Assessment of Text Documentation Accompanying Uncoded Diagnoses in Computerized Health Insurance Claims in Japan

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ABSTRACT

Background: Uncoded diagnoses in health insurance claims (HICs) may introduce bias into Japanese health statistics dependent on computerized HICs. This study’s aim was to identify the causes and characteristics of uncoded diagnoses.

Methods: Uncoded diagnoses from computerized HICs (outpatient, inpatient, and the diagnosis procedure-combination per-diem payment system [DPC/PDPS]) submitted to the National Health Insurance Organization of Kumamoto Prefecture in May 2010 were analyzed. The text documentation accompanying the uncoded diagnoses was used to classify diagnoses in accordance with the International Classification of Diseases-10 (ICD-10). The text documentation was also classified into four categories using the standard descriptions of diagnoses defined in the master files of the computerized HIC system: 1) standard descriptions of diagnoses, 2) standard descriptions with a modifier, 3) non-standard descriptions of diagnoses, and 4) unclassifiable text documentation. Using these classifications, the proportions of uncoded diagnoses by ICD-10 disease category were calculated.

Results: Of the uncoded diagnoses analyzed (n = 363,753), non-standard descriptions of diagnoses for outpatient, inpatient, and DPC/PDPS HICs comprised 12.1%, 14.6%, and 1.0% of uncoded diagnoses, respectively. The proportion of uncoded diagnoses with standard descriptions with a modifier for Diseases of the eye and adnexa was significantly higher than the overall proportion of uncoded diagnoses among every HIC type.

Conclusions: The pattern of uncoded diagnoses differed by HIC type and disease category. Evaluating the proportion of uncoded diagnoses in all medical facilities and developing effective coding methods for diagnoses with modifiers, prefixes, and suffixes should reduce number of uncoded diagnoses in computerized HICs and improve the quality of HIC databases.

Key words: coding; health insurance claim; ICD-10; uncoded diagnoses

INTRODUCTION

A precise evaluation of the burden of disease is required to set priorities in health policy. Health insurance claims (HICs) are prepared by healthcare providers for reimbursement of their services. In Japan, HIC records contain information about health insurance qualification status, healthcare costs, clinical procedures, and diagnoses. Statistics on medical expenditures in Japan, such as those reported in the Estimation of National Medical Expenditures, Social Insurance Claims Survey, and the National Health Insurance Medical Benefit Surveys, are based on HICs. The following list outlines healthcare indicators that recently have been calculated using HIC information: the quality of care of patients with diabetes,1 the completeness of the infectious disease surveillance system,2 the relationship between disease type and patients’ health-seeking behaviors,3 the relationships between health guidance for metabolic syndrome and outpatient charges and drug costs and metabolic syndrome,4 the association between hospital case volume and mortality in non-elderly pneumonia patients,5 and regional differences in the performance of bone marrow transplants.6 There are limitations in the information recorded in HICs in Japan due to regulations on medical cost reimbursement. First, most HICs contain more than one diagnosis7–9 because healthcare providers submit only one HIC describing all of the healthcare services provided to an individual during a calendar month. Previously, HICs were submitted on paper, and it was
common to select only one principal diagnosis from a HIC for the database, even if there were multiple diagnoses. This practice resulted from the labor costs of inputting the information from the HIC into a database. It has been reported that hypertension tended to be selected as the principal diagnosis among the elderly insured by the National Health Insurance for Medical Services for the Aged. Thus, the estimation of disease-specific medical expenditures using HICs may be biased.\textsuperscript{8,10}

