CASE STUDY: EXPLORING HOW OPIOID-RELATED DIAGNOSIS CODES TRANSLATE FROM ICD-9-CM TO ICD-10-CM

Recommended Citation: Moore BJ, Barrett ML. *Case Study: Exploring How Opioid-Related Diagnosis Codes Translate From ICD-9-CM to ICD-10-CM.* ONLINE. April 24, 2017. U.S. Agency for Healthcare Research and Quality. Available: https://www.hcup-us.ahrq.gov/datainnovations/icd10_resources.jsp.

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EXECUTIVE SUMMARY

The Agency for Healthcare Research and Quality (AHRQ) aims to help users of administrative data anticipate challenges in using databases that include both International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) and International Classification of Diseases, 10th Revision, Clinical Modification / Procedure Coding System (ICD-10-CM/PCS) codes. The present study examines how the change in the diagnosis coding systems would affect analyzing trends for a specific group of conditions—opioid-related inpatient stays among patients 25 years and older. It is important to note that the methods are meant to be illustrative of how researchers could investigate shifts in other populations defined by the ICD coding systems both before and after the transition to ICD-10-CM/PCS in October 2015. The case study used 2015 through third quarter 2016 Healthcare Cost and Utilization Project (HCUP) inpatient data from the three States that had four quarters of ICD-10-CM/PCS data processed at the time of this report.

Main Findings

- The number of opioid-related diagnosis codes increased dramatically from 20 ICD-9-CM codes to 100 ICD-10-CM codes. However, only a fourth of the possible 100 opioid-related ICD-10-CM codes were observed in these data, which cover the first 12 months after the transition to ICD-10-CM in three States.
- The number of opioid-related inpatient stays increased 18.3 percent between the third and fourth quarter of 2015—corresponding with the transition from ICD-9-CM to ICD-10-CM coding. In contrast, the average quarterly percentage change between the first three quarters of 2015 *prior* to the transition to ICD-10-CM was a 6.7 percent increase. The average quarterly percentage change between the four quarters *after* the transition to ICD-10-CM (the fourth quarter of 2015 through the third quarter of 2016) was a 3.1 percent increase.
- For adults aged 65 years and older, the number of opioid-related inpatient stays increased 55.7 percent between quarters corresponding with the transition from ICD-9-CM to ICD-10-CM, whereas the number of opioid-related inpatient stays increased 20.8 for adults aged 45–64 years and 2.2 percent for adults aged 25-44 years.
- There was variation by type of opioid-related diagnosis—dependence (including unspecified use), adverse effects, abuse, and poisoning. However, all four categories display a distinct, one-time shift in the number of opioid-related inpatient stays as the transition was made to ICD-10-CM, followed by minimal changes during subsequent quarters.

Although this case study focused only on diagnosis codes (ICD-9-CM and ICD-10-CM), the analytic process of examining specific codes for use in studies applies to both diagnosis and procedure codes (ICD-9-CM and ICD-10-CM/PCS). When using HCUP and other administrative databases that include both ICD-9-CM and ICD-10-CM/PCS codes, researchers should carefully review the codes used to define their study sample under both coding systems, evaluate patterns in the trend, and examine descriptive data at the level of individual codes prior to conducting more advanced statistical analyses to answer the research question of interest.

As described in this report, researchers must examine the extent to which the transition to ICD-10-CM/PCS impacts any apparent discontinuities in trends.

INTRODUCTION

The purpose of this document is to help users of Healthcare Cost and Utilization Project (HCUP) and other administrative databases anticipate challenges in using databases that include both International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) and International Classification of Diseases, 10th Revision, Clinical Modification / Procedure Coding System (ICD-10-CM/PCS) codes. Specifically, this report examines how the change in the diagnosis coding systems would affect analyzing trends for a defined group of conditions.

In this case study, we examine opioid-related inpatient stays for patients 25 years and older. It is important to note that the methods are meant to be illustrative of how researchers could investigate shifts in other populations defined by the ICD coding systems both before and after the transition to ICD-10-CM/PCS on October 1, 2015. The analytic process illustrated here can apply to both diagnosis and procedure codes (ICD-9-CM and ICD-10-CM/PCS).

In 2016, HCUP released information on annual trends in opioid-related inpatient stays from 2005–2014 in the online tool HCUP Fast Stats, identified by using ICD-9-CM diagnosis codes. With the addition of 2015–2016 data planned for April 2017, the transition from ICD-9-CM to ICD-10-CM diagnosis coding meant that a potential discontinuity would emerge in observed trends, owing solely to the change in the diagnosis coding systems, independent of true shifts in prevalence of conditions and changes in medical care. Therefore, we worked with professional medical coders to develop a list of ICD-10-CM opioid-related codes that were comparable to the ICD-9-CM list (see Appendix A). We tested the ICD-10-CM opioid-related codes on inpatient data from three States using all quarters of 2015 and three quarters of 2016.[1] After noticing a discontinuity in the trend that appeared to have resulted from the change in the diagnosis coding systems, we further investigated the population of interest by examining specific types of opioid codes.

Brief Overview of ICD-9-CM Versus ICD-10-CM/PCS

On October 1, 2015, the United States transitioned from reporting medical diagnoses and inpatient procedures using ICD-9-CM to the ICD-10-CM/PCS code sets. ICD-10-CM has two parts:

- ICD-10-CM: diagnosis coding on inpatient and outpatient data
- ICD-10-PCS: procedure coding on inpatient data.

An overview of key differences between ICD-9-CM and ICD-10-CM/PCS is available on the HCUP-US Web site under ICD-10-CM/PCS Resources. A more detailed comparison of the ICD-9-CM and ICD-10-CM/PCS coding systems is available in the HCUP Methods Series Report #2016-02, Impact of ICD-10-CM/PCS on Research Using Administrative Databases.

[1] Data on the last quarter of 2016 were not available at the time of this study.

METHODS

Data Source

This case study presents analyses using inpatient data from three States—Colorado, Kentucky, and Minnesota—from the first quarter of 2015 through the third quarter of 2016. This case study uses the HCUP State Inpatient Databases (SID) for 2015 and similar files for the quarterly data in 2016. The SID include discharge-level data on inpatient stays from most, if not all, hospitals in the State.[2] The SID include all types of inpatient stays, including transfers from another acute care hospital and stays that originated in the hospital emergency department. Starting in the fourth quarter (Q4) of 2015, the inpatient data include ICD-10-CM diagnosis codes. Records were limited to stays for adults aged 25 years and older at community hospitals that are not rehabilitation or long-term acute care hospitals. Transfers to another acute care hospital were excluded.

Case Definition

Opioid-related diagnoses were selected and reviewed by professional medical coders for both the ICD-9-CM and ICD-10-CM coding systems (see Appendix A for details). We then classified individual codes into one of four types of opioid-related diagnoses—dependence (including unspecified use), adverse effects, abuse, and poisoning.

