



**IMPACT OF THE ICD-10-CM/PCS TRANSITION  
ON READMISSION RATES**

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## EXECUTIVE SUMMARY

As part of an ongoing initiative, the Agency for Healthcare Research and Quality is interested in helping users with challenges they may encounter when conducting analyses with Healthcare Cost and Utilization Project (HCUP) databases that span the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) and International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System (ICD-10-CM/PCS). The purpose of this report is to examine the impact of the ICD-10-CM/PCS transition on readmission statistics, which are reported in the online query system HCUPnet.

This report describes the methodology and findings of an analysis that examined the impact of the transition from ICD-9-CM to ICD-10-CM/PCS on October 1, 2015, on condition-specific readmission statistics by comparing discharge quarters 1 to 3 (Q1–3) of 2015 with Q1–3 of 2016. Additionally, the potential impact of fiscal year (FY) coding changes in ICD-10-CM/PCS were examined by comparing Q1–3 of 2016 with Q1–3 of 2017. Conditions were based on two categorizations—diagnosis-related groups (DRGs) and major diagnostic categories (MDCs).

This analysis used the HCUP 2015–2017 Nationwide Readmissions Database (NRD). The NRD addresses a large gap in healthcare data—the lack of nationally representative information on hospital readmissions, regardless of the expected payer for the hospital stay. The NRD was created to enable analyses of national readmission rates and to support public health professionals, administrators, policymakers, and clinicians in their decision making. The NRD is drawn from HCUP State Inpatient Databases (SID) that contain reliable, verified patient linkage numbers that can be used to track a person across hospitals within a State, while adhering to strict privacy guidelines. The NRD includes community hospitals and excludes rehabilitation or long-term acute care hospitals.

### Main Findings

- Index stays, which represent the starting point for any readmission analysis, remained stable for more than half of DRG categories and MDCs across the transition from ICD-9-CM to ICD-10-CM/PCS. However, less stability was observed for index stays within the ICD-10-CM/PCS coding system spanning FY 2016 and 2017.
- First, 30-day all-cause readmission rates were examined for both stable and unstable index stays.
  - Across the transition from ICD-9-CM to ICD-10-CM/PCS, the 30-day all-cause readmission rates were stable for more than half of DRG categories and MDCs, irrespective of the stability for index stays.
  - When spanning two FYs of ICD-10-CM/PCS, the 30-day all-cause readmission rates remained stable for most DRG categories regardless of the stability for index stays. For MDCs, however, stable 30-day all-cause readmission rates were observed only when the index stays were also stable.
- Second, 30-day condition-specific readmission rates, defined as the same DRG category or MDC at readmission, were examined for both stable and unstable index stays.
  - Across the transition from ICD-9-CM to ICD-10-CM/PCS, the 30-day condition-specific readmission rates were stable for most MDCs when index stays were also stable. However, this was not the case for DRGs, in which less than half of the categories had stable 30-day readmission rates for the same DRG. When index stays were unstable, 30-day condition-specific readmission rates were stable for less than half of DRG categories and MDCs.

- When spanning two FYs of ICD-10-CM/PCS, the 30-day condition-specific readmission rates for all MDCs remained stable, regardless of the stability of index stays. However, less than half of DRG categories had stable 30-day condition-specific readmission rates when index stays were both stable and unstable.

## INTRODUCTION

The Healthcare Cost and Utilization Project (HCUP) supports research on hospital readmissions in two ways. First, the HCUP Nationwide Readmissions Database (NRD) is available for purchase through the HCUP Central Distributor. The NRD addresses a large gap in healthcare data—the lack of nationally representative information on hospital readmissions, regardless of the expected payer for the hospital stay. The NRD was created to enable analyses of national readmission rates and to support public health professionals, administrators, policymakers, and clinicians in their decision making. The NRD is drawn from HCUP State Inpatient Databases (SID) that contain reliable, verified patient linkage numbers that can be used to track a person across hospitals within a State, while adhering to strict privacy guidelines. The NRD includes community hospitals, excluding those that are rehabilitation or long-term acute care facilities.