In Japan, confirmed, unconfirmed, and disproved diagnoses are all included in HICs.\textsuperscript{10,11} Furthermore, health insurance coverage is based primarily on fee-for-service reimbursement, with regulations dictating that each clinical procedure be described and justified by a corresponding diagnosis. For certain diagnostic categories (eg, neoplasm), various examinations are usually conducted, including consultations, imaging, and investigations using tumor markers. When test results indicate that a suspected disease is not present, rule-out diagnoses are included in the HIC to ensure reimbursement for the clinical procedures conducted. Technical limitations prevent the assessment of all the information mentioned in a HIC; therefore, information about multiple and rule-out diagnoses have been ignored in estimates of disease-specific medical expenditures, which may introduce bias. For example, more than one-third of the medical expenditures for outpatient care of neoplasms are spent on rule-out diagnoses,\textsuperscript{10} and there are differences in procedures and medical expenditures for inpatients with and without a rule-out diagnosis of sepsis.\textsuperscript{9}

Uncoded diagnoses in computerized HICs have been recognized as a new problem in the management of these data.\textsuperscript{13,14} Medical facilities are required to code all of the diagnoses according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) before submitting the computerized HIC.\textsuperscript{15} However, if the medical facilities are unable to code a diagnosis, it is listed as “uncoded”; in this case, the HICs are submitted with text documentation related to the uncoded diagnoses. The proportion of uncoded diagnoses electronically submitted to National Health Insurance Organization (NHIO) of Kumamoto Prefecture in 2010 was reported as approximately 10%\textsuperscript{13,14}

Uncoded diagnoses are not used in the summaries of key health statistics, such as the Social Insurance Claims Survey and the National Health Insurance Medical Benefit Surveys. The proportion of uncoded diagnoses varies by the type of HIC and disease category, and uncoded diagnoses may have introduced bias into Japanese health statistics that are based on HICs.\textsuperscript{14} The proportion of uncoded diagnoses was relatively high for some diagnoses, especially Diseases of the ear and mastoid process and Injury, poisoning, and certain other consequences of external causes, which are supposed to be accompanied by information about the disease sites (eg, the right or left side of the body). The causes underlying uncoded diagnoses in computerized HICs must be identified to improve the accuracy of Japanese health statistics that are based on computerized HIC data, such as the estimation of disease-specific medical expenditures. The aim of this study is to investigate the causes of uncoded diagnoses in computerized HICs by analyzing the text documentation accompanying the uncoded diagnoses.

**METHODS**

**Health insurance claims**
This study reviewed all 363,753 uncoded diagnoses of the 3,804,246 diagnoses in HICs that were electronically submitted to the NHIO of Kumamoto Prefecture in May 2010. The details of HICs in Japan have been described in our previous report.\textsuperscript{14}

Medical facilities are required to code all diagnoses according to the standard descriptions of diagnoses defined in the “Manual about Specifications of the Computerized Health Insurance Claim System Master File”\textsuperscript{15} before submitting HICs. The coding of the standard descriptions of diagnoses, which is defined in the master file, is based on the ICD-10. In addition, every diagnosis is accompanied by supporting text documentation. We first classified text documentation accompanying the uncoded diagnoses according to the disease categories in the ICD-10, which are subdivided into chapters. Next, we classified text documentation as follows: 1) a standard description of diagnoses, 2) a standard description with a modifier, 3) a non-standard description of diagnoses, and 4) unclassifiable text documentation. The “standard description of diagnoses” classification refers to text documentation that is identical to one of the standard descriptions. The “standard description with a modifier” classification is a combination of the standard description of diagnoses plus information, such as disease sites (eg, right or left side of the body). A “non-standard description of diagnoses” classification occurs when the description of the diagnosis in the text documentation is different from the “standard description” but can still be classified according to the ICD-10 categories. The “unclassifiable text documentation” classification refers to text documentation that cannot be classified in one of the other
Ethical concerns

All personal information from the HIC data was deleted by the NHIO before the data were delivered to the researchers. This study was approved by the Institutional Review Committee of Fukuoka University.