Descriptive Analysis

The trend in the number of opioid-related inpatient stays is presented from the first quarter (Q1) of 2015 through the third quarter (Q3) of 2016. Results are presented overall, as well as stratified by age group (25–44, 45–64, and 65 years and older) and type of opioid-related diagnosis (dependence, adverse effects, abuse, and poisoning).

We compared the percentage change in the *transition period* to ICD-10-CM coding (from 2015 Q3 to Q4) with the average quarterly percentage change during two time periods: the quarters just *before the transition* to ICD-10-CM coding (2015 Q1 through Q3) and the quarters just *after the transition* (2015 Q4 through 2016 Q3). We calculated the average quarterly percentage change using the following formula:

$$\text{Average quarterly percentage change} = \left[\left(\frac{\text{End value}}{\text{Beginning value}}\right)^{\frac{1}{\text{change in quarters}}} - 1\right] \times 100.$$

When analyzing results by type of opioid-related diagnosis, counts were reported as the number of inpatient stays, but a single stay with more than one type of opioid-related diagnosis code was counted under each reported type—dependence, adverse effects, abuse, and poisoning. Finally, for each type of opioid-related diagnosis, we examined the frequency of individual ICD-9-CM and ICD-10-CM codes by age group and quarter.

[2] For more information on the SID, please see https://www.hcup-us.ahrq.gov/sidoverview.jsp.

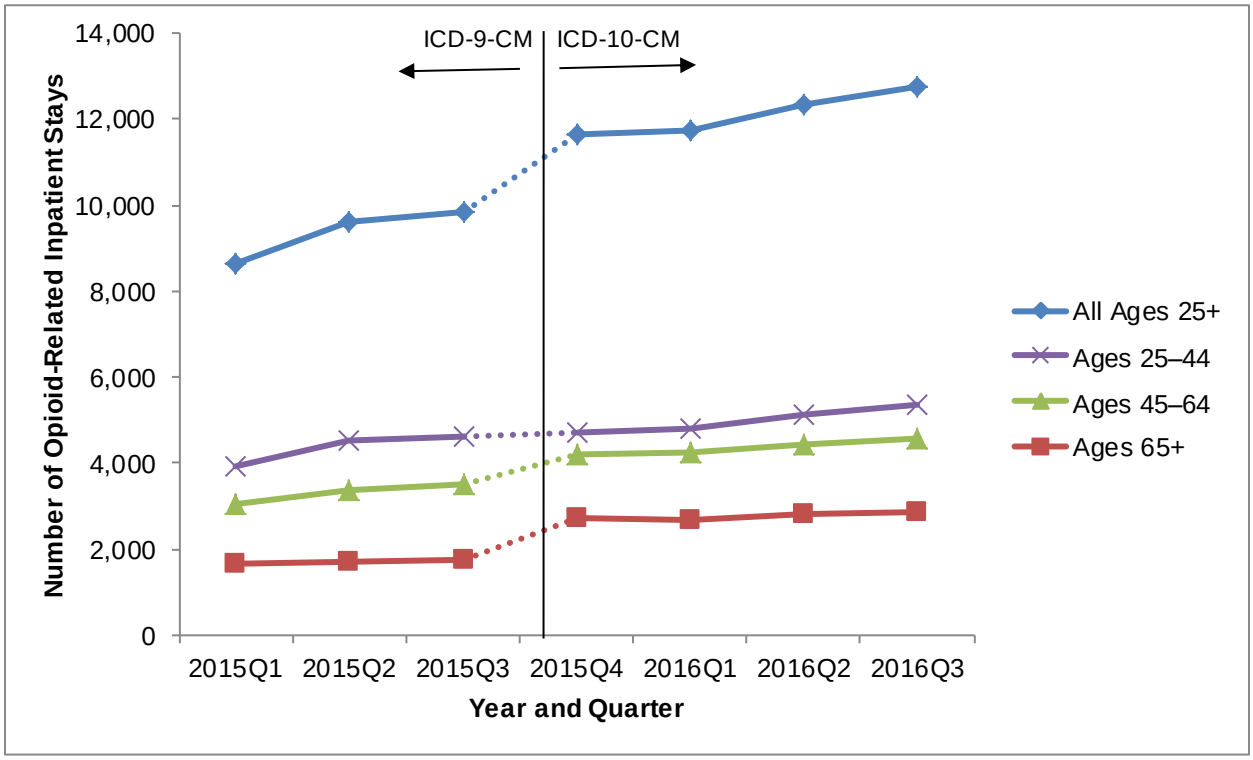
RESULTS

Overall Results

The number of available opioid-related diagnosis codes increased from 20 ICD-9-CM codes to 100 ICD-10-CM codes. However, only a fourth of the possible 100 opioid-related ICD-10-CM codes were observed in these data.

Figure 1 presents the number of opioid-related inpatient stays from 2015 Q1 through 2016 Q3 in three States, overall and by patient age.

Figure 1. Number of Opioid-Related Inpatient Stays by Age, 2015 Q1 Through 2016 Q3



Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

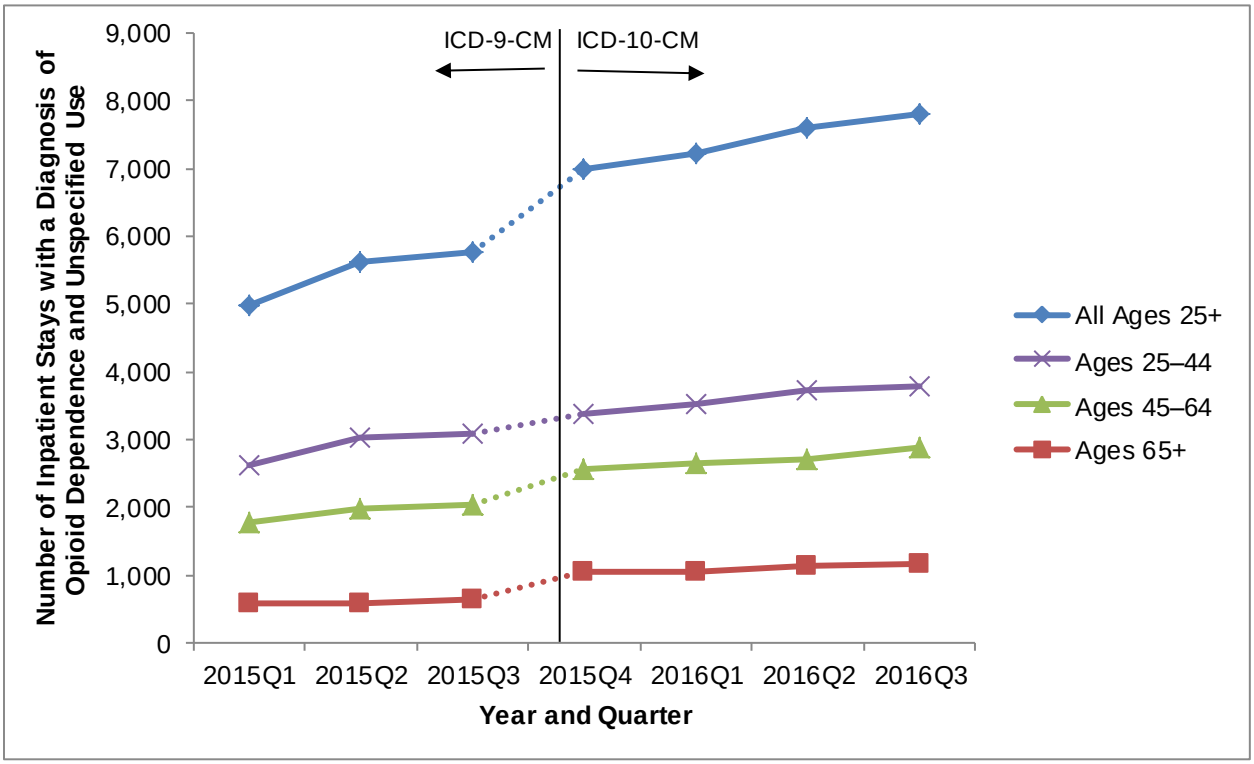
Among adults aged 25 years and older, the overall number of opioid-related inpatient stays increased 18.3 percent between 2015 Q3 and Q4, when diagnosis coding transitioned to ICD-10-CM. However, the magnitude of the change differed by age group. Specifically, the number of opioid-related inpatient stays for adults aged 65 years and older increased 55.7 percent, whereas the number of stays increased 20.8 percent for adults aged 45–64 years and 2.2 percent for adults aged 25-44 years.