Second, tables displaying readmission rates by various clinical categories and patient characteristics based on the 2009–2015 NRD are available on HCUPnet, a free online query system for identifying, tracking, analyzing, and comparing statistics on inpatient and outpatient care. The HCUPnet readmission tables for years 2009–2015 are based on the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). On October 1, 2015, the United States transitioned to using the International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System (ICD-10-CM/PCS) for reporting inpatient diagnoses and procedures.

The purpose of this report is to examine the impact of the transition from ICD-9-CM to ICD-10-CM/PCS on HCUPnet readmission analyses by diagnosis-related groups (DRGs) and major diagnostic categories (MDCs).

## METHODS

This report compares readmission statistics based on the 2015–2017 NRD. Records in the NRD were limited to inpatient stays for patients aged 1 year or older because patient identifiers for patients aged 0 years are included in the NRD only for a subset of States.

The analysis aimed to (1) examine differences in both the number of index stays and readmission rates across the two coding systems and (2) identify potential changes in readmission rates within the newly introduced ICD-10-CM/PCS coding system. For this reason, the analysis included the following time periods:

- ICD-9-CM in fiscal year (FY) 2015: Discharge quarters 1 to 3 (Q1–Q3) of 2015
- ICD-10-CM/PCS in FY 2016: Discharges in Q1–Q3 of 2016
- ICD-10-CM/PCS in FY 2017: Discharges in Q1–Q3 of 2017

Across the two condition domains of DRG and MDC, 30-day all-cause readmissions were examined. In addition, specific readmission outcomes were identified:

- DRG: 30-day readmissions for the same DRG
- MDC: 30-day readmissions for the same MDC

For this analysis, *stable conditions* across ICD-9-CM and ICD-10-CM/PCS are defined as having a change of less than 10 percent. This applies to index stays and readmission rates.

The results presented in this report are specific to overall readmissions and are at a summary level for the two condition domains. The number of index stays and associated readmission

rates were excluded from the results if there were fewer than 500 index stays or if either one of the two reporting periods of interest included a readmission count of 0.

Full results by all of the condition reporting categories are available in the supplemental Excel file, *NRD Readmission Rates\_30Day\_Compare\_2015-2017.xlsx*. In addition to the exclusions noted above, condition-specific readmission rates also are excluded when readmission counts were fewer than 500 discharges. This level of suppression is consistent with the readmission statistics available on HCUPnet.

## **RESULTS**

The first section of the results presents changes in readmission statistics between ICD-9-CM (2015 Q1–Q3) and the introduction of ICD-10-CM/PCS (2016 Q1–Q3). The second section presents changes in readmission statistics between the two ICD-10-CM/PCS time periods, 2016 Q1–Q3 and 2017 Q1–Q3.

