Chronic Condition Data Warehouse

Your source for national CMS Medicare and Medicaid research data

CCW White Paper:

Medicare Claims Maturity

October 2017

Version 2.0

This page intentionally left blank.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1: Background

Medicare administrative claims data are useful for monitoring service utilization – including hospitalizations, home health and physician office visits. Claims generally take many months to be considered 'final' – and be mature enough that the data produce stable estimates of service use, reasons for service, and payments. However, timely information allows investigators to monitor the progress of programs and interventions, enabling mid-course adjustments to improve results.

Before payment can be made for Medicare Part A and Part B-covered services, claims must be filed. The provider must submit the claims, the Medicare Administrative Contractor (MAC) processes the claims for payment, and the claims are uploaded into the CMS National Claims History File (NCH) before they are available to the CMS Chronic Condition Warehouse (CCW). Providers must submit Medicare Part A and B claims no later than 1 calendar year from the claim's date of service.[1] There are some exceptions – such as when retroactive Medicare enrollment takes place or retroactive disenrollment from a Medicare Advantage plan[2]. After the submission deadline, the MAC and providers may continue to make adjustments and deletions to reconcile the claims.

CCW obtains Medicare claims and Part D event data files from CMS each week on a nearly real-time basis as claims are processed by CMS and then loaded to the CCW. CCW obtains a copy of each transactional claim record that is in the NCH. There is a lag between the date of service and when a claim is processed. Also, it is common for claims to undergo more than one round of processing to make adjustments, edits and cancelations before the claim becomes final.

Similarly, multiple iterations of a single prescription drug event (PDE) record may exist. Part D plans or their designated pharmacy benefits manager (PBM) or other third party administrator must submit PDEs at least once a month to CMS by sending a standardized data file to the Drug Data Processing System (DDPS). Plans can make adjustments or deletions to PDEs until the reconciliation deadline six months after the benefit year, at which time they certify the accuracy of all their PDEs (note: plans may submit additional changes after this deadline, however CMS does not consider these for reconciling payments). Then, CMS performs Plan-to-Plan Phase 3 Reconciliation (P2PP3) of the PDEs which may result in edits to fields on the record to reflect Part D plan switching that may have occurred during the benefit year and were not already accounted for in earlier Plan-to-Plan (P2P) reconciliations. PDE data are not considered complete until these adjustments have been made.

Because of the lag time associated with obtaining final adjudicated claim records, use of nearly real-time data to make inferences about service cost, reasons for service (e.g., diagnoses) and

[1] CMS. Medicare Claims Processing Manual. http://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/clm104c01.pdf (see Section 70 - Time Limitations for Filing Part A and Part B Claims). (Accessed 5-19-2015)
[2] CMS. Medicare Learning Network. http://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/MedicareClaimSubmissionGuidelines-ICN906764.pdf (Accessed 5-19-2015)

utilization would not be accurate. Although it is important to allow claims to mature, the key question is "How long is long enough?" The answer to this question depends on the study objectives. Information in this report is designed to assist data users in balancing the tradeoff between timeliness and maturity/stability of the information.

The objective of this document is to describe the completeness of Medicare Institutional fee-for-service (FFS) claims, Medicare Non-Institutional FFS claims, and Part D Events (PDEs) at different levels of claims maturity (i.e., after different amounts of time have elapsed from the service date to the claim processing date).

Note that hereafter we often use the term "claims" to refer to either traditional Medicare FFS claims or PDEs.

Chapter 2: Methodology

We use Medicare administrative data in CCW to address key questions related to the claims:

- When did CCW become aware of a service (i.e., when was the first claim record for the service processed)?
- When was the last time the claim record was updated? How much of a time lag was there between the service date and the date the final transactional record of the claim was processed?
- What changes occurred between the initial claim record and the final version of the claim? In particular, we are interested in whether key variables for research purposes change (e.g., diagnosis code/ reason for service or claim payment amounts).

A. Final Action Processing

The CCW database is the source of all data used in this study. CMS Medicare claims are divided into claim types that include:

- **Institutional Claims:** Inpatient, Skilled nursing facility (SNF), Home Health (HH), Hospice, and Hospital Outpatient (the latter is actually a Part B service that is processed using a Part A claim type).
- **Non-Institutional Claims**: Physician/Supplier-Carrier and Durable Medical Equipment (DME).
- **Part D Events (PDE):** Medicare Part D prescription drug fill records.

1. Institutional and Non-Institutional Claims

CCW loads each transactional claim record to the CCW database. Multiple iterations of a single claim may exist. Each claim can be adjusted or cancelled by the provider or MAC. These changes may consist of submitting an original claim, adjusting, or cancelling a record. There is no limit to the number of times a particular claim can be revised; these adjustments may occur many months after the claim submission deadline for providers.

From the various versions of a claim, CCW determines which transactional claim is the final, adjudicated version, at the time the data are extracted for use. This is called final action processing. The particular version of the claim that is considered final may change over time, and sometimes the final version of the claim is a canceled claim – in which case the final claim will not appear in the extracted data file. Note that the final version of the claim may be for $0 Medicare payment.

CCW uses four key fields to uniquely identify a single Institutional claim group and two key fields to identify a single Non-institutional claim group; all records with these fields in common are considered the same “claim group”. The key variables (along with the variable names from the CCW Institutional Claims files, which appear in parentheses) are:

Institutional claim group

1. Beneficiary HIC number (HIC_ID)[3]
2. Provider number (PRVDR_NUM)
3. Claim from date (CLM_FROM_DT)
4. Claim thru date (CLM_THRU_DT)

Non-institutional claim group

1. Beneficiary HIC number (HIC_ID)[4]
2. Control number (CARR_CLM_CNTL_NUM)

The final action claim is the version of the claim where all adjustments to earlier claims have been resolved and CMS's final action on the claim is accurately recorded. CCW engages in final action (FA) processing each time claims data are loaded; therefore, **final action is specific to a point in time.** Since weeks or months can pass between the provision of a service and the final adjudication of the claim record, CCW generally recommends that researchers allow many months for the "final" reconciled version of the claim to appear before extracting data files for use. This period of time is often called the ***run-out period***.

The FA algorithm was updated and all Medicare FFS claims files disseminated after May 2017 use the updated FA algorithm, which is in alignment with CMS data in the Integrated Data Repository (IDR). Two types of changes in the Final Action methodology were made: 1) the first type affects whether or not a claim record appears in a final action (FA) data file, and 2) the second type affects which version of a claim record is selected, when multiple versions of the record are present. Overall very few claims were processed differently in the using the updated FA algorithm. Claim counts are nearly identical between the original and update FA files, as are the total Medicare payments. **No changes were made to Part B Non-Institutional (Carrier and Durable Medical Equipment) final action logic.**

Identification of the final action version of the claim involves the following sequential steps:

Note: the actual processing algorithm is more complex; this document does not encompass all requirements for FA processing - it is simplified for the purposes of understanding claims maturity.

1) New claims records are downloaded from the CMS Medicare Quality Assurance File (MQA; derived from the CMS Common Working File [CWF]) and loaded to CCW each week.
2) As these records are loaded, CCW identifies all transactional records for each claim (i.e., a claim group; records that refer to the same service from the same provider on the same date).

