Referral for investigation: a redundant SNOMED-CT chief presenting complaint

Peter G Jones, Mark Gardener

ABSTRACT

AIM: The Ministry of Health has mandated that all emergency department (ED) presentations are coded using the Systematised Nomenclature of Medicine – Clinical Terms (SNOMED-CT) from 2021. The current ED reference set contains the non-specific term ‘Referral for investigation’ in the list of available chief presenting complaints (CPCs). The aim of this study was to determine the rate of use of this term and how often a more specific (and therefore more clinically useful) term was used.

METHOD: This was a cross-sectional audit of routinely collected presenting complaint data, supplemented by a retrospective case note review.

RESULTS: ‘Referral for investigation’ was used for 497/9,067 (5.5%, 95%CI 5–6%) presentations, with increased use for urgent cases. An alternative CPC was available in 467/497 (94.0%, 95%CI 92–96%) of cases from the existing reference set. Of 98 different CPCs, the common alternatives were: ‘Chest pain’ (6.4%), ‘Shortness of breath’ (4.2%) ‘Abdominal pain’ (3.6%), ‘Altered mental status’ (3.4%) and ‘Postoperative complication’ (3.2%). Six of 13 cardiac arrests and eight of 63 of multiple trauma cases were coded as ‘Referral for investigation’. With the addition of two new terms to the New Zealand reference set (‘Abnormal blood test’ and ‘Radiology request’), each of the remaining 30 presentations would have an alternative and more accurate CPC.

CONCLUSION: ‘Referral for investigation’ should be removed from the New Zealand emergency department reference set for chief presenting complaints to improve data quality.

The Systematised Nomenclature of Medicine – Clinical Terms (SNOMED-CT) coding system has been adopted by the Ministry of Health in Aotearoa New Zealand.1 SNOMED-CT is designed to provide a standardised method to represent clinical phrases (CT=clinical terms). According to the International Health Terminology Standards Development Organisation (IHTSDO), the uses of SNOMED-CT are multiple, including for clinical purposes, population monitoring and audit/research.1 In emergency departments (EDs), the presenting complaint combined with triage category (urgency to be seen) is used by clinicians to decide which patient should be seen next, so its use is primarily clinical and secondarily for audit and research.

Adoption of SNOMED-CT allows for the first time a standardised approach for recording the reasons people present for care to emergency departments, by using a SNOMED concept code for a patient’s chief presenting complaint (CPC), in line with international recommendations.2 The New Zealand ED reference set for CPCs was developed by clinicians and is a trade-off between the vast number of possible SNOMED-CT concepts (currently over 350,000)3 and the need for ease of use and clinical utility at the bedside in the ED.4 With this in mind, there are only 155 concepts in the New Zealand ED reference set for CPCs.5 Other jurisdictions have independently developed similar size ED CPC reference sets,6,7 with a high concordance between the number of concepts and concept terms selected. Others have recommended larger reference sets,8,9 although if a reference set is too large, it may become unusable.9 A common feature of all of these reference
sets is that they draw upon concepts from different hierarchies within SNOMED-CT that are clinically meaningful.

A previous audit at our site found that the SNOMED-CT concept ‘Referral for investigation’ was being used as the CPC for many primary care referrals to ED. As this implies the source of referral rather than what the patient presented with, this CPC lacks clinical relevance. Approximately 5% of ED presentations were being coded this way, with an alternative CPC evident from the clinician’s notes in 86% of cases. However, this data was limited by the small sample size of 43. If ‘Referral for investigation’ is being used when an alternative CPC is available, then the usefulness of CPC coding is reduced. This may limit the usefulness of CPC coding for surveillance of emerging viral diseases, emerging trends in recreational drug toxicity and mental health presentations. It also means that audit or research of any condition using CPCs will require a manual search of all cases of ‘Referral for investigation’ to ensure that the CPCs of interest is not missed, which would be a waste of time and resources.

The primary aim of the current audit was to find out how often a more specific CPC could have been used for those cases coded as ‘Referral for investigation’. The secondary aim was to explore which types of cases were more likely to be coded this way.

**Method**

This was a cross-sectional audit of routinely collected presenting complaint data, supplemented by a retrospective case note review.

**Setting**

Auckland City Hospital is an urban tertiary academic centre that has an annual census of approximately 76,000 patients 15 years of age or older.