### **Changes From ICD-9-CM to the Introduction of ICD-10-CM/PCS in Fiscal Year 2016**

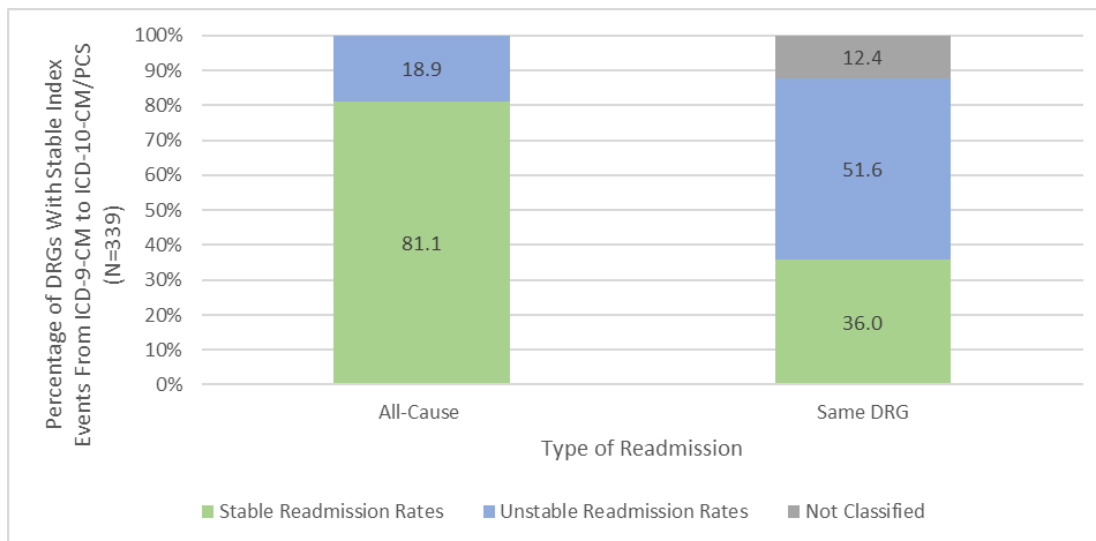
For the first part of this analysis, changes in readmission rates were examined between ICD-9-CM (2015 Q1–Q3) and the introduction of ICD-10-CM/PCS (2016 Q1–Q3) for DRGs and MDCs, respectively. The comparison was sorted by whether the index counts remained stable (with a less than 10 percent difference) versus unstable during the transition.

#### Diagnosis-Related Groups

Of the 670 DRGs with at least 500 index stays, 339 DRG categories (51 percent) had stable index counts across the two coding systems and 331 DRG categories (49 percent) had unstable index counts. The complete list is available in the separately provided supplemental tables.

Of the 339 DRG categories with stable index counts, Figure 1 shows the distribution with respect to stable versus unstable readmission rates for all-cause and condition-specific readmissions, respectively.

**Figure 1. Percentage of DRG Categories With Stable Index Events From ICD-9-CM to ICD-10-CM/PCS With Stable or Unstable Readmission Rates**

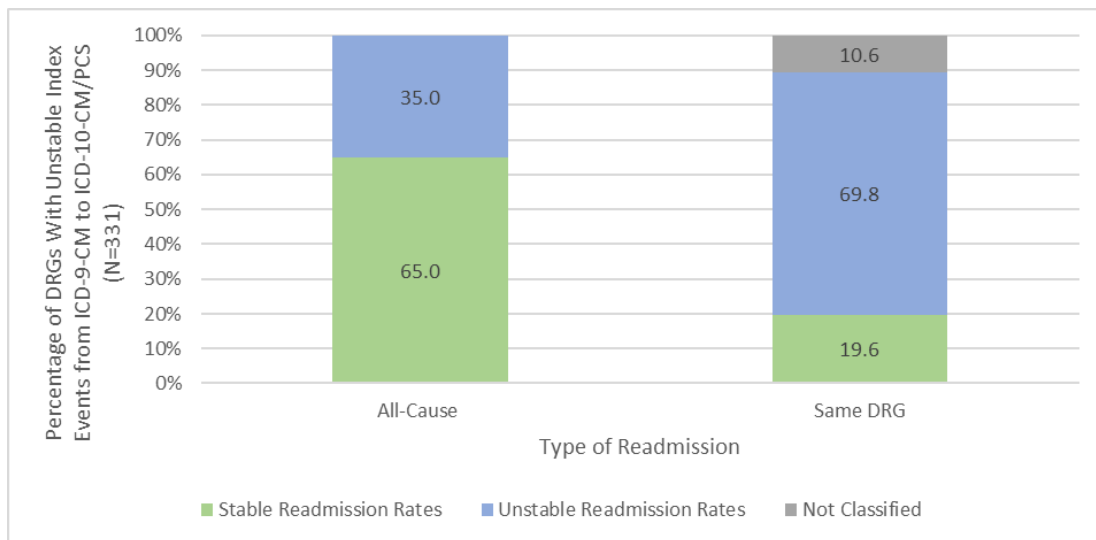


Abbreviations: DRG, diagnosis-related group; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM/PCS, International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Readmissions Database, 2015–2016.