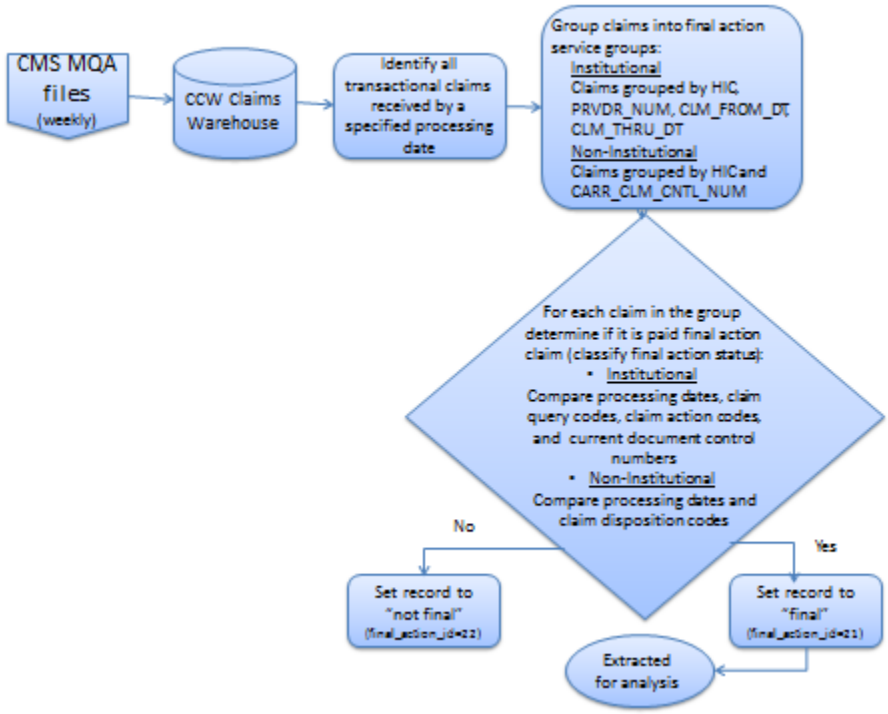
[3] CCW uses its unique CCW beneficiary identifier (BENE_ID) as a refinement to the HIC.
[4] CCW uses its unique CCW beneficiary identifier (BENE_ID) as a refinement to the HIC.

3) If there is no other claim in the claim group – the claim is identified as the "final version" as long as the claim is not cancelled (i.e., as long as the CLAIM_QUERY_CODE ≠ 0).
4) If there is one or more existing record in the claim group, then an algorithm is used to determine which of the transactional records is final. This algorithm varies by claim type and involves decision rules that encompass multiple data fields:
   a) Institutional claims – the algorithm examines the claim processing date (variable called NCH_WKLY_PROC_DT), the claim query code (CLAIM_QUERY_CODE), the claim action code (FI_CLM_ACTN_CD), and the claim control number[5].
   b) Non-institutional claims - the algorithm examines the claim processing date (NCH_WKLY_PROC_DT) and the claim disposition code (CLM_DISP_CODE).
   c) The final version of the claim group is identified, and other versions of the claim record are considered "not final" (note: there may be rare occasions when more than one final claim is identified).
5) When claims are extracted for analysis, only the version of the claim that is the final action version at that particular point in time is delivered.

Every claim is assigned a final action value that may change each time final action processing occurs. A visual depiction of final action processing is in Figure 1.

[5] The historical final action algorithm used the original document control number (FI_ORIG_CLM_CNTL_NUM); the updated algorithm uses the current document control number (FI_DOC_CLM_CNTL_NUM) – and employs all 23 characters of the value rather than just the first 15 characters. The updated algorithm also considers the claim accretion date (CWF_CLM_ACRTN_DT) when determining the sequence in which claims were processed.

Figure 1. CCW Final Action Processing – Medicare Institutional and Non-Institutional Claims



As an example of how the final action version of a claim can change, consider the claim group for an institutional service (Table 1). For a beneficiary (HIC=A), who received a single service from a provider in January 2012, assume there were 5 transactional versions of the claim in the CCW (CLM_ID=1-5).

Table 1. Example of Transactional Versions of Claim Group

HIC	CLM_ID	PROVIDER_ID	CLM_FROM_DT	CLM_THRU_DT	PROC_DT
A	1	123456	1/10/2012	1/15/2012	2/24/2012
A	2	123456	1/10/2012	1/15/2012	6/4/2012
A	3	123456	1/10/2012	1/15/2012	6/4/2012
A	4	123456	1/10/2012	1/15/2012	1/20/2013
A	5	123456	1/10/2012	1/15/2012	1/20/2013

In this claim group the first claim for the service was processed a little more than a month after the service. If an investigator desired claims with three months of run-out, then this first version of the claim would be selected (CLM_ID=1). In June 2012 two adjustment claims in the group were processed. The second claim (CLM_ID=2) cancels the first claim and the third claim becomes the new final action claim (CLM_ID=3). If an investigator wanted six months of run-out, then this third version of the claim would be selected. Finally, in January 2013 two more adjustments in the group were processed. The fourth claim (CLM_ID=4) cancels the third claim and the fifth claim becomes the new final action claim (CLM_ID=5). If

an investigator wanted the final/fully mature claim, then this fifth version of the claim would be selected.

Although it is important to allow claims to mature, the key question is "How long is long enough?" The answer to this question depends on the study objectives. Information presented in the next section (III. Results) of this document is designed to assist data users in balancing the tradeoff between timeliness and maturity/stability of the information.

2. Part D Events

CCW receives weekly PDE Tap files from CMS that consist of all plan-submitted PDEs that passed the DDPS editing process and were loaded into the CMS Integrated Data Repository (IDR). Although CCW obtains weekly PDE tap files, we load these into the CCW PDE Database and perform final action processing once a month. CCW determines which transactional PDE record is the final, adjudicated version of the event using CMS business rules. Only this final version of the PDE is written to a standard analytical file (SAF). This final action processing involves the following sequential steps:

1. Identify all records for each PDE that refer to the same prescription drug event/transaction (i.e., an event claim group);
2. Sort the records within an event claim group to order them from earliest plan-submitted to latest transactional adjustment; and
3. Identify the final action version of each PDE record.

CCW uses seven key fields to uniquely identify a single PDE (a claim group). We list these below, along with the variable names from the CCW PDE files which appear in parentheses.[6]

1. Beneficiary HIC number (HIC_ID)[7]
2. Service provider ID number (SRVC_PRVDR_ID)
3. Service provider ID qualifier code (SRVC_PRVDR_ID_QLFYR_CD)
4. Prescription/service reference number (RX_SRVC_RFRNC_NUM)
5. Date of service (SRVC_DT)
6. Fill number (FILL_NUM)
7. Dispensing status (DSPNSNG_STUS_CD)[8]

For final action processing, all versions of the PDE record that were submitted to DDPS prior to the plan cut-off date (6 months after the end of the benefit year) are considered; furthermore, all edits to these PDE records due to P2P and P2PP3 reconciliation are incorporated. If the latest PDE transaction is not a deletion (i.e., the adjustment/deletion code on the record is not a "D"), then this record is considered the final version of the PDE.

[6] CMS. "Instructions: Requirements for Submitting Prescription Drug Event Data." April 26, 2006, p. 17. (http://www.cms.gov/Medicare/Prescription-Drug-Coverage/DrugCoverageClaimsData/downloads/PDEGuidance.pdf)

[7] CCW uses its unique CCW beneficiary identifier (BENE_ID) as a refinement to the HIC.

[8] This variable is not populated in PDE after 2010.

Otherwise, if the last record for the event claim group is a deletion then there is no final action record for that claim group.

B. Sample

The CCW database is the source of all data used in this study. Within the database 100% of transactional claims records are available, regardless of whether they were a final action claim.

- **Institutional and Non-Institutional Claims**

  We selected two independent samples for this study to validate whether the results for our primary sample were typical. For our primary population (all analyses within the body of the paper), we identified all claims for services in July 2010 (using CLM_THRU_DT). We identified all the transactional claims that were part of the same claim group and represented a unique service – beginning with the month of service (month=1) for 48 months after the date of service (i.e. through June 2014).

  Our comparison sample identified all claims for services in the July 2013, and similarly included al transactional claim records for 48 months. Limited results from this second sample are included in Appendix C.

- **Part D Events**
  For PDE data, we selected a one month sample of data from services in January 2013. We identified all transactional versions of the PDE through final date for creation of the SAF, which was after the June 30, 2014 submission date for plans – and after the subsequent final reconciliation from CMS.

C. Analyses

We examined the number of claims processed at one month intervals for 48 months of run out for the Medicare A/B claims, and for all months of run out before the PDE cutoff date (6 months after the service year). We compared the monthly interval data to the fully mature data for each claim type. For Medicare A/B claims, we determined when we were first aware of the claim (i.e., when the NCH received the initial version of the claim record) and when the claim was considered final.