RESULTS

Table 1 shows the number of uncoded diagnoses analyzed according to the type of claim and type of accompanying text documentation. Among the 363,753 uncoded diagnoses included in the analyses, 316,151 (86.9%) were from outpatient medical HICs, 35,493 (9.8%) were from inpatient medical HICs, and 12,109 (3.3%) were from DPC/PDPS HICs. Standard descriptions of diagnoses were included with approximately one-third of the text documentations submitted with the uncoded diagnoses from outpatient (34.0%) and inpatient (35.7%) HICs; however, standard descriptions of diagnoses comprised more than half of the DPC/PDPS HICs (53.8%). The proportions of uncoded diagnoses with standard descriptions with a modifier were 46.3%, 39.2%, and 44.7% for the outpatient, inpatient, and DPC/PDPS HICs, respectively. The proportions of uncoded diagnoses with non-standard descriptions of diagnoses were 12.1% for outpatient HICs, 14.6% for inpatient HICs, and only 1.0% for DPC/PDPS HICs. The proportions of uncoded diagnoses with unclassifiable text documentation from outpatient and inpatient HICs were 7.6% and 10.4%, respectively; only 0.6% of uncoded diagnoses in DPC/PDPS HICs included unclassifiable text documentation. The proportion of the types of text documentation accompanying uncoded diagnoses differed significantly according to type of HIC.

Table 2 shows the proportion of uncoded diagnoses according to the type of text documentation accompanying the diagnoses in the outpatient HICs after the documentation data were classified into major disease categories. For every disease category, the proportions of uncoded diagnoses were significantly different from the overall proportion of the uncoded diagnoses. The proportion of uncoded diagnoses with the standard description for diagnoses was lowest in the category of Pregnancy, childbirth, and the puerperium (4.5%). However, only seven diagnoses in total fell into this category. The proportion and number of uncoded diagnoses related to Diseases of the eye and adnexa were 5.4% and 2082 respectively. The proportion of uncoded diagnoses with standard descriptions of diagnoses was the highest in the Mental and behavioral disorders category (72.2%), followed by the Diseases of the respiratory system category (69.3%).

The proportion of uncoded diagnoses with the standard description with a modifier was the largest in the Diseases of the eye and adnexa category (91.1%); Neoplasms had the second largest proportion (68.7%), and Pregnancy, childbirth, and the puerperium (15.4%) had the lowest proportion; however, only 24 diagnoses were classified in the latter category. The proportion and number of uncoded diagnoses in the Diseases of the respiratory system category, which was the second least frequently represented disease in this text documentation category, were 19.4% and 1712, respectively.

The proportion of uncoded diagnoses with non-standard descriptions of diagnoses was highest for Pregnancy, childbirth, and the puerperium (80.1%), followed by...
Congenital malformations, deformations, and chromosomal abnormalities (35.0%). The lowest proportion of uncoded diagnoses with non-standard descriptions of diagnoses was in the Diseases of the eye and adnexa category (3.5%), followed by Diseases of the circulatory system (5.1%).

Table 3 shows the proportion of uncoded diagnoses according to the type of text documentation accompanying the diagnoses for inpatient HICs. Except for Certain conditions originating in the perinatal period, the proportions of uncoded diagnoses were significantly different from the overall proportion of uncoded diagnoses among all disease categories. The proportion of uncoded diagnoses with standard descriptions of diagnoses was highest for Certain conditions originating in the perinatal period (71.4%). However, there were only seven diagnoses in this disease category and the difference was not statistically significant. For Mental and behavioral disorders, the category with the second highest proportion of uncoded diagnoses with standard descriptions, the proportion was 68.9%; the number of diagnoses classified in this category was 2077. The proportion of uncoded diagnoses with the standard descriptions of diagnoses was the lowest for Pregnancy, childbirth, and the puerperium (9.5%). However, there were only 21 diagnoses in this disease category. For Injury, poisoning, and certain other consequences of external causes, which was the category with the second lowest proportion (10.8%), there were 311 diagnoses.

The proportion of uncoded diagnoses with the standard description with a modifier was highest for Diseases of the eye and adnexa (65.1%) and second highest proportion for Neoplasms (60.1%), which was the same as observed in the outpatient HICs. However, the proportions in both of these disease categories were lower than those in the outpatient HICs. The proportion of uncoded diagnoses with the standard description with a modifier was lowest for Pregnancy, childbirth, and the puerperium (4.8%). However, there were only 21 diagnoses in this category. The second lowest proportion was observed in the Mental and behavioral disorders category (24.4%), which consisted of 735 diagnoses.