Of the 331 DRG categories with unstable index counts, Figure 2 shows the variation with respect to stable versus unstable readmission rates for all-cause and condition-specific readmissions, respectively.

**Figure 2. Percentage of DRG Categories With Unstable Index Events From ICD-9-CM to ICD-10-CM/PCS With Stable or Unstable Readmission Rates**



Abbreviations: DRG, diagnosis-related group; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM/PCS, International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System.

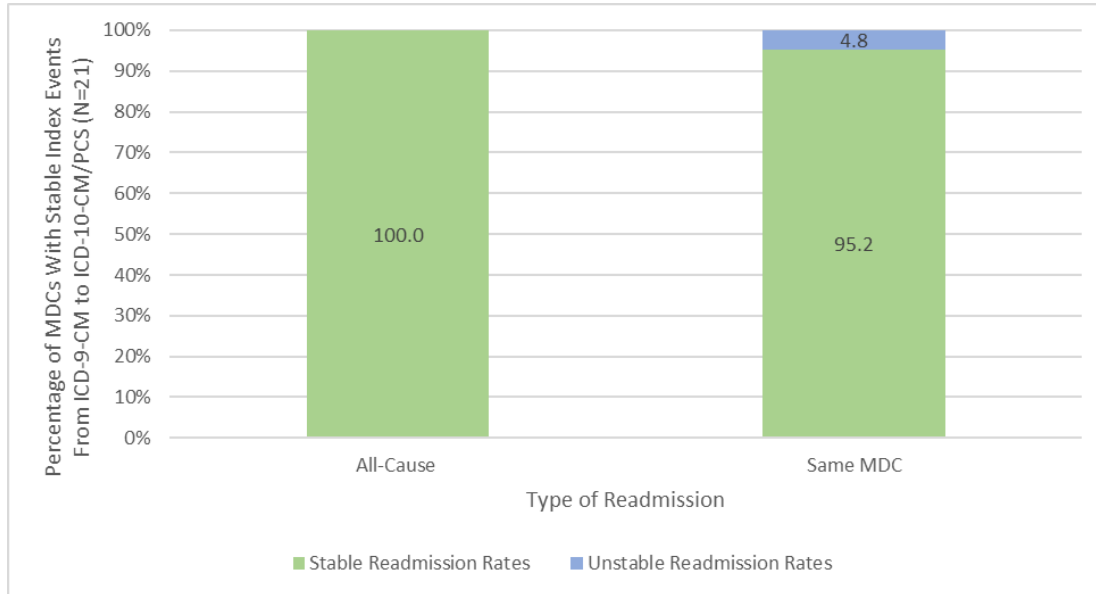
Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Readmissions Database, 2015–2016.

### Major Diagnostic Categories

Of the 25 MDCs with at least 500 index stays, 21 MDCs (84 percent) had stable index counts across the two coding systems and 4 MDCs (16 percent) had unstable index counts. The complete list is available in the separately provided supplemental tables.

Of the 21 MDCs with stable index counts, Figure 3 shows the variation with respect to stable versus unstable readmission rates for all-cause and condition-specific readmissions, respectively.

**Figure 3. Percentage of MDCs With Stable Index Events From ICD-9-CM to ICD-10-CM/PCS With Stable or Unstable Readmission Rates**