Many claims for services are accepted the first time they are submitted. They have only one version – and are never updated or adjusted; we determine how often the initial record is the final version. Then, for Part A and B claims undergoing an adjustment of some sort – we identified the timing of the adjustment and classified the types of changes that occurred. Some claim fields are more commonly used by researchers than others. We identified a subset of variables often used for data analysis: (1) reason for service (primary diagnosis code; variable called PRNCPAL_DGNS_CD) and (2) Medicare payment amount (variable called the CLM_PMT_AMT). We determined whether the values for either of these research-critical variables changed as transactional claims were processed and final action was performed. Similarly, for PDE, we

examined key variables such as the drug (national drug code), the payment fields, and plan identifiers.

Chapter 3: Results

The major questions addressed in this document were: how much time must elapse before a claim is considered final, and what types of information are unstable if using immature claims. Results vary by claim type.

Note that CMS occasionally must perform a batch update for particular claims due to changes in regulations, policies, and/or to address issues. In addition to the results presented herein, we include data tables for July 2013 claims to illustrate claims maturity over a different time period (see Appendix C).

A. Time to Initial Claim

The amount of time between the service month (month #1) and the month the initial claim is processed for all Institutional and Non-Institutional claim types, is documented in Table 2.

Table 2. Cumulative Number and Percent of Medicare Claims Received by Months after Service, July 2010 Services

	Months															
N and % claims	0*	1†	2	3	4	5	6	7	8	9	10	11	12	24	36	48
Institutional Claims																
All IP																
N		510,365	952,095	999,261	1,018,487	1,026,088	1,030,751	1,033,013	1,035,622	1,037,677	1,039,498	1,040,551	1,041,417	1,043,823	1,044,058	1,044,208
%		48.88%	91.18%	95.70%	97.54%	98.26%	98.71%	98.93%	99.18%	99.37%	99.55%	99.65%	99.73%	99.96%	99.99%	100.00%
SNF																
N		11,436	382,213	433,135	450,892	457,499	461,478	463,954	465,765	467,208	468,562	469,350	470,073	472,160	472,452	472,562
%		2.42%	80.88%	91.66%	95.41%	96.81%	97.65%	98.18%	98.56%	98.87%	99.15%	99.32%	99.47%	99.91%	99.98%	100.00%
Hospice																
N		30,895	285,962	315,714	327,913	332,112	334,401	335,743	336,931	337,807	338,531	339,094	339,497	340,292	340,357	340,375
%		9.08%	84.01%	92.75%	96.34%	97.57%	98.24%	98.64%	98.99%	99.25%	99.46%	99.62%	99.74%	99.98%	99.99%	100.00%
HH																
N		340,252	909,413	1,039,955	1,091,641	1,109,718	1,120,112	1,125,936	1,130,394	1,133,919	1,137,617	1,140,850	1,144,362	1,148,112	1,148,151	1,148,192
%		29.63%	79.20%	90.57%	95.07%	96.65%	97.55%	98.06%	98.45%	98.76%	99.08%	99.36%	99.67%	99.99%	100.00%	100.00%
HOP																
N		4,973,532	11,064,843	11,693,796	12,005,062	12,120,293	12,192,707	12,239,600	12,278,065	12,308,021	12,337,129	12,358,119	12,377,671	12,417,267	12,420,729	12,428,591
%		40.02%	89.03%	94.09%	96.59%	97.52%	98.10%	98.48%	98.79%	99.03%	99.26%	99.43%	99.59%	99.91%	99.94%	100.00%
Non-Institutional Claims																
Carrier																
N		33,918,707	60,923,672	64,616,459	66,592,374	67,470,684	68,058,681	68,446,105	68,736,889	68,977,197	69,199,650	69,357,880	69,472,479	69,852,293	69,884,484	69,895,373
%		48.53%	87.16%	92.45%	95.27%	96.53%	97.37%	97.93%	98.34%	98.69%	99.00%	99.23%	99.39%	99.94%	99.98%	100.00%
DME																
N	944,180	3,782,128	5,237,121	5,512,838	5,689,375	5,775,945	5,841,965	5,885,070	5,922,035	5,949,508	5,975,013	5,991,586	6,004,363	6,035,485	6,037,466	6,038,345
%	15.64%	62.64%	86.73%	91.30%	94.22%	95.65%	96.75%	97.46%	98.07%	98.53%	98.95%	99.23%	99.44%	99.95%	99.99%	100.00%

* For DME, zero (0) months could be from 1-11 months prior to the claim through date.
† Month 1 is the service month (i.e., month for the claim through date).

Inpatient claims are submitted fairly quickly after the last date of service – 48.9% are submitted the same month the service ends and 91% are submitted by the end of the following month. The proportion of Medicare claims available reaches 90 percent by the end of the second full month following the service month (see column for month 3; Table 2) for all Institutional and Non-institutional settings. For DME, we have a unique

claims situation where claims may be processed prior to the service date (i.e., claim is processed when the equipment is ordered – before it is received). Approximately 15.6% of claims are processed before the service date.

For all claim types, the final adjudicated version of the claim may be submitted at a later time; the initial claim may be different than the final version.

B. Time to Final Claim

The amount of time it takes before the final version of the claim is available in the database is documented in Table 3. The percent of claims considered mature at any particular time interval differs by claim type.

Table 3. Cumulative Number and Percent of Medicare Claims Considered Final by Months after Service, July 2010 Services

	Months															
N and % claims	0*	1†	2	3	4	5	6	7	8	9	10	11	12	24	36	48
Institutional Claims																
All IP																
N		426,446	823,542	879,721	914,805	931,615	939,374	943,489	963,136	969,405	986,075	993,749	997,991	1,016,717	1,034,032	1,044,208
%		40.84%	78.87%	84.25%	87.61%	89.22%	89.96%	90.35%	92.24%	92.84%	94.43%	95.17%	95.57%	97.37%	99.03%	100.00%
SNF																
N		10,668	358,705	414,608	438,110	448,443	454,199	457,805	460,366	462,470	464,760	466,121	467,269	470,860	471,405	472,562
%		2.26%	75.91%	87.74%	92.71%	94.90%	96.11%	96.88%	97.42%	97.86%	98.35%	98.64%	98.88%	99.64%	99.76%	100.00%
Hospice																
N		29,418	271,081	303,147	318,054	323,635	327,561	330,170	332,064	333,517	335,033	335,899	336,820	339,905	340,156	340,375
%		8.64%	79.64%	89.06%	93.44%	95.08%	96.24%	97.00%	97.56%	97.99%	98.43%	98.68%	98.96%	99.86%	99.94%	100.00%
HH																
N		118,946	408,751	665,653	974,211	1,056,284	1,083,950	1,095,973	1,105,470	1,116,959	1,124,344	1,129,502	1,133,801	1,145,057	1,146,525	1,148,192
%		10.36%	35.60%	57.97%	84.85%	92.00%	94.40%	95.45%	96.28%	97.28%	97.92%	98.37%	98.75%	99.73%	99.85%	100.00%
HOP																
N		4,738,555	10,631,242	11,322,964	11,672,794	11,813,506	11,903,722	11,963,890	12,018,160	12,064,169	12,168,258	12,234,577	12,266,588	12,385,751	12,404,536	12,428,591
%		38.13%	85.54%	91.10%	93.92%	95.05%	95.78%	96.26%	96.70%	97.07%	97.91%	98.44%	98.70%	99.66%	99.81%	100.00%
Non-Institutional Claims																
Carrier																
N		33,571,193	60,388,741	64,080,504	66,124,980	67,052,902	67,687,971	68,107,418	68,437,087	68,722,478	68,978,457	69,156,976	69,288,107	69,775,510	69,848,354	69,895,373
%		48.03%	86.40%	91.68%	94.61%	95.93%	96.84%	97.44%	97.91%	98.32%	98.69%	98.94%	99.13%	99.83%	99.93%	100.00%
DME																
N	931,544	3,664,341	5,094,031	5,394,069	5,587,574	5,686,965	5,763,512	5,813,275	5,859,228	5,891,892	5,922,444	5,943,110	5,959,122	6,010,970	6,031,304	6,038,345
%	15.43%	60.68%	84.36%	89.33%	92.53%	94.18%	95.45%	96.27%	97.03%	97.57%	98.08%	98.42%	98.69%	99.55%	99.88%	100.00%

* For DME, zero (0) months could be from 1-11 months prior to the claim through date.