The proportion of uncoded diagnoses with non-standard descriptions of diagnoses was highest for Pregnancy, childbirth, and the puerperium (85.7%), as was observed among outpatient HICs. Once again, however, the total number of diagnoses in this disease category was small (18). The category with the second highest proportion was Injury, poisoning, and certain other consequences of external causes (35.4%). No uncoded diagnoses with the non-standard descriptions of diagnoses were observed in Certain conditions originating in the perinatal period. There were seven diagnoses classified in this disease category and the difference was not statistically significant. The second lowest proportion was in the Diseases of the circulatory system category (6.5%), with 260 diagnoses.

Table 2. The proportion of uncoded diagnoses according to type of text documentation accompanying diagnoses in outpatient HICs

| ICD-10 major disease categories | Standard descriptions of diagnoses | Standard descriptions with a modifier | Non-standard descriptions of diagnoses | P |
|---------------------------------|-----------------------------------|--------------------------------------|----------------------------------------|---|
| 1 Certain infectious and parasitic diseases | Uncoded (%) | 2234 | 32.6% | 3729 | 54.4% | 895 | 13.1% | <0.001 |
| 2 Neoplasms | Uncoded (%) | 1498 | 15.2% | 6774 | 68.7% | 1583 | 16.1% | <0.001 |
| 3 Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | Uncoded (%) | 732 | 42.1% | 880 | 50.6% | 128 | 7.4% | <0.001 |
| 4 Endocrine, nutritional, and metabolic diseases | Uncoded (%) | 9289 | 60.5% | 5100 | 33.2% | 969 | 6.3% | <0.001 |
| 5 Mental and behavioral disorders | Uncoded (%) | 10030 | 72.2% | 2995 | 21.6% | 865 | 6.2% | <0.001 |
| 6 Diseases of the nervous system | Uncoded (%) | 7389 | 58.4% | 4187 | 33.2% | 1070 | 8.5% | <0.001 |
| 7 Diseases of the eye and adnexa | Uncoded (%) | 2082 | 5.4% | 35325 | 91.1% | 1364 | 3.5% | <0.001 |
| 8 Diseases of the ear and mastoid process | Uncoded (%) | 1984 | 41.8% | 2280 | 48.0% | 487 | 10.3% | <0.001 |
| 9 Diseases of the circulatory system | Uncoded (%) | 17848 | 49.5% | 16387 | 45.4% | 1847 | 5.1% | <0.001 |
| 10 Diseases of the respiratory system | Uncoded (%) | 6104 | 69.3% | 1712 | 19.4% | 995 | 11.3% | <0.001 |
| 11 Diseases of the digestive system | Uncoded (%) | 14346 | 42.6% | 14502 | 43.1% | 4811 | 14.3% | <0.001 |
| 12 Diseases of the skin and subcutaneous tissue | Uncoded (%) | 4022 | 21.3% | 10002 | 53.0% | 4830 | 25.6% | <0.001 |
| 13 Diseases of the musculoskeletal system and connective tissue | Uncoded (%) | 14114 | 33.6% | 21467 | 51.1% | 6427 | 15.3% | <0.001 |
| 14 Diseases of the genitourinary system | Uncoded (%) | 6227 | 47.3% | 5169 | 39.3% | 1760 | 13.4% | <0.001 |
| 15 Pregnancy, childbirth, and the puerperium | Uncoded (%) | 7 | 4.5% | 24 | 15.4% | 125 | 80.1% | <0.001 |
| 16 Certain conditions originating in the perinatal period | Uncoded (%) | 15 | 44.1% | 8 | 23.5% | 11 | 32.4% | <0.001 |
| 17 Congenital malformations, deformations, and chromosomal abnormalities | Uncoded (%) | 708 | 22.4% | 1344 | 42.6% | 1103 | 35.0% | <0.001 |
| 18 Symptoms, signs, and abnormal clinical and laboratory findings not elsewhere classified | Uncoded (%) | 6712 | 47.7% | 4709 | 33.5% | 2654 | 18.9% | <0.001 |
| 19 Injury, poisoning, and certain other consequences of external causes | Uncoded (%) | 2130 | 11.6% | 9935 | 54.1% | 6293 | 34.3% | <0.001 |
| Total | Uncoded (%) | 107451 | 36.8% | 146529 | 50.2% | 38217 | 13.1% |
Table 3. The proportion of uncoded diagnoses according to type of text documentation accompanying diagnoses in inpatient HICs