The average quarterly percentage change in opioid-related inpatient stays for adults aged 25 years and older before the transition to ICD-10-CM coding was a 6.7 percent increase. The average quarterly percentage change for adults aged 25 years and older after the transition to ICD-10-CM coding was a 3.1 percent increase.

Results by Type of Opioid-Related Diagnosis

Figures 2 through 5 present trends in the number of inpatient stays for each type of opioid-related diagnosis—dependence (including unspecified use), adverse effects, abuse, and poisoning. Tables 1 through 4 present the frequency of individual ICD codes by age and quarter for each type of diagnosis.

Figure 2. Inpatient Stays With a Diagnosis of Opioid Dependence and Unspecified Use by Age, 2015 Q1 Through 2016 Q3



Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

Among adults aged 25 years and older, the number of inpatient stays with a diagnosis of opioid dependence and unspecified use increased 21.3 percent between 2015 Q3 and Q4, when diagnosis coding transitioned to ICD-10-CM. The average quarterly percentage change before the transition to ICD-10-CM coding was a 7.4 percent increase. The average quarterly percentage change after the transition to ICD-10-CM coding was a 3.7 percent increase. Between 2015 Q3 and Q4, the number of inpatient stays with a diagnosis of opioid dependence and unspecified use increased 9.2 percent for adults aged 25–44, 25.5 percent for adults aged 45–64, and 67.5 percent for adults aged 65 years and older.

Table 1. Frequency of Inpatient Stays With a Diagnosis of Opioid Dependence and Unspecified Use by Age, 2015 Q3 and Q4

Code and Description	Ages 25–44		Ages 45–64		Ages 65+	
	2015 Q3	2015 Q4	2015 Q3	2015 Q4	2015 Q3	2015 Q4
ICD-9-CM codes						
30400: Opioid type dependence, unspecified	1,498		1,025		294	
30401: Opioid type dependence, continuous	962		791		312	
30470: Combinations of opioid type drug with any other drug dependence, unspecified	395		130		12	
30471: Combinations of opioid type drug with any other drug dependence, continuous	267		88		12	
ICD-10-CM codes						
F1120: Opioid dependence, uncomplicated		1,755		1,803		856
F1123: Opioid dependence with withdrawal		1,121		391		71
F1124: Opioid dependence with opioid-induced mood disorder		164		30		0
F11288: Opioid dependence with other opioid-induced disorder		20		*		*
F1129: Opioid dependence with unspecified opioid-induced disorder		58		78		29
F1190: Opioid use, unspecified, uncomplicated		293		229		68
F11921: Opioid use, unspecified, with intoxication delirium		*		*		20
F1194: Opioid use, unspecified with opioid-induced mood disorder		13		*		*
F1199: Opioid use, unspecified with unspecified opioid-induced disorder		15		*		0
Total inpatient stays with a diagnosis of opioid dependence and unspecified use[a]	**3,095**	**3,379**	**2,034**	**2,553**	**631**	**1,057**
Percent change, 2015 Q3 to Q4	**9.2**		**25.5**		**67.5**	

Note: Values based on 10 or fewer discharges are suppressed to protect confidentiality of patients and are designated with an asterisk (*). Individual codes for opioid dependence and unspecified use with frequencies of 10 or fewer discharges in all cells are not presented. A complete list of codes included in each opioid-related diagnosis type for this study is included in Appendix A.

[a] The total number of inpatient stays with a diagnosis of opioid dependence and unspecified use may be less than the sum of the number of stays by individual codes for opioid dependence and unspecified use because a stay may include more than one diagnosis.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

The group of diagnoses for opioid dependence included six ICD-9-CM codes and 14 ICD-10-CM codes.[3] Under ICD-10-CM there are an additional 14 diagnosis codes for unspecified opioid "use" for which there are no ICD-9-CM equivalents. The two most frequently used ICD-9-CM codes were for *unspecified* (30400) and *continuous* (30401) *opioid dependence*. The three most frequently used ICD-10-CM codes were for *uncomplicated opioid dependence* (F1120), *opioid dependence with withdrawal* (F1123), and *opioid use unspecified and uncomplicated* (F1190).

Among adults aged 25–44 years, fewer stays with the ICD-10-CM code for *uncomplicated opioid dependence* (F1120) were reported in 2015 Q4 compared with ICD-9-CM reporting of *unspecified* (30400) or *continuous* (30401) *dependence* in 2015 Q3 (1,755 stays vs. 1,498 or 962 stays, respectively). In addition, a substantial number of stays among adults aged 25–44 years had the ICD-10-CM code for *opioid dependence with withdrawal* (F1123) reported on their inpatient stay (1,121 stays).

Among adults aged 45–64 years, the frequency of the ICD-10-CM code for *uncomplicated opioid dependence* (F1120) in 2015 Q4 was similar to that for the ICD-9-CM code for *unspecified* (30400) or *continuous* (30401) *dependence* in 2015 Q3 (about 1,800 stays in each quarter).