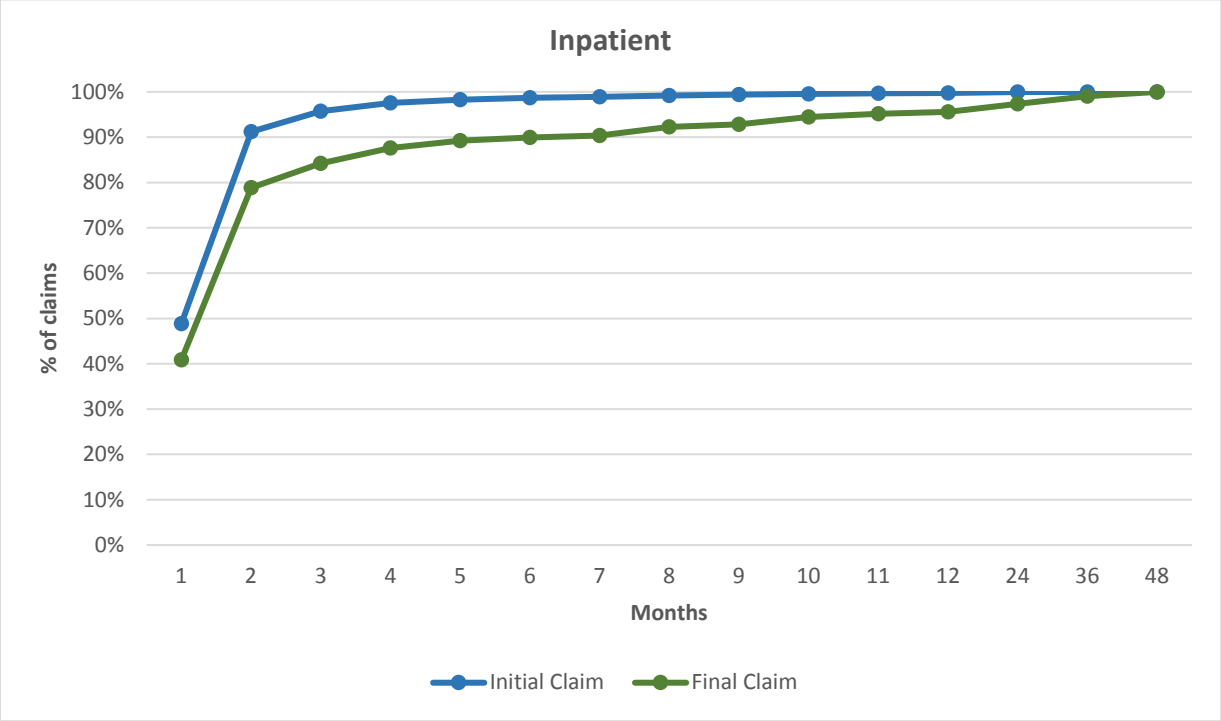
† Month 1 is the service month (i.e., month for the claim through date).

More than 95% Hospice, HOP, and Carrier claims are completely reconciled and in final form (i.e., final action) at 5 months post service; SNF and DME claims reach this level of maturity at 6 months. Inpatient and Home health claims are slightly slower to mature, with 89.9% and 94.4% of claims, respectively, considered final after 6 months. For all claim types, updates continue to be made to claims beyond 12 months.

It is important to note that, although more than 95% of inpatient claims are received by the end of the second full month following the service month (see column for month 3; Table 2), eleven months must elapse before 95% of the IP claims are in the final, reconciled form (Table 3).

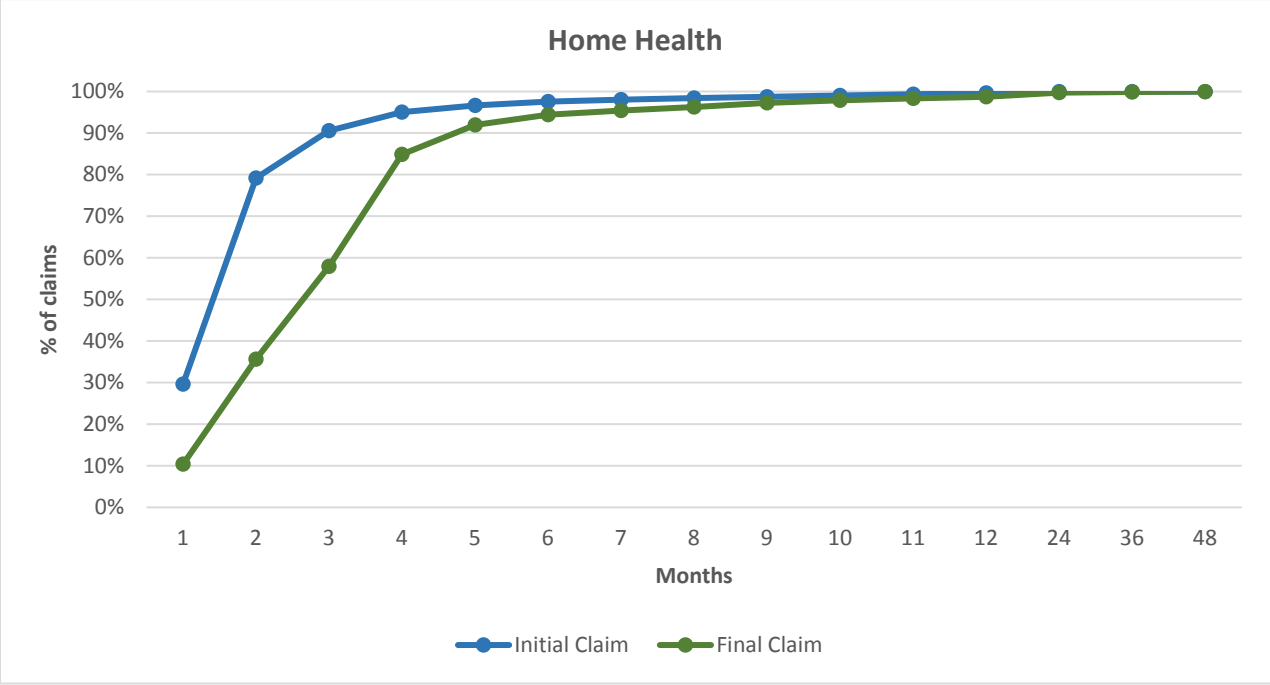
In the first several months after the service date, many adjustments to the claims occur. For Inpatient claims, after 12 months of maturity, there are still many edits and adjustments to the claims (Figure 2).

Figure 2. Timing of Initial and Final Versions of Inpatient Claims, July 2010 Services



For home health services, it takes several months before the majority of claims are available, and adjustments are common for at least the first eight months after the service date (Figure 3).