**Case selection**

Consecutive presentations to ED were selected between 1 March and 30 April 2020. Two months was chosen to give a sample size of approximately 600 cases of ‘Referral for investigation’, based on our usual annual presentations (5% x 76,000 annual presentations / 6).

**Data collection**

**Real-time CPC ‘Referral for investigation’**

Real-time CPCs were recorded by triage nurses for all ED presentations except those ambulance patients requiring immediate resuscitation or primary care referrals to inpatient teams. Clerical staff recorded the CPCs for patients referred from their primary care provider or patients requiring immediate resuscitation (while clinical staff provided immediate care).

The following data was retrieved from the hospital data warehouse by one author (MG): event number, National Health Index (NHI), date/time of presentation, age, sex, ethnicity, Accident Compensation Corporation (ACC) status, triage code, arrival mode, real-time CPC and free-text triage comments fields. This was stored on a password protected USB stick.

**Auditor CPC**

The triage comments fields were scanned manually for text that mapped to the current SNOMED-CT CPC reference set. If there were multiple CPCs recorded in the triage comments field, the first CPC recorded was used. If there were no CPCs recorded in the triage comments field, the clinical records system Concerto (Orion Health, Auckland, New Zealand) was accessed using a password protected virtual private network connection on a password protected computer. One author (PJ) recorded CPCs based on the first treating clinician’s clinical notes. The first treating clinician was either an independent nurse practitioner or doctor. When there was more than one presenting complaint recorded by the first treating clinician, the first recorded presenting complaint was used.

**Data handling**

All data were entered into a purpose-built electronic data collection form in Microsoft Excel (Microsoft Corporation, Redmond, Washington, US) on a password protected USB stick.

**Data analysis**

The CPCs recorded were tabulated and described using number and proportion with a 95% confidence interval (95%CI). The 95%CI was calculated using Graphpad QuickCalcs (https://www.graphpad.com/quickcalcs/confinterval1; San Diego, CA, US).
Ethics
As an audit of the data quality undertaken by staff in the department where this data was collected, and as no identifying data would be reported, this study did not meet the threshold to require ethical approval. Institutional approval was obtained from the Auckland District Health Board Research Review Committee, A+8901.

Results
Over the period of the audit, there were 9,067 presentations to ED. ‘Referral for investigation’ was used for 497 presentations: 497/9,067=5.5% (95%CI 5–6%). Table 1 shows the baseline demographics of this group compared to those cases with other CPCs. Those with ‘Referral for investigation’ as their CPC were more likely to be older or male or to have arrived by ambulance and have higher triage acuity compared to other patients.

In 467/497 (94.0% (95%CI 92–96%)) cases there was a more specific CPC from the current ED reference set recorded in the triage comments, primary care referral letter or clinical notes. In total, 98 different CPCs were used; these are shown in Figure 1.

The most commonly used alternative CPCs were: ‘Chest pain’ (32, 6.4%), ‘Shortness of breath’ (21, 4.2%), ‘Abdominal pain’ (18, 3.6%), ‘Altered mental status’ (17, 3.4%) and ‘Postoperative complication’ (16, 3.2%). Six of 13 cardiac arrests (46%) and eight of 63 of multiple trauma cases (13%) were coded as ‘Referral for investigation’.