| ICD-10 major disease categories                                                                 | Standard descriptions of diagnoses | Standard descriptions with a modifier | Non-standard descriptions of diagnoses | P       |
|-------------------------------------------------------------------------------------------------|------------------------------------|--------------------------------------|----------------------------------------|---------|
|                                                                                                 | Uncoded (%)                        | Uncoded (%)                          | Uncoded (%)                            |         |
| 1 Certain infectious and parasitic diseases                                                     | 340 (31.5%)                        | 562 (52.1%)                          | 176 (16.3%)                            | <0.001  |
| 2 Neoplasms                                                                                     | 173 (18.0%)                        | 579 (60.1%)                          | 211 (21.9%)                            | <0.001  |
| 3 Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | 173 (40.0%)                        | 229 (53.0%)                          | 30 (6.9%)                              | <0.001  |
| 4 Endocrine, nutritional, and metabolic diseases                                                | 1098 (53.4%)                       | 757 (36.8%)                          | 202 (9.8%)                             | <0.001  |
| 5 Mental and behavioral disorders                                                                | 2077 (68.9%)                       | 735 (24.4%)                          | 204 (6.8%)                             | <0.001  |
| 6 Diseases of the nervous system                                                                | 990 (44.8%)                        | 1015 (45.9%)                         | 205 (9.3%)                             | <0.001  |
| 7 Diseases of the eye and adnexa                                                                | 225 (28.4%)                        | 516 (65.1%)                          | 52 (6.6%)                              | <0.001  |
| 8 Diseases of the ear and mastoid process                                                       | 81 (60.0%)                         | 38 (28.1%)                           | 16 (11.5%)                             | <0.001  |
| 9 Diseases of the circulatory system                                                             | 1749 (43.5%)                       | 2010 (50.0%)                         | 260 (6.5%)                             | <0.001  |
| 10 Diseases of the respiratory system                                                            | 749 (55.0%)                        | 412 (30.2%)                          | 202 (14.8%)                            | <0.001  |
| 11 Diseases of the digestive system                                                              | 1932 (46.3%)                       | 1738 (41.6%)                         | 504 (12.1%)                            | <0.001  |
| 12 Diseases of the skin and subcutaneous tissue                                                 | 561 (25.5%)                        | 1028 (45.2%)                         | 666 (29.3%)                            | <0.001  |
| 13 Diseases of the musculoskeletal system and connective tissue                                 | 814 (29.3%)                        | 1482 (53.3%)                         | 484 (17.4%)                            | <0.001  |
| 14 Diseases of the genitourinary system                                                          | 559 (40.8%)                        | 534 (39.0%)                          | 277 (20.2%)                            | <0.001  |
| 15 Pregnancy, childbirth, and the puerperium                                                     | 2 (9.5%)                           | 1 (4.8%)                             | 18 (85.7%)                             | <0.001  |
| 16 Certain conditions originating in the perinatal period                                        | 51 (71.4%)                         | 2 (28.6%)                            | 0 (0.0%)                              | 0.194   |
| 17 Congenital malformations, deformations, and chromosomal abnormalities                          | 39 (25.3%)                         | 70 (45.3%)                           | 45 (29.2%)                             | <0.001  |
| 18 Symptoms, signs, and abnormal clinical and laboratory findings not otherwise classified       | 765 (37.2%)                        | 669 (32.5%)                          | 623 (30.3%)                            | <0.001  |
| 19 Injury, poisoning, and certain other consequences of external causes                          | 311 (10.8%)                        | 1554 (53.8%)                         | 1021 (35.4%)                           | <0.001  |
| Total                                                                                            | 12663 (39.8%)                      | 13931 (43.8%)                        | 5196 (16.3%)                           |         |