Figure 3. Timing of Initial and Final Versions of Home Health Claims, July 2010 Services

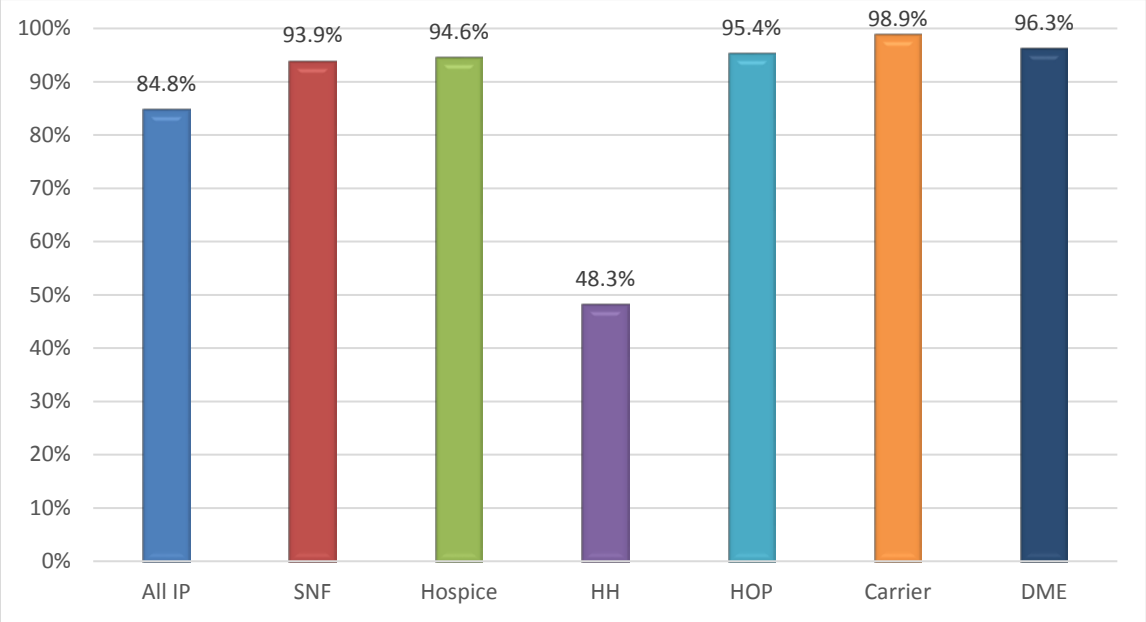


Home health providers may submit requests for anticipated payment (RAP), which CMS uses to make interim payments. In fully mature data, RAP claims are typically (but not always) adjusted with a final version of the claim may explain the very low proportion of claims that are final in early months, compared to other types of claims. Note that if data are extracted in early months of maturity (i.e., with a limited run-out period), RAP claims may be included in the data file.

C. Types and Timing of Adjustments to Claims

The presence of an adjusted claim does not necessarily mean that any of the key fields researchers might use have changed. We determined what proportion of claims is received in the final form, and never adjusted or updated (Figure 4). Note that some of these claims may be denied; they are not necessarily all paid claims.

Figure 4. Proportion of Institutional Claims with No Adjustments, by Setting, July 2010 Services



For 84.8% of inpatient claims, the initial version of the claim is the final, adjudicated version – there are no adjustments or updates. For SNF, Hospice, HOP, Carrier and DME claims, over 90% of the initial claims are final. It is likely that the very high proportion of HH records that are updated is due to RAP claims; many RAP claims are eventually denied.

When there is a difference between the original and the final version of the claim, a single update is most likely; however, there may be multiple updated transactional records for the claim group. An examination of the HH claim groups with adjustments demonstrated that it was uncommon to find claim groups with two or more adjustments before the final reconciled version of the claim was identified; the maximum number of adjusted records for HH was 8. The types and timing of adjustments are shown in (Table 4).

The cumulative percentage of claims that were received in their initial form, and the cumulative percentage of claims that are final at a point in time are documented by setting in Table 4. In

addition, the table illustrates the percentage of claims that are revised to accommodate a primary diagnosis and/or payment change for each month. The diagnosis code and dollar change rows in the table represent the proportion of claims that had either a diagnosis code change (DX change) or Medicare payment change during the month ($ Change; the denominator for each month is the cumulative number of claims to date – see claim counts in Table 2).

Table 4. Number of Claims and Proportion with Diagnosis and/or Dollar Changes * by Month, July 2010 Services

	Months															
Claims	**0†**	**1‡**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**24**	**36**	**48**
Institutional Claims																
All IP																
# Initial Claims		510,365	952,095	997,535	1,015,534	1,022,168	1,026,447	1,028,260	1,030,603	1,032,471	1,034,015	1,034,813	1,035,547	1,037,931	1,037,366	1,037,092
% with DX Change		0.45%	0.36%	0.28%	0.22%	0.21%	0.19%	0.18%	0.17%	0.15%	0.14%	0.13%	0.13%	0.08%	0.03%	0.00%
% with $ Change		7.66%	6.96%	6.28%	5.70%	5.31%	5.13%	5.03%	4.81%	4.55%	4.24%	4.10%	3.96%	2.52%	0.89%	0.00%
SNF																
# Initial Claims		11,436	382,213	433,071	450,025	455,932	459,582	461,813	463,413	464,720	465,924	466,575	467,231	469,292	469,253	469,278
% with DX Change		0.08%	0.05%	0.03%	0.02%	0.02%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%
% with $ Change		2.06%	2.23%	1.58%	1.12%	0.91%	0.77%	0.68%	0.61%	0.56%	0.50%	0.46%	0.42%	0.25%	0.21%	0.00%
Hospice																
# Initial Claims		30,895	285,962	315,616	327,536	331,508	333,674	334,795	335,893	336,751	337,476	337,845	338,224	339,099	339,063	339,061
% with DX Change		0.03%	0.02%	0.02%	0.01%	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
% with $ Change		2.39%	2.60%	2.03%	1.54%	1.25%	0.97%	0.82%	0.68%	0.58%	0.40%	0.33%	0.27%	0.09%	0.04%	0.00%
HH																
# Initial Claims		340,252	909,413	1,013,849	907,324	664,932	607,968	597,635	594,001	592,060	592,064	592,711	594,282	596,860	590,208	590,159
% with DX Change		0.13%	0.09%	0.07%	0.06%	0.05%	0.02%	0.01%	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
% with $ Change		60.02%	49.85%	32.37%	9.13%	4.83%	3.64%	2.92%	2.60%	1.67%	1.28%	1.17%	1.17%	0.36%	0.18%	0.00%
HOP																
# Initial Claims		4,973,532	11,064,843	11,685,833	11,987,704	12,095,709	12,164,940	12,209,659	12,245,979	12,274,207	12,302,345	12,321,933	12,340,521	12,377,095	12,375,756	12,380,803
% with DX Change		0.12%	0.07%	0.04%	0.03%	0.02%	0.01%	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
% with $ Change		2.86%	2.24%	1.61%	1.25%	1.06%	0.92%	0.81%	0.71%	0.63%	0.56%	0.51%	0.44%	0.18%	0.08%	0.00%
Non-Institutional Claims																
Carrier																
# Initial Claims		33,918,707	60,923,672	64,611,178	66,584,862	67,460,979	68,047,942	68,434,305	68,724,217	68,963,792	69,185,489	69,343,142	69,457,466	69,837,128	69,865,073	69,875,637
% with DX Change		0.01%	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
% with $ Change		0.91%	0.77%	0.66%	0.55%	0.48%	0.41%	0.37%	0.33%	0.31%	0.27%	0.25%	0.24%	0.11%	0.05%	0.00%
DME																
# Initial Claims	944,111	3,781,935	5,236,734	5,512,206	5,688,287	5,774,543	5,840,329	5,883,214	5,920,052	5,947,384	5,972,774	5,989,266	6,001,972	6,033,036	6,034,747	6,035,326
% with DX Change	0.01%	0.11%	0.09%	0.07%	0.05%	0.04%	0.03%	0.02%	0.02%	0.02%	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%
% with $ Change	1.24%	2.96%	2.59%	2.01%	1.68%	1.45%	1.27%	1.16%	1.01%	0.92%	0.84%	0.77%	0.72%	0.40%	0.10%	0.00%

† For DME, zero (0) months could be from 1-11 months prior to the claim through date.

‡ Month 1 is the service month (i.e., month for the claim through date).

As claims are adjusted, updates may be made to diagnoses, payments and a variety of other fields. In the inpatient care setting, it is much more common to see edits to claims to accommodate payment changes (i.e., the Medicare claim payment amount) rather than primary diagnosis code changes. Payment changes for IP remain fairly common through the end of the second year of maturity. In Home health edits to these important data fields are very common, particularly in the early months. Approximately 12 months following a HH service, the payment becomes fairly stable. For all other claim types, edits to payment or primary diagnosis code fields affect a very small proportion of claims.

1. Diagnosis Code Adjustments

When adjustments are made to Medicare Institutional claims, it is rarely to change the primary diagnosis (Table 4). However, when diagnosis code changes are made, it is often to a completely different category of diagnosis, not a slight change within the category (categorization in Appendix B) (see Table 5).