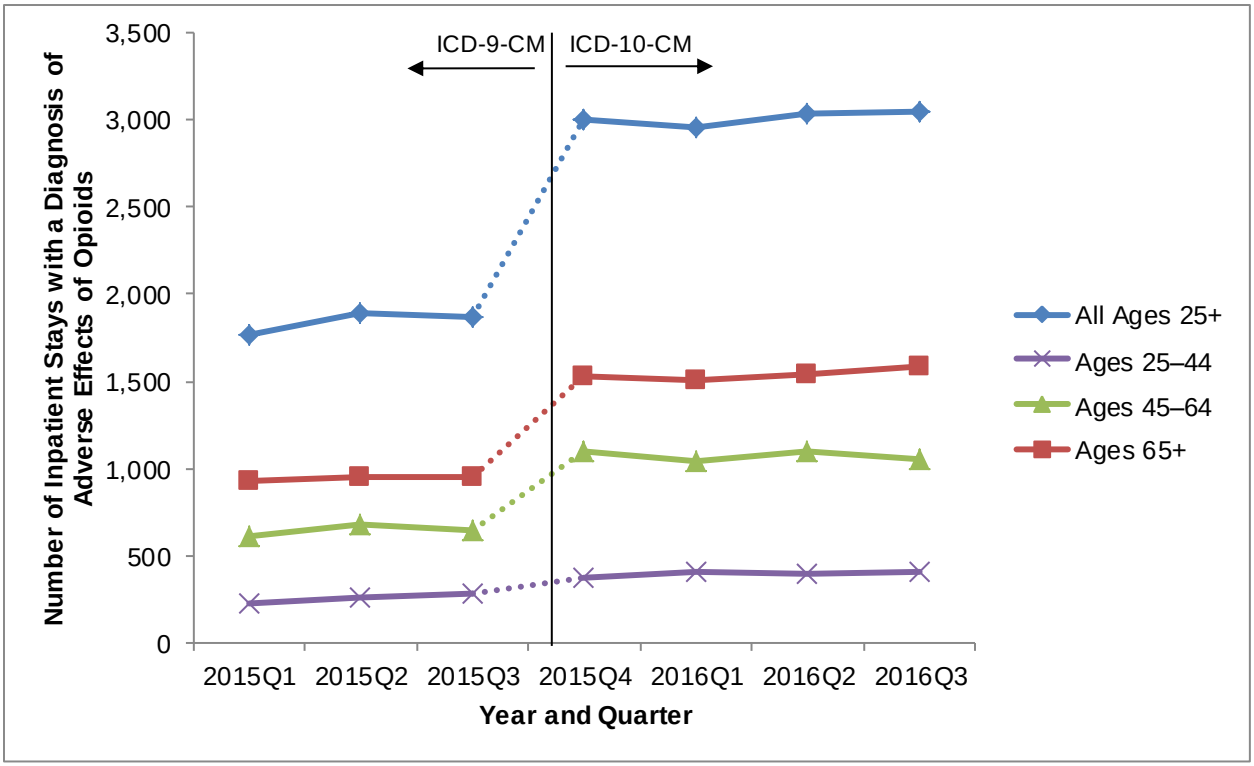
The increase in stays with a diagnosis of opioid dependence between 2015 Q3 and Q4 for adults aged 65 years and older, displayed in Figure 2, are driven by *uncomplicated opioid dependence*. There were 294 cases with ICD-9-CM codes for *unspecified* (30400) and 312 cases with *continuous* (30401) *dependence* in 2015 Q3 among adults aged 65 years and older. In 2015 Q4, there were 856 cases with an ICD-10-CM code for *uncomplicated opioid dependence* (F1120).

Within each age group in 2015 Q4, about 10 percent of the inpatient stays in this category included a diagnosis of unspecified opioid use. Even though ICD-10-CM codes for unspecified opioid use do not have ICD-9-CM equivalents, their introduction does not account for the increases in the number of stays for opioid dependence *and* unspecified use.

[3] Codes with 10 or fewer cases in every age group are not presented in this table. A complete list of codes included in each opioid-related diagnosis type for this study is provided in Appendix A.

Figure 3 and Table 2 present information on the number of inpatient stays with a diagnosis of adverse effects of opioids.

Figure 3. Inpatient Stays With a Diagnosis of Adverse Effects of Opioids by Age, 2015 Q1 Through 2016 Q3



Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

Among adults aged 25 years and older, the number of inpatient stays with a diagnosis of adverse effects of opioids increased by 60.4 percent between 2015 Q3 and Q4, when diagnosis coding transitioned to ICD-10-CM. The average quarterly percentage change before the transition to ICD-10-CM coding was a 3.0 percent increase. The average quarterly percentage change after the transition to ICD-10-CM coding was a 0.5 percent increase. Between 2015 Q3 and Q4, the number of inpatient stays with a diagnosis of adverse effects of opioids increased 34.7 percent for adults aged 25–44, increased 69.7 percent for adults aged 45–64, and increased 61.6 percent for adults aged 65 years and older.

Table 2. Frequency of Inpatient Stays With a Diagnosis of Adverse Effects of Opioids by Age, 2015 Q3 and Q4

Code and Description	Ages 25–44		Ages 45–64		Ages 65+	
	2015 Q3	2015 Q4	2015 Q3	2015 Q4	2015 Q3	2015 Q4
ICD-9-CM codes						
E9351: Methadone causing adverse effects in therapeutic use	11		13		*	
E9352: Other opiates and related narcotics causing adverse effects in therapeutic use	254		619		925	
E9401: Adverse effects of opiate antagonists	*		18		16	
ICD-10-CM codes						
T400X5A: Adverse effect of opium, initial encounter		*		*		11
T402X5A: Adverse effect of other opioids, initial encounter		195		549		743
T403X5A: Adverse effect of methadone, initial encounter		*		15		*
T404X5A: Adverse effect of synthetic narcotics, initial encounter		16		42		88
T40605A: Adverse effect of unspecified narcotics, initial encounter		142		461		666
T40695A: Adverse effect of other narcotics, initial encounter		*		*		15
Total inpatient stays with a diagnosis of adverse effects of opioids[a]	**277**	**373**	**647**	**1,098**	**946**	**1,529**
Percent change, 2015 Q3 to Q4	**34.7**		**69.7**		**61.6**	

Note: Values based on 10 or fewer discharges are suppressed to protect confidentiality of patients and are designated with an asterisk (*). Individual opioid adverse effects codes with frequencies of 10 or fewer discharges in all cells are not presented. A complete list of codes included in each opioid-related diagnosis type for this study is included in Appendix A.