HIC, health insurance claim; ICD-10, the International Statistical Classification of Diseases and Related Health Problems, 10th Revision. The number of uncoded diagnoses with unclassifiable text documentation was 3703. Major disease category 20 (External causes of morbidity and mortality) was not found in inpatient HICs.

Table 4 shows the proportion of uncoded diagnoses according to the type of text documentation accompanying the diagnoses in DPC/PDPS HICs. Except for Diseases of the ear and mastoid process, the proportions of uncoded diagnoses were significantly different from the overall proportion of uncoded diagnoses among all of the disease categories. The proportion of uncoded diagnoses with the standard descriptions of diagnoses was highest for Pregnancy, childbirth, and the puerperium (93.5%), followed by Mental and behavioral disorders (93.0%). There were fewer than 100 diagnoses for almost every disease category, with the highest proportion of uncoded diagnoses with standard descriptions of diagnoses found for Endocrine, nutritional, and metabolic diseases (81.3%), followed by Diseases of the eye and adnexa (84.5%), and certain other consequences of external causes (84.5%). However, few diagnoses were categorized in the three least frequently represented disease categories.

For almost every disease category, the proportions of uncoded diagnoses with non-standard descriptions of diagnoses were lower in outpatient than inpatient HICs. The highest proportion of uncoded diagnoses with non-standard descriptions of diagnoses was found for Diseases of the skin and subcutaneous tissue (42.2%). No diagnosis was found for Diseases of the eye and adnexa, Diseases of the ear and mastoid process, or Certain conditions originating in the perinatal period.

For all three types of HICs, the proportions of uncoded diagnoses with standard descriptions of diagnoses were highest for Endocrine, nutritional, and metabolic diseases and Mental and behavioral disorders and were lowest for Diseases of the skin and subcutaneous tissue and Injury, poisoning, and certain other consequences of external causes. The proportions of uncoded diagnoses with standard descriptions of diagnoses were highest for Neoplasms, Diseases of the eye and adnexa, and Injury, poisoning, and certain other consequences of external causes. The proportions of uncoded diagnoses with a modifier were lowest for Pregnancy, childbirth, and the puerperium (4.3%), followed by Mental and behavioral disorders (5.0%). However, few diagnoses were categorized in the three least frequently represented disease categories.
The present study was the first in Japan to investigate the reasons for uncoded diagnoses in computerized HICs by analyzing the text documentation that accompanied the uncoded diagnoses. The three main findings were as follows: 1) the pattern of text documentation that accompanied uncoded diagnoses varied by type of HIC, 2) the proportions of uncoded diagnoses with standard descriptions of diagnoses with a modifier comprised approximately 40%–45% of all types of HICs, and 3) the proportions of uncoded diagnoses with standard descriptions of diagnoses with a modifier varied by disease category.

The proportions of uncoded diagnoses with non-standard descriptions of diagnoses and unclassifiable text documentation comprised approximately 10% of both outpatient and inpatient HICs and approximately 1% of DPC/PDPS HICs. Certification to provide DPC/PDPS care is granted only to hospitals that submit the required data using the format specified by the regulations on medical cost reimbursement. Thus, medical facilities certified for DPC/PDPS are motivated to use the standard descriptions of diagnoses. In comparison, there is no penalty for using non-standard descriptions of diagnoses for outpatient and inpatient HICs.