Table 5. Number of Claims with Diagnosis Code Changes, and Percent that Change to a Different Diagnosis Category by Month, July 2010 Services

N claims and % to different category	Months															
	0*	1†	2	3	4	5	6	7	8	9	10	11	12	24	36	48
Institutional Claims																
All IP																
N diagnosis change		2,291	3,474	2,761	2,269	2,104	1,979	1,863	1,747	1,570	1,444	1,378	1,334	881	285	0
% category change		64.43%	65.76%	66.11%	66.57%	67.01%	67.54%	67.86%	67.77%	68.21%	68.53%	68.21%	69.16%	72.02%	70.92%	0.00%
SNF																
N diagnosis change		9	172	147	96	80	51	41	38	35	29	26	22	7	5	0
% category change		66.67%	86.63%	89.54%	85.29%	85.00%	86.27%	82.93%	81.58%	82.86%	79.31%	76.92%	78.26%	71.43%	80.00%	0.00%
Hospice																
N diagnosis change		8	52	49	39	31	22	17	16	13	8	8	7	3	0	0
% category change		62.50%	63.46%	68.00%	71.79%	70.97%	81.82%	76.47%	81.25%	84.62%	100.00%	100.00%	100.00%	100.00%		0.00%
HH																
N diagnosis change		443	789	745	529	344	121	86	63	58	45	27	21	0	0	0
% category change		79.68%	76.63%	75.97%	72.01%	72.40%	72.46%	70.65%	68.57%	65.00%	65.31%	68.97%	77.27%			0.00%
HOP																
N diagnosis change		6,156	7,682	4,875	3,058	2,215	1,683	1,301	1,009	790	611	479	377	37	18	0
% category change		69.79%	68.98%	68.37%	69.35%	68.76%	69.53%	70.53%	70.11%	71.50%	71.06%	69.42%	68.16%	67.57%	55.56%	0.00%
Non-Institutional Claims																
Carrier																
N diagnosis change		4,242	6,545	5,416	3,724	2,802	2,087	1,629	1,279	1,021	811	692	627	56	21	0
% category change		58.37%	59.42%	59.30%	60.74%	60.86%	61.95%	62.76%	62.38%	62.52%	62.27%	64.89%	65.66%	43.86%	42.86%	0.00%
DME																
N diagnosis change	54	4,223	4,893	4,090	2,956	2,170	1,635	1,386	1,147	897	718	541	393	159	127	0
% category change	83.33%	86.19%	84.22%	83.31%	81.64%	81.38%	80.14%	79.37%	78.29%	77.19%	76.72%	74.40%	71.61%	57.76%	59.84%	0.00%

* For DME, zero (0) months could be from 1-11 months prior to the claim through date.

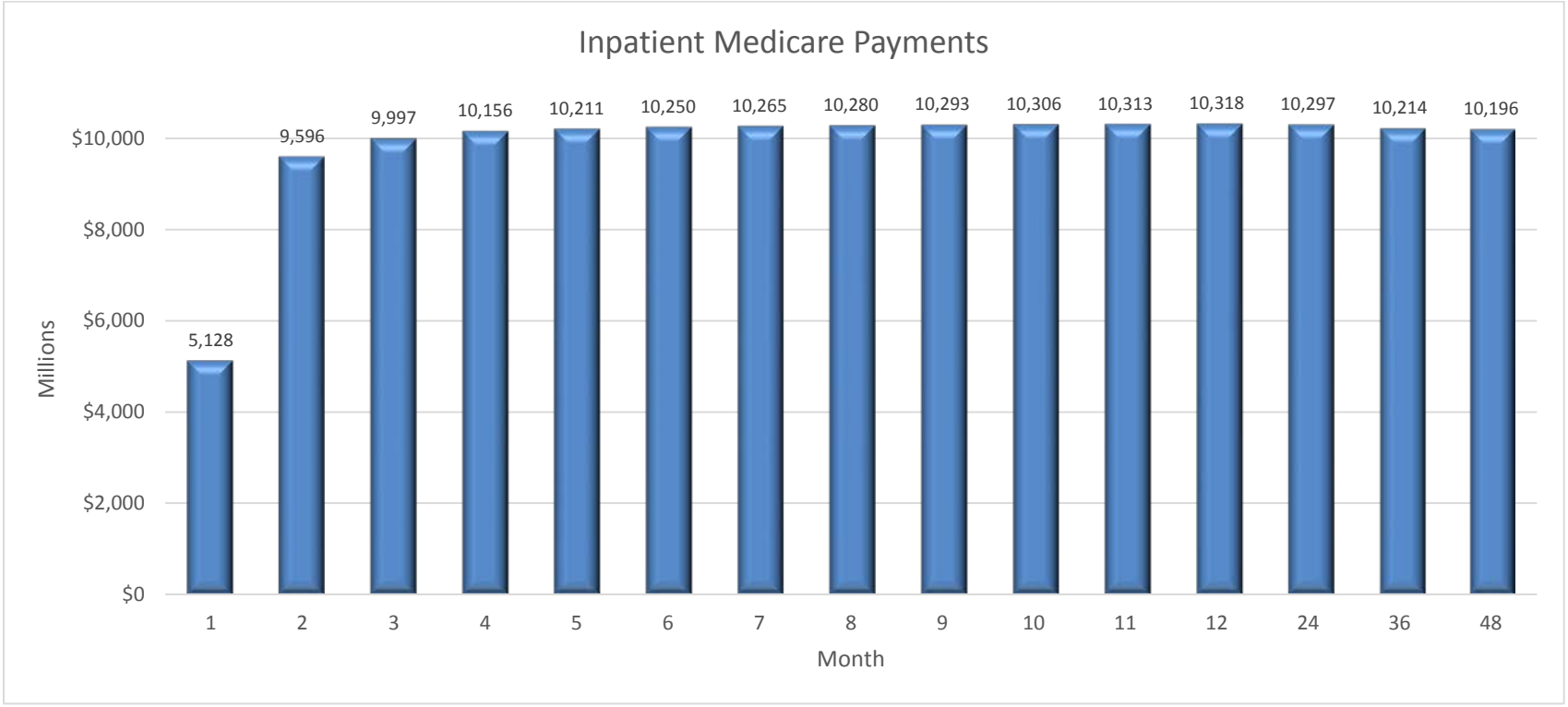
† Month 1 is the service month (i.e., month for the claim through date).

The overall number of claims that undergo an adjustment to a diagnosis code is quite small (Table 4).

2. Payment Adjustments

The total Medicare payment amount may take a while to stabilize. In fact, 12 months after the service date, the total IP Medicare payment amount is higher than it is at 24 or later months, since denials can occur after this time (see Figure 5).

Figure 5. Medicare Inpatient Payments (in Millions) by Months after Service Month, July 2010 Services



D. PDE Timing

Two key questions we address for PDEs are: 1) when do we first see a PDE, and 2) when do we see the final version of a PDE. In general, PDE records are processed very quickly with regard to the dispensing date. The amount of time between the service month and the time the claim is processed for PDEs is documented in Table 7.

Table 6. Cumulative Percent of PDEs Received by Months after Service, January 2013 Services

	Months																	Final (Mature)
Maturity	1*	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
% PDEs	53.1	42.5	3.5	0.3	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Cumulative % PDEs Received	53.1	95.6	99.1	99.3	99.5	99.6	99.6	99.7	99.7	99.8	99.8	99.8	99.9	99.9	99.9	99.9	99.9	100.0

* Month 1 is the service month (i.e., month the prescription was filled).

After a month has elapsed following the service month (i.e., month 2), there is a record for 95.6% of PDEs; the proportion rises to 99% after two months of maturity beyond the service month (i.e., month 3). The version of the PDE that is initially available may not be the same as the final version of the PDE; final PDE maturity is shown in Table 7.