[a] The total number of inpatient stays with a diagnosis of adverse effects of opioids may be less than the sum of the number of stays by individual opioid adverse effects codes because a stay may include more than one diagnosis.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

The group of diagnoses for adverse effects of opioids included four ICD-9-CM codes and 18 ICD-10-CM codes.[4] The most frequently used ICD-9-CM code was *other opiates and related narcotics causing adverse effects in therapeutic use* (E9352). The two most frequently used ICD-10-CM codes were initial adverse effects encounters for *unspecified narcotics* (T40605A) or *other opioids* (T402X5A).[5]

There were 619 stays with ICD-9-CM codes for *other opiates and related narcotics causing adverse effects in therapeutic use* (E9352) in 2015 Q3 among adults aged 45–64 and 925 cases among adults aged 65 years and older. In 2015 Q4, the number of stays more than

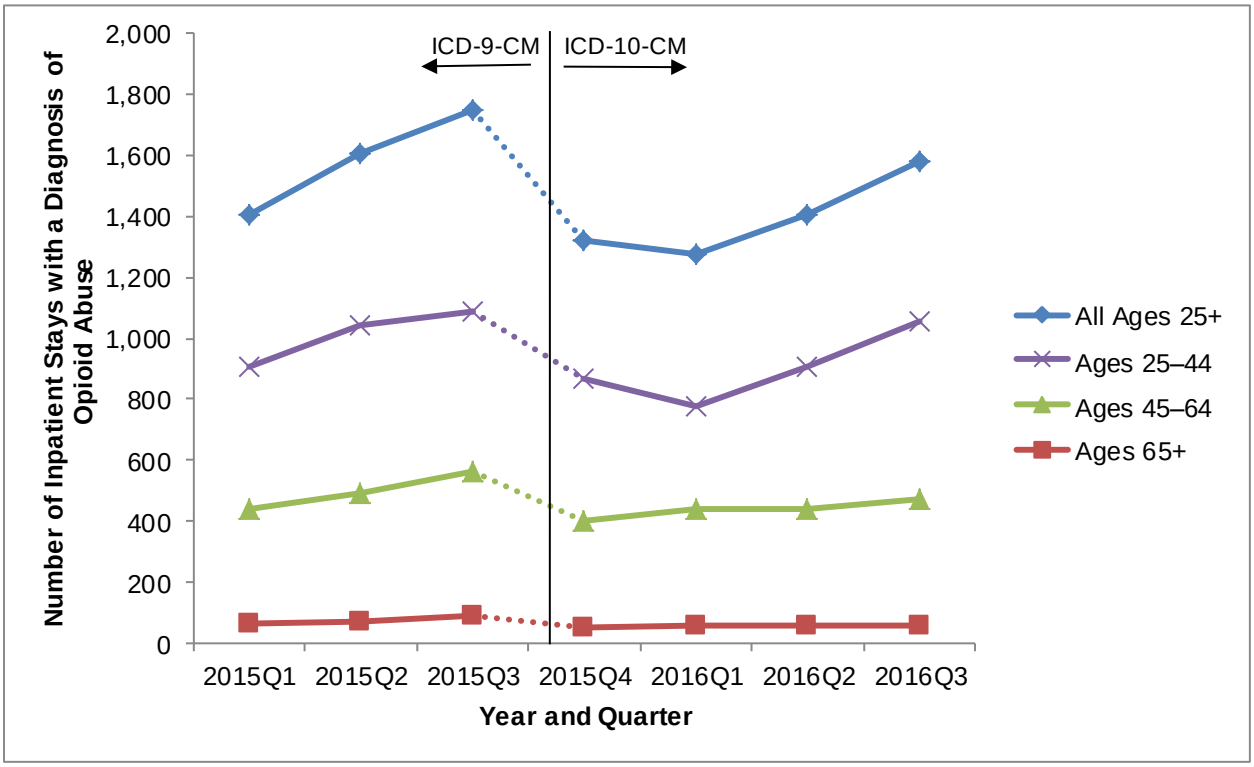
[4] Codes with 10 or fewer cases in every age group are not presented in this table. A complete list of codes included in each opioid-related diagnosis type for this study is provided in Appendix A.

[5] No ICD-10-CM code is specific to therapeutic use.

doubled to 1,010 cases with an ICD-10-CM code for initial adverse effect encounters for *unspecified narcotics* (T40605A) or *other opioids* (T402X5A) among adults aged 45–64 years and 1,409 cases among adults aged 65 years and older.

Figure 4 and Table 3 present information on the number of inpatient stays with a diagnosis of opioid abuse.

Figure 4. Inpatient Stays With a Diagnosis of Opioid Abuse by Age, 2015 Q1 Through 2016 Q3



Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

Among adults aged 25 years and older, the number of inpatient stays with a diagnosis of opioid abuse decreased by 24.3 percent between 2015 Q3 and Q4, when diagnosis coding transitioned to ICD-10-CM. The average quarterly percentage change before the transition to ICD-10-CM coding was an 11.4 percent increase. The average quarterly percentage change after the transition to ICD-10-CM coding was a 6.2 percent increase. Between 2015 Q3 and Q4, the number of inpatient stays with a diagnosis of opioid abuse decreased 20.5 percent for adults aged 25–44, 28.6 percent for adults aged 45–64, and 43.0 percent for adults aged 65 years and older.

Table 3. Frequency of Inpatient Stays With a Diagnosis of Opioid Abuse by Age, 2015 Q3 and Q4

Code and Description	Ages 25–44		Ages 45–64		Ages 65+	
	2015 Q3	2015 Q4	2015 Q3	2015 Q4	2015 Q3	2015 Q4
ICD-9-CM codes						
30550: Opioid abuse, unspecified	954		495		71	
30551: Opioid abuse, continuous	124		58		21	
30552: Opioid abuse, episodic	13		11		*	
ICD-10-CM codes						
F1110: Opioid abuse, uncomplicated		813		380		45
F11120: Opioid abuse with intoxication, unspecified		11		*		*
F1114: Opioid abuse with opioid-induced mood disorder		17		*		0
Total inpatient stays with a diagnosis of opioid abuse[a]	**1,090**	**867**	**563**	**402**	**93**	**53**
Percent change, 2015 Q3 to Q4	**–20.5**		**–28.6**		**–43.0**	

Note: Values based on 10 or fewer discharges are suppressed to protect confidentiality of patients and are designated with an asterisk (*). Individual opioid abuse codes with frequencies of 10 or fewer discharges in all cells are not presented. A complete list of codes included in each opioid-related diagnosis type for this study is included in Appendix A.