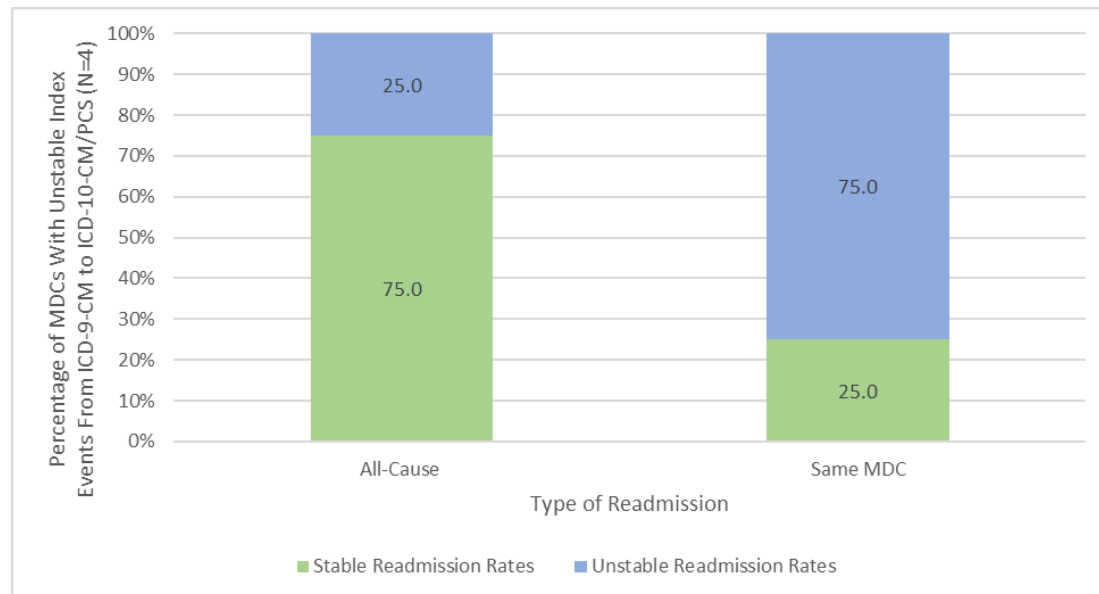
Abbreviations: ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM/PCS, International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System; MDC, major diagnostic category.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Readmissions Database, 2015–2016.



Of the four MDCs with unstable index counts, Figure 4 shows the variation with respect to stable versus unstable readmission rates for all-cause and condition-specific readmissions, respectively.

**Figure 4. Percentage of MDCs With Unstable Index Events From ICD-9-CM to ICD-10-CM/PCS With Stable or Unstable Readmission Rates**



Abbreviations: ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM/PCS, International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System; MDC, major diagnostic category.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Readmissions Database, 2015–2016.

### Changes From ICD-10-CM/PCS in Fiscal Year 2016 to Fiscal Year 2017

The second part of this analysis examined changes between the introduction of ICD-10-CM/PCS in the last 3 quarters of FY 2016 (2016 Q1–Q3) and any introduced ICD-10-CM diagnosis codes or coding guideline changes in FY 2017 (2017 Q1–Q3). The purpose was to uncover any discontinuity in trends for specific diagnoses within ICD-10-CM.

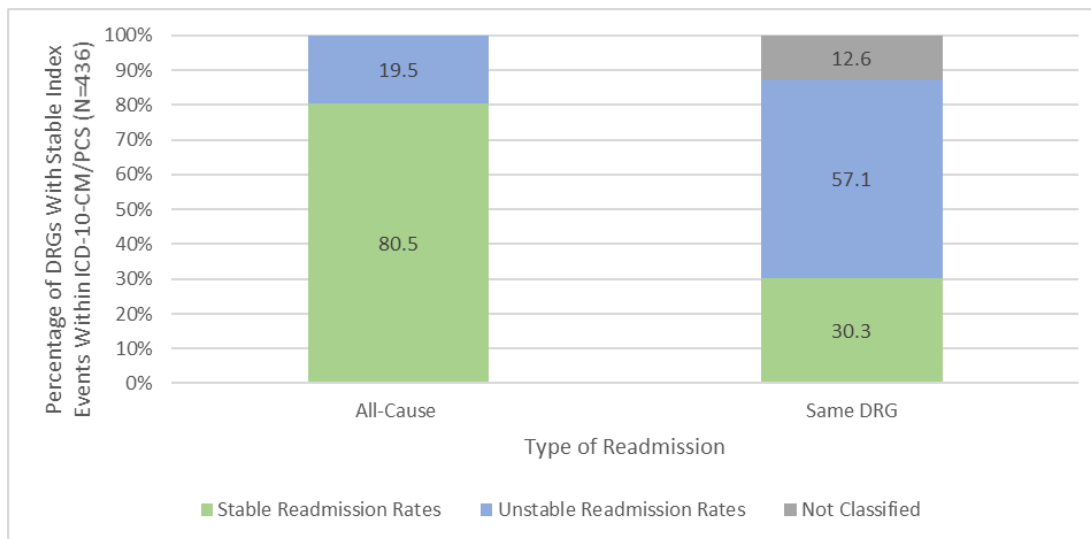
Consistent with the analysis examining changes across the two coding systems, readmission outcomes were compared for both stable and unstable index counts across the two FY periods.

