alter a patient's primary diagnosis, and overall HRG for their admission, reduced significantly. This was achieved through better documentation from junior clinicians, resulting from their increased awareness of the coding process, and through clinical coders recognising alternative sources of information in the medical record. The coding of primary and secondary procedures also improved following the sessions.

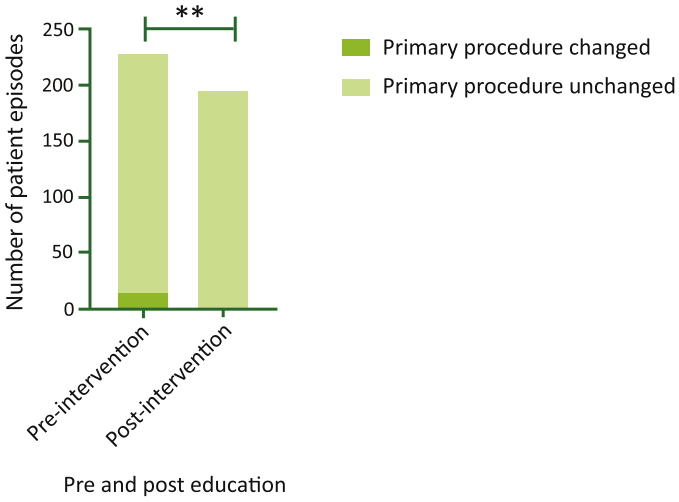

Fig. 4. Changes in primary procedures pre- and post-education sessions. Fisher's exact test 2-tailed, **p<0.008.

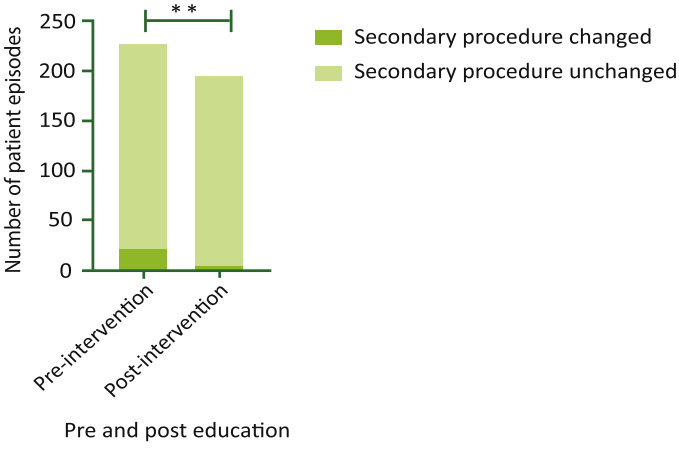

Fig. 5. Changes in secondary procedures pre- and post-education sessions. Fisher's exact test 2-tailed, **p<0.0016.

Concerns regarding the accuracy of clinical coding data have been raised previously, most notably in 2010, when a report from the Audit Commission suggested that primary care Trusts might have made around £1 billion worth of incorrect payments.[14,15] Inaccurate documentation by JDs has frequently been suggested as a significant contributor to this.[7,10] Previous studies have highlighted issues with coding accuracy in both inpatient medical settings and more procedure-focussed surgical specialities.[8,16–18] Inaccurate coding can impact our understanding of the detail of NHS activity, including knowledge of patients' presenting medical conditions as well as the treatments they receive.

Inaccuracies can also have financial implications for healthcare organisations. These issues have led to several different approaches to try to improve coding accuracy, including increasing the involvement of clinicians in the auditing process, an approach that has been shown to increase the tariffs paid to NHS trusts.[9] However, because of demands on clinician time, alternative methods of improving clinical coding accuracy are needed, with a focus on improving the precision of the initial coding. This project highlights another method through which coding accuracy can be improved.

This study does have some limitations. Each set of data was collected during a single month from a single ward, which means the overall sample size is small. Given the focus on a single ward, the number of JDs educated was also small, potentially affecting the reproducibility of the findings. The study was undertaken in the context of the COVID-19 pandemic, which might have influenced the mix of patients admitted to the ward, although the ward studied was not a dedicated COVID unit.

Given that all patient documentation was electronic in this study, this enabled easy access to clinical coders to access patient notes. The continued improvement of electronic healthcare record systems, by developing more user-friendly interfaces, is one further potential method to improve the accuracy of coding that could be explored in future work. A further possible option to improve coding acquisition could be clinical coders assisting clinicians in real-time to improve initial note writing, although this would require multiple coders to attend wards, incurring workforce-planning issues and could have adverse implications by lengthening ward round timings.

Conclusion

This study shows that targeted education sessions for both junior clinicians and clinical coders can improve the accuracy of clinical coding data. Use of similar sessions more widely has the potential to improve the accuracy of the data used to understand clinical activity in the NHS, as well as tariffs paid to NHS organisations.

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