[a] The total number of inpatient stays with a diagnosis of opioid abuse may be less than the sum of the number of stays by individual opioid abuse codes because a stay may include more than one diagnosis.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

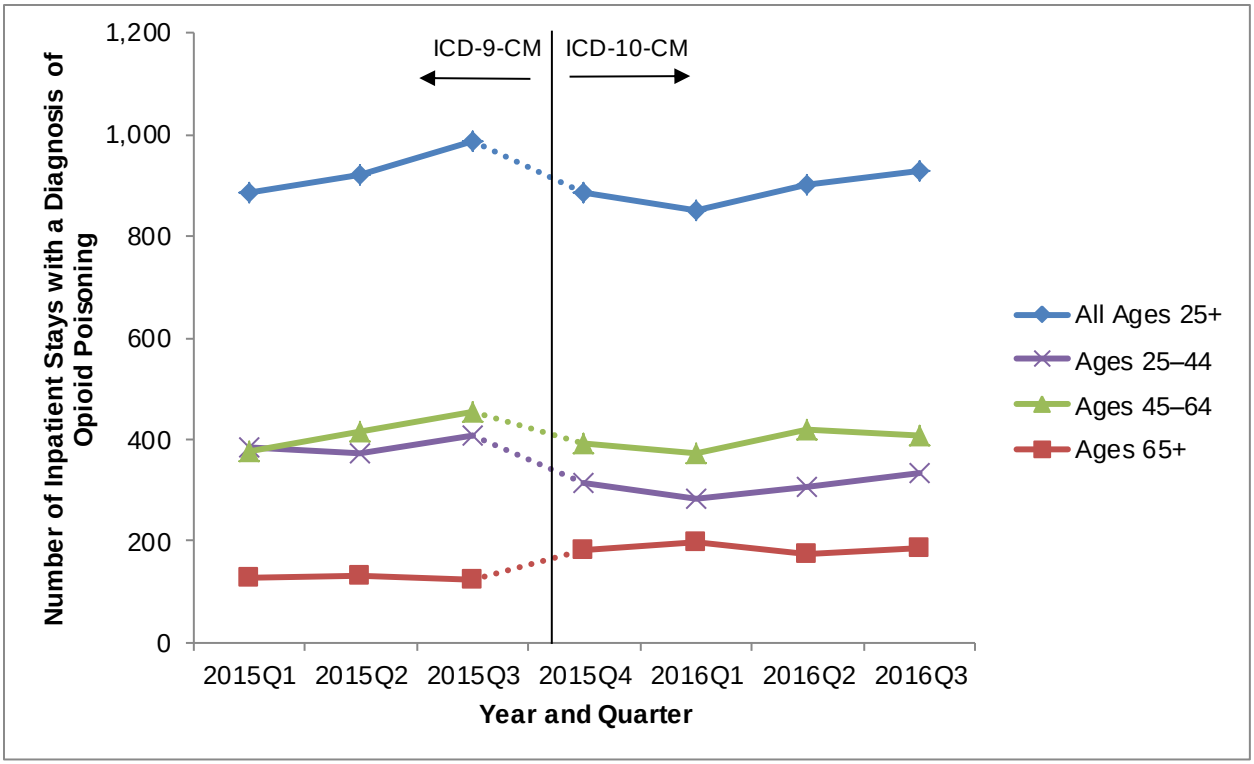
The group of diagnoses for opioid abuse included three ICD-9-CM codes and 13 ICD-10-CM codes.[6] The most frequently used ICD-9-CM code was *unspecified opioid abuse* (30550). The most frequently used ICD-10-CM code was *uncomplicated opioid abuse* (F1110).

There were 954 stays with ICD-9-CM codes for *unspecified opioid abuse* (30550) in 2015 Q3 among adults aged 25–44 and 495 cases among adults aged 45–64 years. In 2015 Q4, there were 813 stays with an ICD-10-CM code for *uncomplicated opioid abuse* (F1110) among adults aged 25–44 years and 380 cases among adults aged 45–64 years.

[6] Codes with 10 or fewer cases in every age group are not presented in this table. A complete list of codes included in each opioid-related diagnosis type for this study is provided in Appendix A.

Figure 5 and Table 4 present information on the number of inpatient stays with a diagnosis of opioid abuse.

Figure 5. Inpatient Stays With a Diagnosis of Opioid Poisoning by Age, 2015 Q1 Through 2016 Q3



Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

Among adults aged 25 years and older, the number of inpatient stays with a diagnosis of opioid poisoning decreased by 10.2 percent between 2015 Q3 and Q4, when diagnosis coding transitioned to ICD-10-CM. The average quarterly percentage change before the transition to ICD-10-CM coding was a 5.4 percent increase. The average quarterly percentage change after the transition to ICD-10-CM coding was a 1.6 percent increase. Between 2015 Q3 and Q4, the number of inpatient stays with a diagnosis of opioid poisoning decreased 23.5 percent for adults aged 25–44, decreased 13.7 percent for adults aged 45–64, and increased 46.0 percent for adults aged 65 years and older.

Table 4. Frequency of Inpatient Stays With a Diagnosis of Opioid Poisoning by Age, 2015 Q3 and Q4

Code and Description	Ages 25–44		Ages 45–64		Ages 65+	
	2015 Q3	2015 Q4	2015 Q3	2015 Q4	2015 Q3	2015 Q4
ICD-9-CM codes						
96500: Poisoning by opium (alkaloids), unspecified	117		160		49	
96501: Poisoning by heroin	145		60		*	
96502: Poisoning by methadone	37		48		*	
96509: Poisoning by other opiates and related narcotics	108		183		62	
9701: Poisoning by opiate antagonists	21		12		*	
E8500: Accidental poisoning by heroin	76		28		*	
E8501: Accidental poisoning by methadone	17		26		*	
E8502: Accidental poisoning by other opiates and related narcotics	91		169		82	
ICD-10-CM codes						
T401X1A: Poisoning by heroin, accidental (unintentional), initial encounter		127		36		*
T402X1A: Poisoning by other opioids, accidental (unintentional), initial encounter		79		145		101
T403X1A: Poisoning by methadone, accidental (unintentional), initial encounter		22		35		*
T404X1A: Poisoning by synthetic narcotics, accidental (unintentional), initial encounter		12		22		11
T40601A: Poisoning by unspecified narcotics, accidental (unintentional), initial encounter		40		126		51
Total inpatient stays with a diagnosis of opioid poisoning[a]	**409**	**313**	**453**	**391**	**124**	**181**
Percent change, 2015 Q3 to Q4	**–23.5**		**–13.7**		**46.0**	

Note: Values based on 10 or fewer discharges are suppressed to protect confidentiality of patients and are designated with an asterisk (*). Individual opioid poisoning codes with frequencies of 10 or fewer discharges in all cells are not presented. A complete list of codes included in each opioid-related diagnosis type for this study is included in Appendix A.

[a] The total number of inpatient stays with a diagnosis of opioid poisoning may be less than the sum of the number of stays by individual opioid poisoning codes because a stay may include more than one diagnosis.

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

The group of diagnoses for opioid poisoning included eight ICD-9-CM codes and 42 ICD-10-CM codes.[7] There were four different ICD-9-CM codes for diagnoses of opioid poisoning with at least 100 diagnoses in a single age group in 2015 Q3. In 2015 Q4, just three of the 42 ICD-10-CM codes for opioid-related poisoning were used for at least 100 discharges in a single age group.