Table 7. Cumulative Percent of PDEs Considered Final by Months after Service, January 2013 Services

	Months (January PDEs only)																	Final (Mature)
Maturity	1*	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
% PDEs	39.4	33.0	3.8	1.7	2.1	1.0	0.2	2.1	0.7	2.0	1.3	1.2	1.1	1.2	0.8	1.0	3.0	4.4
Cumulative % PDEs Final	39.4	72.4	76.2	77.9	80.1	81.0	81.3	83.3	84.0	86.0	87.3	88.5	89.6	90.8	91.6	92.6	95.6	100

* Month 1 is the service month (i.e., month the prescription was filled).

After a month has elapsed following the service month, there is a final record for 72.4% of PDEs; the proportion rises to 89.6% one year after the service date (i.e., month 13). The cumulative percent that are final continues to incrementally improve up until the final reconciliation date – after June 30 of the year following the service date (month 18). In accordance with PDE data processing rules – the final reconciliation results in late changes to a fairly large proportion of PDEs (7.4% of records had a change; see months 17 and 18 in Table 7). This pattern was not present for other types of Medicare claims, although bulk updates for Medicare FFS claims may occur.

Chapter 4: Discussion

CCW data generally indicates that a Medicare service has been provided quickly after the service month. Over 99% of inpatient claims are identified within 8 months of a service; Hospice and HOP reach 99% percent at 9 months and the remainder of the settings (SNF, HH, and Carrier) are at 99 percent at 10 months post-service. Among the inpatient claims, 95% are identified by the end of the second month after the service month.

For some claim types, a fair amount of run-out must occur before claims are fully reconciled and mature. After 12 months, 95.6% of inpatient claims are fully mature. This is a lower proportion than any of the other institutional or non-institutional settings; more than 98% of SNF, Hospice, HH, HOP, Carrier and DME claims are completely mature after 12 months. Within 24 months 99% of each claim type except for inpatient is final. Inpatient claims continue to be subjected to edits beyond two years post-service; 99% completion is not reached until 36 months of maturity. However, within 11 months, 95% of Inpatient claims are final. Note that CMS occasionally engages in a batch update of claims – and inpatient claims are often affected. To illustrate the rate of claim maturity for a different claims population, we include services from July 2013 in Appendix C. Maturity rates displayed in this paper may not match the maturity rates observed in a different population or time frame of data; results can also vary over time.

The overwhelming majority of Institutional claims are not adjusted. Among inpatient claims, 84.8% of the initial claims were not ever adjusted. In contrast, more than half of home health claims were adjusted after the initial claim submission.

The proportion of claims records that are updated to reflect adjustments in payments or primary diagnosis codes varies for the different claim types and also varies over time as claims mature. The largest percent of adjusted claims affecting the primary diagnosis code was seen in inpatient claims; however, the largest percent of adjusted claims affecting payment was seen in HH. For all other non-inpatient claim types, the percentage of adjusted claims that had diagnosis code changes was 0.13% or less.

CCW typically delivers final action claims to researchers once claims have reached 12 months post-service maturity. Claims that are this mature are very stable and undergo relatively few modifications, and therefore are ideal for a variety of research, policy and programmatic purposes.

CCW data users who access something other than fully mature data need to understand and accept the limitations of working with immature data. For example, within 3 months of a service we are generally aware that a service has taken place; however, depending on the claim type, we may not be particularly certain about the reason for service (primary diagnosis) or the Medicare payment amounts.

An additional consideration when deciding how much run-out is appropriate is whether you plan to have a comparison group of claims from a different time frame. If comparing data from two or more different time periods, caution should be used to ensure data from each cohort is

allowed to mature for the same run out period; claims continue to be updated indefinitely in CCW, and CMS occasionally makes batch updates to claims, which can introduce bias.

Appendix A: Acronym List

Acronym	Definition
CCW	Chronic Conditions Data Warehouse
CMS	Centers for Medicare & Medicaid Services
DDPS	Drug Data Processing System
DME	Durable Medical Equipment
DRG	Diagnosis-Related Group
FA	Final Action
FFS	Fee-For-Service
HH(A)	Home Health (Agency)
HOP	Hospital Outpatient
MAC	Medicare Administrative Contractor
NCH	National Claims History
PBM	Pharmacy Benefits Manager
PDE	Part D Prescription Drug Event
RAP	Request for Anticipated Payment
SAF	Standard Analytic Files
SNF	Skilled Nursing Facility

Appendix B: Diagnosis Code Groupings

The following ICD-9 diagnosis code groups were used to determine whether changes in diagnosis code were within the same category[9] or resulted in a larger change in diagnosis code. We grouped all ICD-9 primary diagnosis codes into the following categories, and determined whether a change in primary diagnosis code on the claim resulted in switching categories.

Diagnosis Codes	Category Label
001 - 139	1 = Infectious and parasitic diseases
140 - 239	2 = Neoplasms
240 - 279	3 = Endocrine, nutritional and metabolic diseases, and immunity disorders
280 - 289	4 = Diseases of the blood and blood-forming organs
290 - 319	5 = Mental disorders
320 - 359	6 = Diseases of the nervous system
360 - 389	7 = Diseases of the sense organs
390 - 459	8 = Diseases of the circulatory system'
460 - 519	9 = Diseases of the respiratory system
520 - 579	10 = Diseases of the digestive system
580 - 629	11 = Diseases of the genitourinary system
630 - 679	12 = Complications of pregnancy, childbirth, and the puerperium
680 - 709	13 = Diseases of the skin and subcutaneous tissue
710 - 739	14 = Diseases of the musculoskeletal system and connective tissue
740 - 759	15 = Congenital anomalies
760 - 779	16 = Certain conditions originating in the perinatal period
780 - 799	17 = Symptoms, signs, and ill-defined conditions
800 - 999	18 = Injury and poisoning
All diagnosis codes starting with E or V	19 = E & V Codes: External causes of injury and supplemental classification

[9] The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) is based on the World Health Organization's Ninth Revision, International Classification of Diseases (ICD-9). Copyright 2014 World Health Organization. All Rights Reserved.

Appendix C: Claim Maturity for July 2013 Services

The following data tables contain a second sample of Medicare claims to demonstrate variability in claim maturity. These tables use claims for all services in July 2013. All methods were similar to those in the main body of the paper.

Table 8. Cumulative Percent of Medicare Claims Received by Months after Service, July 2013 Services

	Months																
	0	1	2	3	4	5	6	7	8	9	10	11	12	24	36	48
Institutional Claims																	
All IP																	
N		319,898	868,287	915,840	933,894	943,693	948,777	952,504	955,021	957,034	958,502	959,954	961,042	963,725	963,957	964,036
%		33.18%	90.07%	95.00%	96.87%	97.89%	98.42%	98.80%	99.06%	99.27%	99.43%	99.58%	99.69%	99.97%	99.99%	100.00%
SNF																	
N		6,831	357,475	404,743	417,873	425,892	429,232	431,993	434,101	435,419	436,505	437,526	438,362	440,453	440,937	441,095
%		1.55%	81.04%	91.76%	94.74%	96.55%	97.31%	97.94%	98.41%	98.71%	98.96%	99.19%	99.38%	99.85%	99.96%	100.00%
Hospice																	
N		5,229	289,209	321,428	333,091	339,671	342,087	343,919	345,025	345,793	346,345	346,830	347,102	347,747	347,787	347,796
%		1.50%	83.15%	92.42%	95.77%	97.66%	98.36%	98.89%	99.20%	99.42%	99.58%	99.72%	99.80%	99.99%	100.00%	100.00%
HH																	
N		210,083	875,727	994,226	1,043,150	1,070,374	1,080,916	1,088,973	1,094,515	1,099,062	1,102,634	1,108,216	1,112,507	1,122,497	1,122,575	1,122,588
%		18.71%	78.01%	88.57%	92.92%	95.35%	96.29%	97.01%	97.50%	97.90%	98.22%	98.72%	99.10%	99.99%	100.00%	100.00%
HOP																	
N		3,936,847	12,465,261	13,146,434	13,412,573	13,588,642	13,672,156	13,735,228	13,778,089	13,816,511	13,842,847	13,869,758	13,887,904	13,921,950	13,923,587	13,925,808
%		28.27%	89.51%	94.40%	96.31%	97.58%	98.18%	98.63%	98.94%	99.22%	99.40%	99.60%	99.73%	99.97%	99.98%	100.00%
Non-Insitutional Claims																	
Carrier																	
N	0	25,932,923	65,841,608	69,535,168	71,261,834	72,454,015	73,035,453	73,557,652	73,888,576	74,138,676	74,327,784	74,511,788	74,645,015	75,004,042	75,027,492	75,032,615
%	0.00%	34.56%	87.75%	92.67%	94.97%	96.56%	97.34%	98.03%	98.48%	98.81%	99.06%	99.31%	99.48%	99.96%	99.99%	100.00%
DME																	
N	905,330	2,990,635	4,931,478	5,185,096	5,342,210	5,461,977	5,522,186	5,575,656	5,614,183	5,642,208	5,665,197	5,688,752	5,727,569	5,766,706	5,768,726	5,769,427
%	15.69%	51.84%	85.48%	89.87%	92.60%	94.67%	95.71%	96.64%	97.31%	97.79%	98.19%	98.60%	99.27%	99.95%	99.99%	100.00%