### Diagnosis-Related Groups

Of the 677 DRGs with at least 500 index stays, 436 DRG categories (64 percent) had stable index counts across the two ICD-10-CM/PCS FYs and 241 DRG categories (36 percent) had unstable index counts. The complete list is available in the separately provided supplemental tables.

Of the 436 DRG categories with stable index counts, Figure 5 shows the variation with respect to stable versus unstable readmission rates for all-cause and condition-specific readmissions, respectively.

**Figure 5. Percentage of DRG Categories With Stable Index Events Within ICD-10-CM/PCS With Stable or Unstable Readmission Rates**

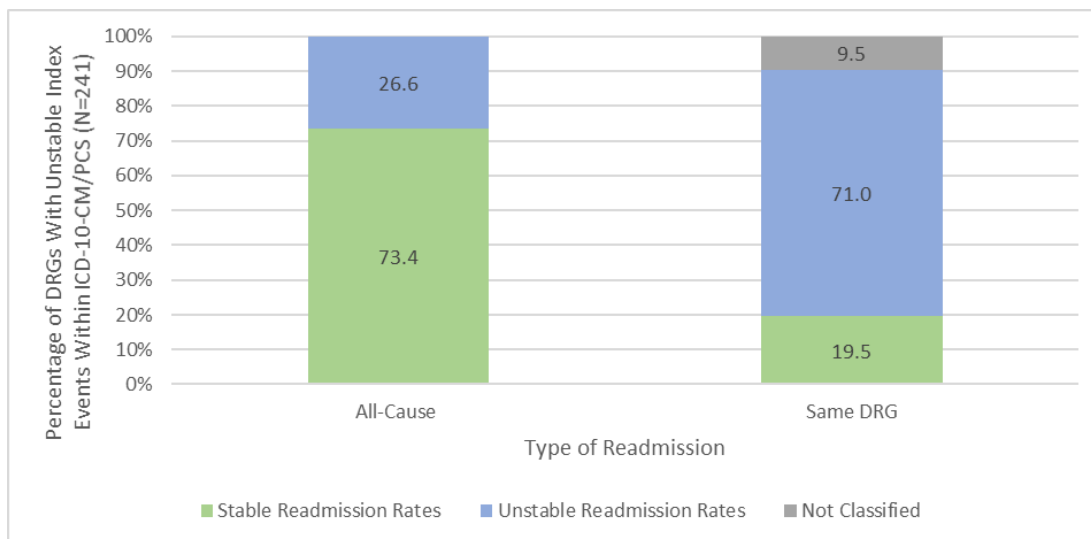


Abbreviations: DRG, diagnosis-related group; ICD-10-CM/PCS, International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Readmissions Database, 2016–2017.

Of the 241 DRG categories with unstable index counts, Figure 6 shows the variation with respect to stable versus unstable readmission rates for all-cause and condition-specific readmissions, respectively.

**Figure 6. Percentage of DRG Categories With Unstable Index Events Within ICD-10-CM/PCS With Stable or Unstable Readmission Rates**



Abbreviations: DRG, diagnosis-related group; ICD-10-CM/PCS, International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Readmissions Database, 2016–2017.

## Major Diagnostic Categories

Of the 25 MDCs with at least 500 index stays, 24 MDCs (96 percent) had stable index counts across the two ICD-10-CM/PCS FYs and 1 MDC (4 percent) had unstable index counts. The complete list is available in the separately provided supplemental tables.