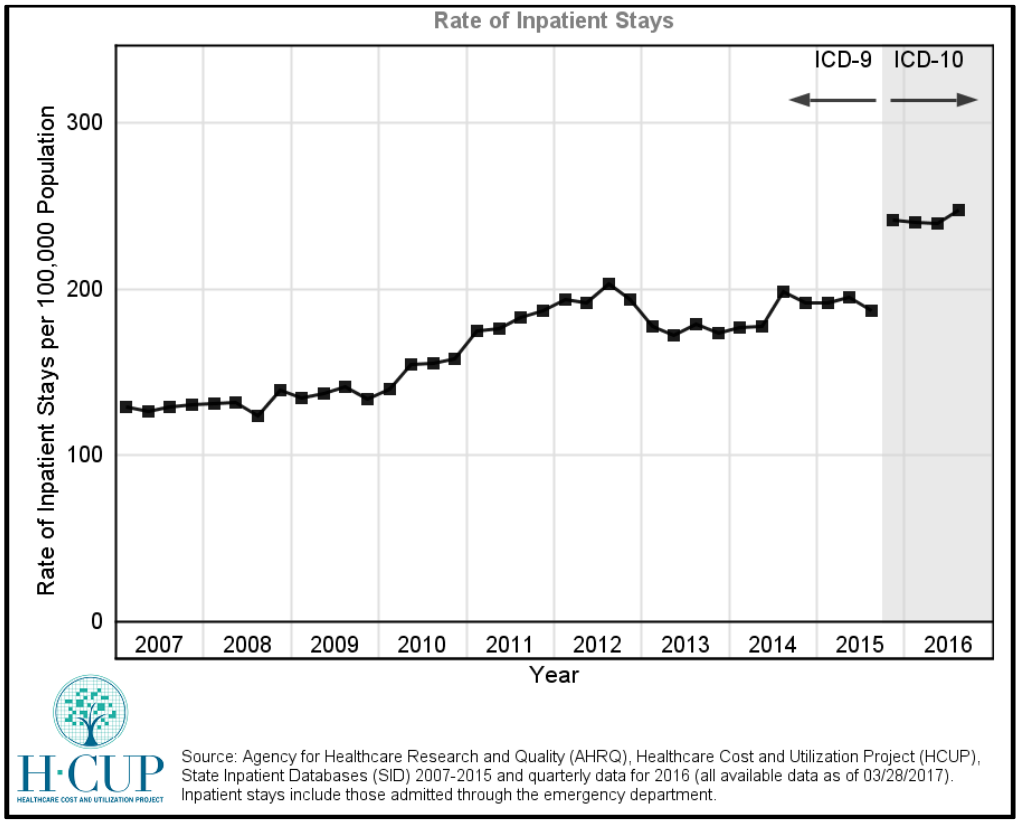
[7] Codes with 10 or fewer cases in every age group are not presented in this table. A complete list of codes included in each opioid-related diagnosis type for this study is provided in Appendix A.

DISCUSSION

This case study demonstrates the need to examine data trends before, during, and after the transition to ICD-10-CM diagnosis coding, and by extension to ICD-10-PCS procedure coding. We used professional medical coders to define inpatient stays with the clinical conditions of interest in both the ICD-9-CM and ICD-10-CM diagnosis coding systems, and we looked at frequencies for individual codes to help understand how our study sample was affected.

The descriptive results presented here point toward a substantial one-time shift in the number of opioid-related inpatient stays as the transition was made to ICD-10-CM diagnosis coding in the fourth quarter of 2015. The presentation of our results clearly designated a switch in the coding systems between 2015 Q3 and Q4. We chose to differentially represent the trend line between these quarters as a dashed line to further signify a potential discontinuity caused by coding. In the HCUP online tool HCUP Fast Stats, the graphs for opioid-related hospital use do not connect the trend lines before and after the transition to ICD-10-CM and indicate the ICD-10-CM time period with shading (Figure 6).

Figure 6. Example of HCUP Fast Stats Figure for Opioid-Related Hospital Use, 2007 Through 2016



This investigation had some limitations. We did not make any attempt to decompose the observed change in trends into effects attributable to ICD-10-CM coding practices or to other factors associated with an already increasing opioid epidemic in the United States as a whole or these States in particular. Furthermore, we did not look at variation by hospital, hospital

characteristics, or other patient characteristics such as expected primary payer. Those additional stratifications could have helped explain why we are seeing these changes in the coding of opioid-related hospital inpatient stays. It also is important to remember that these results are specific to three States. We recommend repeating the analysis with additional data as it becomes available.

Even though the number of available opioid-related diagnosis codes increased dramatically from 20 ICD-9-CM codes to 100 ICD-10-CM codes, only a fourth of the possible 100 opioid-related codes were observed in the data. This study covers the first 12 months after the transition to ICD-10-CM coding. We recommend repeating the analysis after clinicians and coders have had more time to become familiar with ICD-10-CM to determine whether they have started to incorporate additional clinical detail and a wider range of the available codes.

Although this case study focused only on diagnosis codes (ICD-9-CM and ICD-10-CM), the analytic process of examining specific codes for use in studies applies to both diagnosis and procedure codes (ICD-9-CM and ICD-10-CM/PCS). Additional guidance and forewarning to users analyzing outcomes that may be affected by the transition to the ICD-10-CM/PCS can be found on the HCUP-US Web site under ICD-10-CM/PCS Resources.

APPENDIX A. ICD-9-CM AND ICD-10-CM OPIOID-RELATED DIAGNOSIS CODES USED IN THIS STUDY

ICD-9-CM Code	ICD-10-CM Code	Description
Opioid Abuse		
30550		Opioid abuse, unspecified
30551		Opioid abuse, continuous
30552		Opioid abuse, episodic
	F1110	Opioid abuse, uncomplicated
	F11120	Opioid abuse with intoxication, uncomplicated
	F11121	Opioid abuse with intoxication delirium
	F11122	Opioid abuse with intoxication with perceptual disturbance
	F11129	Opioid abuse with intoxication, unspecified
	F1114	Opioid abuse with opioid-induced mood disorder
	F11150	Opioid abuse with opioid-induced psychotic disorder with delusions
	F11151	Opioid abuse with opioid-induced psychotic disorder with hallucinations
	F11159	Opioid abuse with opioid-induced psychotic disorder, unspecified
	F11181	Opioid abuse with opioid-induced sexual dysfunction
	F11182	Opioid abuse with opioid-induced sleep disorder
	F11188	Opioid abuse with other opioid-induced disorder
	F1119	Opioid abuse with unspecified opioid-induced disorder
Adverse Effects of Opioids		
E9350		Heroin causing adverse effects in therapeutic use
E9351		Methadone causing adverse effects in therapeutic use
E9352		Other opiates and related narcotics causing adverse effects in therapeutic use
E9401		Adverse effects of opiate antagonists
	T400X5A	Adverse effect of opium, initial encounter
	T400X5D	Adverse effect of opium, subsequent encounter
	T400X5S	Adverse effect of opium, sequela
	T402X5A	Adverse effect of other opioids, initial encounter
	T402X5D	Adverse effect of other opioids, subsequent encounter
	T402X5S	Adverse effect of other opioids, sequela
	T403X5A	Adverse effect of methadone, initial encounter
	T403X5D	Adverse effect of methadone, subsequent encounter
	T403X5S	Adverse effect of methadone, sequela
	T404X5A	Adverse effect of synthetic narcotics, initial encounter
	T404X5D	Adverse effect of synthetic narcotic, subsequent encounter
	T404X5S	Adverse effect of synthetic narcotic, sequela
	T40605A	Adverse effect of unspecified narcotics, initial encounter
	T40605D	Adverse effect of unspecified narcotics, subsequent encounter
	T40605S	Adverse effect of unspecified narcotics, sequela
	T40695A	Adverse effect of other narcotics initial encounter