Table 1: Demographics of sample population.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Referral for investigation</th>
<th>All other CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n, % (n=497)</td>
<td>n, % (n=8570)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>57.7 (22.0)</td>
<td>48.4 (21.8)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>233, 46.9</td>
<td>4309, 50.3</td>
</tr>
<tr>
<td>Male</td>
<td>264, 53.1</td>
<td>4261, 49.7</td>
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<tr>
<td><strong>Ethnicity</strong></td>
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<td></td>
</tr>
<tr>
<td>Asian</td>
<td>101, 20.3</td>
<td>1725, 21.4</td>
</tr>
<tr>
<td>European</td>
<td>261, 52.2</td>
<td>4325, 53.7</td>
</tr>
<tr>
<td>Māori</td>
<td>53, 10.7</td>
<td>904, 11.2</td>
</tr>
<tr>
<td>Pacific</td>
<td>65, 13.1</td>
<td>1167, 14.5</td>
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<tr>
<td>Other</td>
<td>17, 3.4</td>
<td>449, 5.6</td>
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<td><strong>Triage category</strong></td>
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<tr>
<td>1</td>
<td>95, 19.1</td>
<td>369, 4.6</td>
</tr>
<tr>
<td>2</td>
<td>140, 28.2</td>
<td>1683, 20.9</td>
</tr>
<tr>
<td>3</td>
<td>136, 27.4</td>
<td>3640, 45.2</td>
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<tr>
<td>4</td>
<td>109, 21.9</td>
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<td>5</td>
<td>13, 2.6</td>
<td>244, 3.0</td>
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<tr>
<td><strong>Arrival mode</strong></td>
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<td>Ambulance</td>
<td>223, 44.9</td>
<td>2675, 33.2</td>
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<tr>
<td>Aeromedical</td>
<td>7, 1.4</td>
<td>51, 0.6</td>
</tr>
<tr>
<td>Police</td>
<td>3, 0.6</td>
<td>47, 0.6</td>
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<tr>
<td>Self</td>
<td>253, 50.9</td>
<td>5760, 71.5</td>
</tr>
<tr>
<td>Unknown</td>
<td>11, 2.2</td>
<td>37, 0.5</td>
</tr>
</tbody>
</table>

CPC=chief presenting complaint; SD=standard deviation; CI=confidence interval; *4 missing triage categories from ‘Referral for investigation’ and 17 missing overall.
Figure 1: Specific CPCs.

CPC=chief presenting complaint; UTI=urinary tract infection.
The 30 cases where no specific CPC was available were: nine referrals for treatment of a specific condition, eighteen abnormal blood tests (seven hyperkalaemia, three abnormal liver function, two anaemia and one each for hypercalcaemia, d-dimer, creatinine, hypoglycaemia, hyponatremia and polycythaemia) and three were for specific radiology tests (one computerised tomography (CT) scan and two ultrasound).

Discussion

This comprehensive audit of use of the CPC ‘Referral for investigation’ in a New Zealand ED found that approximately 5% of all ED presentations were coded as ‘Referral for investigation’. This is consistent with a previous audit in our department in 2019. In nearly every case, an alternative and more specific CPC was available from the triage comments, primary care referral letter or clinical notes.

The cases where this non-specific CPC was used were more likely to be those arriving by ambulance and in the most urgent triage categories. This means that our data on the sickest patients are of lower quality than that of other patients. The need to rapidly load urgent cases onto the hospital information system and focus clinical staff on patient care immediately on arrival means that this CPC was used for expediency by some staff. However, as most urgent cases were being coded with a more specific CPC, this was likely due to individual variation in practice rather than intrinsic to the urgency of the situation.

We identified this issue with use of ‘Referral for investigation’ in 2019 and have attempted to reduce its use by a process of education and feedback for triage nurses and clerks. This process included departmental presentations, engagement of the opinion leaders within each craft group, email reminders and individual feedback. Despite these efforts, there has been no change over time. It is likely that other hospitals introducing SNOMED-CT as part of the Ministry of Health’s requirements may encounter similar problems. We therefore believe that the simplest solution to improve data quality is to remove the CPC ‘Referral for investigation’ from the New Zealand reference set. We also suggest that the following codes be added for presenting complaints that are not currently available in the reference set: ‘Abnormal blood test’ (151271000119102) and ‘Radiographic imaging procedure requested’ (168495003). The alternative to this change is to improve the delivery and uptake of education about more appropriate use of the ‘Referral for investigation’ CPC. This may be feasible in smaller departments with a limited number of staff involved: in our setting, the time and resources required to embark on further efforts at education for the more than 150 staff potentially entering this information would be considerable, especially when there is no guarantee of success. We believe the most efficient and practicable solution is to make the changes suggested above.

Conclusion

‘Referral for investigation’ was used for 5% of all cases presenting to our ED, particularly for the most urgent cases, despite more accurate and specific presenting complaints being readily accessible. ‘Referral for investigation’ should be removed from the New Zealand emergency department reference set for chief presenting complaints to improve data quality.
REFERENCES


Competing interests:
Dr Jones reports and is part of a clinical advisory team to the Ministry of Health with respect to implementation of SNOMED-CT in emergency departments in Aotearoa New Zealand.

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