Approximately one-half of the uncoded diagnoses included standard description of diagnoses with a modifier. The proportions of uncoded diagnoses with standard descriptions of diagnoses with a modifier were relatively high in disease categories in which it is important to distinguish the affected sites on the body, such as Diseases of the eye and adnexa, and Diseases of the circulatory system.

### DISCUSSION

The number of uncoded diagnoses with unclassifiable text documentation was 68. There were 58,125 diagnoses classified as Major disease category 20 (External causes of morbidity and mortality) in the DPC/PDPS HICs, but no diagnoses were uncoded diagnoses in this disease category.

### Table 4. The proportion of uncoded diagnoses according to type of text documentation accompanying diagnoses in DPC/PDPS HICs

| ICD-10 major disease categories | Standard descriptions of diagnoses | Standard descriptions with a modifier | Non-standard descriptions of diagnoses | P     |
|---------------------------------|-----------------------------------|--------------------------------------|---------------------------------------|-------|
|                                 | Uncoded (%)                       | Uncoded (%)                          | Uncoded (%)                           |       |
| 1. Certain infectious and parasitic diseases | 230 (72.8%) | 83 (26.3%) | 3 (0.9%) | <0.001 |
| 2. Neoplasms                     | 1619 (58.5%)                      | 1137 (41.1%) | 11 (0.4%) | <0.001 |
| 3. Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | 201 (77.6%) | 57 (22.0%) | 1 (0.4%) | <0.001 |
| 4. Endocrine, nutritional, and metabolic diseases | 545 (81.3%) | 119 (17.8%) | 6 (0.9%) | <0.001 |
| 5. Mental and behavioral disorders | 93 (93.0%) | 5 (5.0%) | 2 (2.0%) | <0.001 |
| 6. Diseases of the nervous system | 226 (64.2%) | 123 (34.9%) | 3 (0.9%) | <0.001 |
| 7. Diseases of the eye and adnexa | 137 (27.2%) | 367 (72.8%) | 0 (0.0%) | <0.001 |
| 8. Diseases of the ear and mastoid process | 21 (42.0%) | 29 (58.0%) | 0 (0.0%) | 0.152 |
| 9. Diseases of the circulatory system | 1067 (60.4%) | 697 (39.5%) | 2 (0.1%) | <0.001 |
| 10. Diseases of the respiratory system | 471 (65.5%) | 245 (34.1%) | 3 (0.4%) | <0.001 |
| 11. Diseases of the digestive system | 742 (66.6%) | 352 (31.6%) | 20 (1.8%) | <0.001 |
| 12. Diseases of the skin and subcutaneous tissue | 84 (39.6%) | 119 (56.1%) | 9 (4.2%) | <0.001 |
| 13. Diseases of the musculoskeletal system and connective tissue | 258 (28.7%) | 631 (70.2%) | 10 (1.1%) | <0.001 |
| 14. Diseases of the genitourinary system | 251 (70.1%) | 103 (28.6%) | 4 (1.1%) | <0.001 |
| 15. Pregnancy, childbirth, and the puerperium | 43 (93.5%) | 2 (4.3%) | 1 (2.2%) | <0.001 |
| 16. Certain conditions originating in the perinatal period | 21 (87.5%) | 3 (12.5%) | 0 (0.0%) | 0.005 |
| 17. Congenital malformations, deformations, and chromosomal abnormalities | 27 (77.1%) | 7 (20.0%) | 1 (2.9%) | 0.008 |
| 18. Symptoms, signs, and abnormal clinical and laboratory findings not elsewhere classified | 281 (76.8%) | 75 (20.5%) | 10 (2.7%) | <0.001 |
| 19. Injury, poisoning, and certain other consequences of external causes | 198 (13.3%) | 1254 (84.5%) | 32 (2.2%) | <0.001 |
| Total                           | 6515 (54.1%) | 5408 (44.9%) | 118 (1.0%) | 0.000 |

DPC/PDPS, Diagnosis Procedure Combination/Per-Diem Payment System; HIC, health insurance claim; ICD-10, the International Statistical Classification of Diseases and Related Health Problems, 10th Revision.