* For DME, zero (0) months could be from 1-11 months prior to the claim through date.

† Month 1 is the service month (i.e., month for the claim through date).

The claims data matured similarly for the July 2013 and July 2010 samples. For example, at 12 months of maturity 99.7% of IP claims were received (see Table 2).

Table 9. Cumulative Percent of Medicare Claims Considered Final by Months after Service, July 2013 Services

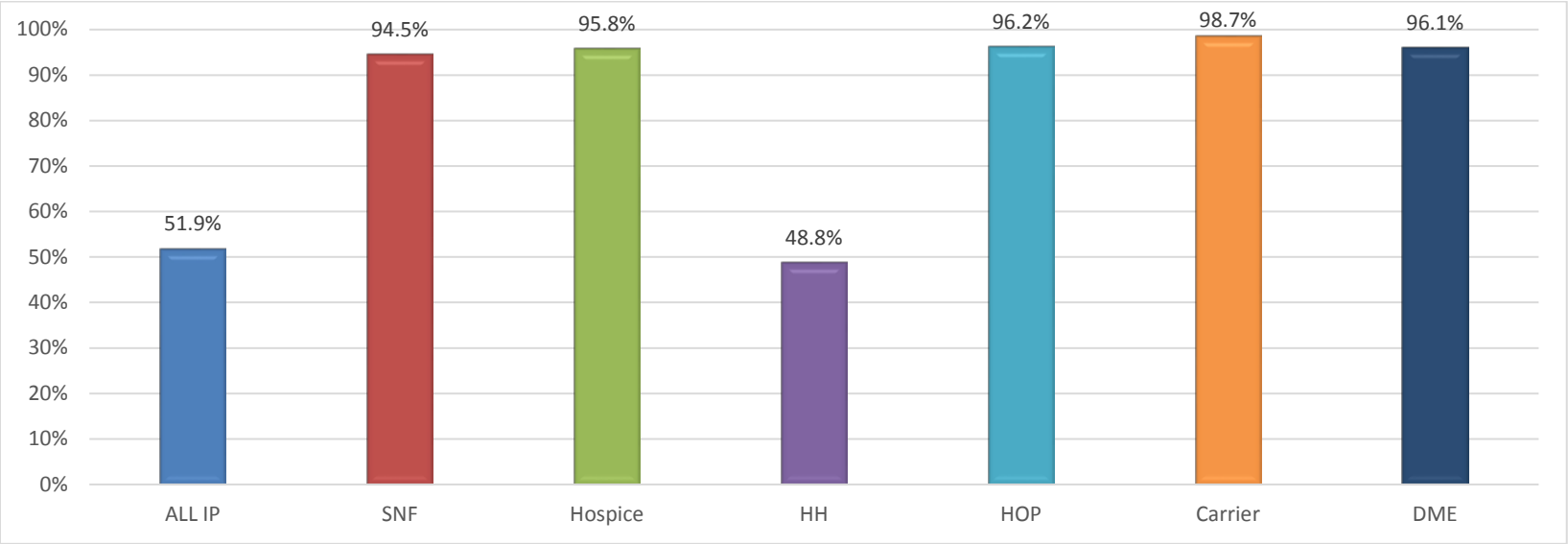
	Months															
	0	1	2	3	4	5	6	7	8	9	10	11	12	24	36	48
Institutional Claims																
All IP																
N		158,056	447,768	483,666	500,453	512,768	520,711	662,566	756,925	810,993	837,959	851,410	926,971	958,570	962,425	964,036
%		16.40%	46.45%	50.17%	51.91%	53.19%	54.01%	68.73%	78.52%	84.12%	86.92%	88.32%	96.16%	99.43%	99.83%	100.00%
SNF																
N		6,382	338,147	389,846	407,234	417,600	421,936	425,788	428,864	431,424	433,175	435,032	436,414	440,025	440,778	441,095
%		1.45%	76.66%	88.38%	92.32%	94.67%	95.66%	96.53%	97.23%	97.81%	98.20%	98.63%	98.94%	99.76%	99.93%	100.00%
Hospice																
N		4,912	277,146	312,191	325,699	334,513	337,785	340,520	342,228	343,690	344,731	345,634	346,272	347,619	347,728	347,796
%		1.41%	79.69%	89.76%	93.65%	96.18%	97.12%	97.91%	98.40%	98.82%	99.12%	99.38%	99.56%	99.95%	99.98%	100.00%
HH																
N		69,192	381,599	633,988	884,238	1,008,862	1,035,839	1,058,253	1,072,158	1,081,149	1,087,702	1,094,410	1,099,215	1,120,908	1,122,165	1,122,588
%		6.16%	33.99%	56.48%	78.77%	89.87%	92.27%	94.27%	95.51%	96.31%	96.89%	97.49%	97.92%	99.85%	99.96%	100.00%
HOP																
N		3,787,058	12,087,576	12,822,024	13,127,430	13,363,479	13,490,728	13,585,926	13,650,299	13,712,536	13,751,493	13,791,841	13,829,019	13,901,303	13,922,914	13,925,808
%		27.19%	86.80%	92.07%	94.27%	95.96%	96.88%	97.56%	98.02%	98.47%	98.75%	99.04%	99.30%	99.82%	99.98%	100.00%
Non-Insitutional Claims																
Carrier																
N		25,622,127	65,136,385	68,876,015	70,674,136	71,992,575	72,651,262	73,225,513	73,595,665	73,889,919	74,109,873	74,322,852	74,479,704	74,949,908	75,010,469	75,032,615
%		34.15%	86.81%	91.79%	94.19%	95.95%	96.83%	97.59%	98.08%	98.48%	98.77%	99.05%	99.26%	99.89%	99.97%	100.00%
DME																
N	893,434	2,892,620	4,791,175	5,053,983	5,224,017	5,362,065	5,435,297	5,500,684	5,565,527	5,600,746	5,628,889	5,654,698	5,690,783	5,757,286	5,765,662	5,769,427
%	15.49%	50.14%	83.04%	87.60%	90.55%	92.94%	94.21%	95.34%	96.47%	97.08%	97.56%	98.01%	98.64%	99.79%	99.93%	100.00%

* For DME, zero (0) months could be from 1-11 months prior to the claim through date.

† Month 1 is the service month (i.e., month for the claim through date).

For the inpatient claims, we see delayed claim maturity in the July 2013 population compared to July 2010 (54% of claims mature at 6 months compared to 98.7%, respectively; see Table 3). There was likely a batch update by CMS that involved services in July 2013. CMS must occasionally update claims due to issues that are discovered - which can interfere with the typical claim maturity process. As a result, we observe the claims taking longer to mature then would typically be the (compare to Table 3).

Figure 6. Proportion of Institutional Claims with No Adjustments, by Setting, July 2013 Services



For July 2013, we see a much lower proportion of IP claims without adjustments compared to the sample from July 2010 (Figure 6 vs. Figure 4). The remainder of the claim types follow a typical pattern of claims maturity.