All 24 MDCs with stable index counts exhibited stable readmission rates across the two FYs for both all-cause readmissions and for readmissions with the same MDC. Only one MDC with unstable index counts exhibited an unstable all-cause readmission rate but a stable readmission rate with the same MDC across the two FYs.

## **SUMMARY**

### **Changes From ICD-9-CM to the Introduction of ICD-10-CM/PCS in Fiscal Year 2016**

Regardless of how the condition was categorized (DRG or MDC), more than half of the counts for index stays remained stable between ICD-9-CM and the introduction of ICD-10-CM/PCS in FY 2016. MDCs—the coding scheme with the broadest categories—were the most stable, with 84 percent of the 25 MDCs having stable index counts. In contrast, stable index counts were shown for only 51 percent of the 670 DRGs, the more detailed categorization. Across the two FY periods within the ICD-10-CM/PCS coding system, a similar pattern was observed, with more than half of the counts for index stays remaining stable (96 percent for MDCs and 64 percent for DRGs).

For both condition domains, and irrespective of the stability of the number of index stays, more than half of the 30-day all-cause readmission rates remained stable across the two coding systems. The 30-day all-cause readmission rates associated with stable index counts remained stable for 100 percent of MDCs and 81 percent of DRGs. For categories with unstable index counts, the 30-day all-cause readmission rates remained stable for 75 percent of MDCs and 65 percent of DRGs. In contrast, the 30-day readmission rates for the same category (i.e., same DRG and same MDC) were mainly unstable. The only exception is for MDCs with stable index counts, where the 30-day readmission rate for the same MDC remained stable for 95 percent of MDCs. Table 1 includes a summary of the percentage of categories under each condition domain that had stable readmission rates between ICD-9-CM and ICD-10-CM/PCS.

**Table 1. Summary of Categories for Each Condition Domain With Stable Readmission Rates, ICD-9-CM to ICD-10-CM/PCS**

<b>Readmission</b>	<b>By DRG, %</b>	<b>By MDC, %</b>
<b><i>Stability of Readmission Rates When Index Stay Count Is Stable</i></b>		
All-cause readmission	81	100
Same DRG or MDC	36	95
<b><i>Stability of Readmission Rates When Index Stay Count Is Unstable</i></b>		
All-cause readmission	65	75
Same DRG or MDC	20	25

Abbreviations: DRG, diagnosis-related group; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM/PCS, International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System; MDC, major diagnostic category.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Readmissions Database, 2015–2016.

## Changes From ICD-10-CM/PCS in Fiscal Year 2016 to Fiscal Year 2017

When index counts were stable between the two FYs of ICD-10-CM/PCS, most MDCs and DRG categories exhibited stable 30-day all-cause readmission rates (100 percent for MDCs and 81 percent for DRGs). However, when index counts were unstable, 73 percent of DRG categories had stable 30-day all-cause readmission rates while the single MDC with an unstable index count had an unstable 30-day all-cause readmission rate. For 30-day readmission rates of the same category, stability varied between the two condition domains. Specifically, 100 percent of MDCs had stable 30-day readmission rates for the same MDC, regardless of the stability of index counts. In contrast, less than half of DRG categories had stable 30-day readmission rates for the same DRG (30 percent when index counts were stable and 20 percent when index counts were unstable). Table 2 includes a summary of the percentage of categories under each condition domain that had stable readmission rates within ICD-10-CM/PCS but across the two FYs.

**Table 2. Summary of Categories for Each Condition Domain With Stable Readmission Rates, ICD-10-CM/PCS**

Readmission	By DRG, %	By MDC, %
<b><i>Stability of Readmission Rates When Index Stay Count Is Stable</i></b>		
All-cause readmission	81	100
Same DRG or MDC	30	100
<b><i>Stability of Readmission Rates When Index Stay Count Is Unstable</i></b>		
All-cause readmission	73	0
Same DRG or MDC	20	100

Abbreviations: DRG, diagnosis-related group; ICD-10-CM/PCS, International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System; MDC, major diagnostic category.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Readmissions Database, 2016–2017.