Diseases of the skin and subcutaneous tissue; Pregnancy, childbirth, and the puerperium; Congenital malformations, deformations, and chromosomal abnormalities; and Injury, poisoning, and certain other consequences of external causes.

The proportions of uncoded diagnoses with non-standard descriptions of diagnoses were lowest for Diseases of the blood and blood-forming organs, Certain disorders involving the immune mechanism, Diseases of the eye and adnexa, and Diseases of the circulatory system.

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The proportions of uncoded diagnoses with standard descriptions of diagnoses with a modifier were relatively high in the categories of Diseases of the eye and adnexa and Injury, poisoning, and certain other consequences of external causes, and were relatively low for Certain conditions originating in the perinatal period; Mental and behavioral disorders; and Pregnancy, childbirth, and the puerperium. The proportion of uncoded diagnoses varied by the type of HIC and disease category. If there was a tendency for certain types of diagnoses requiring additional information regarding body sites to be uncoded, it may have created a bias in estimating disease-specific medical expenditures.

Approximately one-third of the accompanying text documentation with uncoded diagnoses were classified as standard descriptions of diagnoses. As there is no penalty for submitting uncoded diagnoses, some medical facilities may lack the motivation to complete the coding. Hospitalization charges per day are determined according to the principal diagnosis, which may account for the high proportion of uncoded diagnoses with standard descriptions of diagnoses in the DPC/PDPS HICs. This reimbursement scheme may be an additional reason why medical facility staff may not be motivated to complete the coding. There are various types of diagnoses in DPC/PDPS claims, including 1) principal diagnosis, 2) most resource-intensive diagnoses, 3) diagnoses prompting hospitalization, 4) comorbidity present at the time of admission, and 5) complications developed in the course of hospitalization. Further research on the relationship between the types of diagnoses in DPC/PDPS claims and uncoded diagnoses is required.

There are some limitations in this study. First, I investigated information only from the computerized HICs. Therefore, the characteristics of the medical facilities and the validity of the diagnoses were not assessed directly. An evaluation of the characteristics of the medical facilities, the validity of the diagnoses, and the accuracy of coding of the diagnoses in the HICs requires additional information using medical charts or telephone interviews.

Second, this study investigated only whether the standard descriptions of the diagnoses and modifier were included in the text documentation that accompanied the uncoded diagnoses. If a description currently used for a specific disease is not endorsed by a society of specialists, the description may not be used in the future and, therefore, will be classified as an abolished description. Such abolished description of the diagnoses will be deleted from the standard description of diagnoses after one year. From the results of this study, it is presumed that most of the modifiers are related to disease sites (eg, right or left side of the body). Modifiers other than disease sites, such as “severe,” are defined in the manual on specifications of the computerized HIC system master file. Further investigation of the effect of such changes in definitions on the standard descriptions of diagnoses and the type of modifier, prefix, and suffix is necessary.

Third, this study assessed HICs for reimbursement services provided only in May 2010. The current providers of health statistics in Japan, including the Social Insurance Claims Survey and National Health Insurance Medical Benefit Surveys, also used HIC data from May only. In the past, most of the technical limitations associated with data from HICs were because they were derived from paper submissions of HICs. This study reviewed HICs that were electronically submitted; it has been reported that 96.6% of HICs were computerized by March 2014. Investigation of electronic HICs over a longer period is necessary.

In conclusion, the pattern of uncoded diagnoses varied by the type of HIC and disease category. Most of the text documentation that accompanied uncoded diagnoses was classified using the standard descriptions of diagnoses defined by the Japanese reimbursement rules and the standard descriptions of diagnoses with a modifier. An evaluation of the proportion of uncoded diagnoses in all medical facilities and the implementation of effective methods for coding diagnoses using modifiers, prefixes, and suffixes should reduce the proportion of uncoded diagnoses in the computerized HICs in Japan and improve the quality of HIC databases.

ONLINE ONLY MATERIAL

Abstract in Japanese.

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