ICD-9-CM Code	ICD-10-CM Code	Description
	T40695D	Adverse effect of other narcotics, subsequent encounter
	T40695S	Adverse effect of other narcotics, sequela
Opioid Dependence and Unspecified Use		
30400		Opioid type dependence, unspecified
30401		Opioid type dependence, continuous
30402		Opioid type dependence, episodic
30470		Combinations of opioid type drug with any other drug dependence, unspecified
30471		Combinations of opioid type drug with any other drug dependence, continuous
30472		Combinations of opioid type drug with any other drug dependence, episodic
	F1120	Opioid dependence, uncomplicated
	F11220	Opioid dependence with intoxication, uncomplicated
	F11221	Opioid dependence with intoxication delirium
	F11222	Opioid dependence with intoxication with perceptual disturbance
	F11229	Opioid dependence with intoxication, unspecified
	F1123	Opioid dependence with withdrawal
	F1124	Opioid dependence with opioid-induced mood disorder
	F11250	Opioid dependence with opioid-induced psychotic disorder with delusions
	F11251	Opioid dependence with opioid-induced psychotic disorder with hallucinations
	F11259	Opioid dependence with opioid-induced psychotic disorder, unspecified
	F11281	Opioid dependence with opioid-induced sexual dysfunction
	F11282	Opioid dependence with opioid-induced sleep disorder
	F11288	Opioid dependence with other opioid-induced disorder
	F1129	Opioid dependence with unspecified opioid-induced disorder
	F1190	Opioid use, unspecified, uncomplicated
	F11920	Opioid use, unspecified, with intoxication, uncomplicated
	F11921	Opioid use, unspecified, with intoxication delirium
	F11922	Opioid use, unspecified, with intoxication with perceptual disturbance
	F11929	Opioid use, unspecified, with intoxication, unspecified
	F1193	Opioid use, unspecified with withdrawal
	F1194	Opioid use, unspecified with opioid-induced mood disorder
	F11950	Opioid use, unspecified with opioid-induced psychotic disorder with delusions
	F11951	Opioid use, unspecified with opioid-induced psychotic disorder with hallucinations
	F11959	Opioid use, unspecified with opioid-induced psychotic disorder, unspecified
	F11981	Opioid use, unspecified with opioid-induced sexual dysfunction
	F11982	Opioid use, unspecified with opioid-induced sleep disorder
	F11988	Opioid use, unspecified with other opioid-induced disorder
	F1199	Opioid use, unspecified with unspecified opioid-induced disorder
Opioid Poisoning		
96500		Poisoning by opium (alkaloids), unspecified
96501		Poisoning by heroin

ICD-9-CM Code	ICD-10-CM Code	Description
96502		Poisoning by methadone
96509		Poisoning by other opiates and related narcotics
9701		Poisoning by opiate antagonists
E8500		Accidental poisoning by heroin
E8501		Accidental poisoning by methadone
E8502		Accidental poisoning by other opiates and related narcotics
	T400X1A	Poisoning by opium, accidental (unintentional), initial encounter
	T400X1D	Poisoning by opium, accidental (unintentional), subsequent encounter
	T400X1S	Poisoning by opium, accidental (unintentional), sequela
	T400X4A	Poisoning by opium, undetermined, initial encounter
	T400X4D	Poisoning by opium, undetermined, subsequent encounter
	T400X4S	Poisoning by opium, undetermined, sequela
	T401X1A	Poisoning by heroin, accidental (unintentional), initial encounter
	T401X1D	Poisoning by heroin, accidental (unintentional), subsequent encounter
	T401X1S	Poisoning by heroin, accidental (unintentional), sequela
	T401X4A	Poisoning by heroin, undetermined, initial encounter
	T401X4D	Poisoning by heroin, undetermined, subsequent encounter
	T401X4S	Poisoning by heroin, undetermined, sequela
	T402X1A	Poisoning by other opioids, accidental (unintentional), initial encounter
	T402X1D	Poisoning by other opioids, accidental (unintentional), subsequent encounter
	T402X1S	Poisoning by other opioids, accidental (unintentional), sequela
	T402X4A	Poisoning by other opioids, undetermined, initial encounter
	T402X4D	Poisoning by other opioids, undetermined, subsequent encounter
	T402X4S	Poisoning by other opioids, undetermined, sequela
	T403X1A	Poisoning by methadone, accidental (unintentional), initial encounter
	T403X1D	Poisoning by methadone, accidental (unintentional), subsequent encounter
	T403X1S	Poisoning by methadone, accidental (unintentional), sequela
	T403X4A	Poisoning by methadone, undetermined, initial encounter
	T403X4D	Poisoning by methadone, undetermined, subsequent encounter
	T403X4S	Poisoning by methadone, undetermined, sequela
	T404X1A	Poisoning by synthetic narcotics, accidental (unintentional), initial encounter
	T404X1D	Poisoning by synthetic narcotics, accidental (unintentional), subsequent encounter
	T404X1S	Poisoning by synthetic narcotics, accidental (unintentional), sequela
	T404X4A	Poisoning by synthetic narcotics, undetermined, initial encounter
	T404X4D	Poisoning by synthetic narcotics, undetermined, subsequent encounter
	T404X4S	Poisoning by synthetic narcotics, undetermined, sequela
	T40601A	Poisoning by unspecified narcotics, accidental (unintentional), initial encounter
	T40601D	Poisoning by unspecified narcotics, accidental (unintentional), subsequent encounter
	T40601S	Poisoning by unspecified narcotics, accidental (unintentional), sequela

ICD-9-CM Code	ICD-10-CM Code	Description
	T40604A	Poisoning by unspecified narcotics, undetermined, initial encounter
	T40604D	Poisoning by unspecified narcotics, undetermined, subsequent encounter
	T40604S	Poisoning by unspecified narcotics, undetermined, sequela
	T40691A	Poisoning by other narcotics, accidental (unintentional), initial encounter
	T40691D	Poisoning by other narcotics, accidental (unintentional), subsequent encounter
	T40691S	Poisoning by other narcotics, accidental (unintentional), sequela
	T40694A	Poisoning by other narcotics, undetermined, initial encounter
	T40694D	Poisoning by other narcotics, undetermined, subsequent encounter
	T40694S	Poisoning by other narcotics, undetermined, sequela