



The impact of three discharge coding methods on the accuracy of diagnostic coding and hospital reimbursement for inpatient medical care



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ABSTRACT

Background: Coding of diagnoses is important for patient care, hospital management and research. However coding accuracy is often poor and may reflect methods of coding. This study investigates the impact of three alternative coding methods on the inaccuracy of diagnosis codes and hospital reimbursement.

Methods: Comparisons of coding inaccuracy were made between a list of coded diagnoses obtained by a coder using (i) the discharge summary alone, (ii) case notes and discharge summary, and (iii) discharge summary with the addition of medical input. For each method, inaccuracy was determined for the primary, secondary diagnoses, Healthcare Resource Group (HRG) and estimated hospital reimbursement. These data were then compared with a gold standard derived by a consultant and coder.

Results: 107 consecutive patient discharges were analysed. Inaccuracy of diagnosis codes was highest when a coder used the discharge summary alone, and decreased significantly when the coder used the case notes (70% vs 58% respectively, $p < 0.0001$) or coded from the discharge summary with medical support (70% vs 60% respectively, $p < 0.0001$). When compared with the gold standard, the percentage of incorrect HRGs was 42% for discharge summary alone, 31% for coding with case notes, and 35% for coding with medical support. The three coding methods resulted in an annual estimated loss of hospital remuneration of between £1.8M and £16.5M.

Conclusion: The accuracy of diagnosis codes and percentage of correct HRGs improved when coders used either case notes or medical support in addition to the discharge summary. Further emphasis needs to be placed on improving the standard of information recorded in discharge summaries.

1. Introduction

In most health systems across the world, patient diagnoses are translated into suitable codes at hospital discharge using a coding scheme such as ICD 10 [1,2], the most widely used terminology. The resulting diagnosis codes are used by several organizations for differing purposes: (i) hospitals or health insurers, to justify and receive financial

remuneration (tariffs attributed according to the Healthcare Resource Group (HRG) within UK and to the Diagnosis Related Group (DRG) throughout other countries. HRG (or DRG) are clinically meaningful groups of diagnoses and interventions considered as consuming similar levels of financial resources) [3], (ii) health systems, to monitor disease outbreaks, report mortality and plan national strategies for improving the quality and safety of healthcare (e.g. the Centre for Disease Control

Abbreviations: HRG, Healthcare Resource Group

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in USA) [4,5], (iii) companies, to measure doctor and hospital performance (e.g. Dr Foster in the UK) [6–8], (iv) researchers, to carry out epidemiology and health services research [9]. Despite the importance of recording accurate data, there remains significant variation in the reported accuracy of diagnosis codes which can range from 51% to 98% [10,11]. This may reflect differences in coding practices between hospitals.

There is significant variation in coding practice between countries and even hospitals in the same health care system [12,13], with diagnoses being collected either through remote or point-of-care coding. Remote coding is done entirely by dedicated coders, who are non-medical staff with strong terminology skills, using discharge summaries with or without case notes [12]. The discharge summary is often used as the sole source of information. While these are concise documents, they can be written retrospectively due to time constraints and the information in summaries can be inaccurate [14,15]. In contrast, the case notes contain in-depth prospectively recorded information. However, this is often voluminous, disorganized and contains multiple abbreviations, making it difficult for coders to extract the information they need [16]. Point-of-care coding is undertaken by medical doctors and coders, usually from discharge summaries alone [12]. Since medical doctors often lack knowledge of coding terminology, coders usually check and complete the list of codes generated by the doctor.

Despite the importance of accurately recording and coding discharge diagnoses, few studies [17–19] have assessed the impact of varying methods of data capture on the accuracy of diagnosis codes. It remains unclear if coders should refer to case notes and/or discharge summaries and whether and how medical doctors should be involved. To address these questions, we conducted a prospective study comparing the impact of three coding methods on the inaccuracy of diagnosis coding against a gold standard (or criterion standard), and the consequent impact on calculated hospital remuneration.

2. Methods

2.1. Study design

This was a comparative study using data from a prospective cohort of consecutive patients discharged from three adult respiratory wards at St James University Hospital Leeds during March 2015. Exclusion criteria included the absence of a primary respiratory diagnosis, a missing discharge summary or an ambulatory patient attending for a day case procedure such as a bronchoscopy.

For each patient, we generated four lists of diagnosis codes (Table 1):

- The gold standard list (or criterion standard). This was derived soon after discharge by the doctor responsible for the care episode, working with a coder using the case notes
- The remote coded list with case notes. This was derived by a coder using the paper case notes in addition to the electronic discharge summaries
- The remote coded list. This was derived by the coder using the electronic discharge summary, which had been generated by junior doctors following discharge using a basic template.
- The point of care coded list with doctor. This was derived by a doctor naïve to the case and the coder using the electronic discharge summary alone

One author (RT) who did not participate in the coding process compared the four lists of codes for each patient.

2.2. Generation of the four code lists for each patient

2.2.1. Generation of the gold standard list

First, the doctor responsible for that patient’s inpatient stay identified the primary and secondary diagnoses for their patient using the case notes, test results and their knowledge about the patient. These diagnoses were then converted into ICD 10 codes by the coder in the presence of the doctor. Then, after reading the case notes alone, the coder suggested new or modified codes. The doctor could then decide whether to accept the changes or not. The resulting list was taken as the gold standard for each patient. During this process, the team was blinded to the contents of the discharge summary.

2.2.2. Generation of remote coding with case notes

The coders used the case notes and electronic discharge summaries to generate this list during the routine hospital coding process. Coders were blind to the three other code lists.

2.2.3. Remote coding with discharge summaries and point of care coding by coder and doctor with discharge summaries

A doctor naïve to the clinical case and the coder independently and simultaneously generated a list of diagnoses from the anonymised discharge summary. The coder generated a list of codes from the electronic discharge summary and converted them into ICD10 codes. This corresponds to the remote coding with discharge summaries. Then, the doctor and coder compared their lists and generated a complete list of codes that was taken as the point of care coding list. Anonymised discharge summaries and a wash-out period of at least three weeks after the derivation of the gold standard were used to reduce memory effects

Table 1
Definition of source of coding and personal involvement in code generation.

Features		Gold standard	Remote coding	Remote coding with case notes	Point of care coding with doctor
Materials	Case notes	x		x	
	Discharge summaries		x	x	x
Paper format Electronic basic template fill by junior doctors for all patients in discharge. It includes the following sections: <ul style="list-style-type: none"> – Administrative patient data – Drug allergies and sensitivities – Primary diagnosis/procedure and advice to GPs – Information on medication – Follow up arrangements 					
Persons involved in coding	Coder	x	x		x
	Coders			x	
	Consultant Consultant	x			x
Responsible for the care episode Naïve to the care episode					

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