



## An Introductory Analysis of Potentially Preventable Health Care Events in Minnesota

### Supplemental Technical Information

#### Overview

This document provides additional technical information on the 3M Health Information Systems software tools, methodology, and analytical results to complement the published results on MDH's study of Potentially Preventable Health Care Events.<sup>1</sup> MDH is conducting follow-up research and will make additional information available.

#### Analytic Software Tools

Potentially preventable health care events were identified using two primary tools developed by 3M Health Information Systems:

1. The 3M Population Focused Preventables (PFP) tool
2. The 3M Potentially Preventable Readmissions (PPR) classification software

These software tools use an individual's administrative claims to assess the mix of diagnoses, medical procedures, and other medical codes to identify potentially preventable health care events. 3M developed the logic to identify preventable events based on a combination of literature reviews, data analysis, and consultation with physician panels.

#### Methodology

Two years of medical claims data were taken from the Minnesota All-payer Claims Database (MN APCD) and passed into the 3M software. Medical claims for service dates in 2011 and 2012 were used from members who had at least one emergency department visit and/or one hospitalization in 2012.

Medical claims for services in 2011 were used to establish the medical history of a member. For preventable emergency department visits and inpatient admissions, these historical medical claims were used to assign members into one of nine 3M Clinical Risk Groups (CRGs) to determine health status. CRGs measure an individual's illness burden and classify them into a mutually exclusive risk group based on their clinical history and demographic characteristics.

Health care claims for some individuals were excluded from the analysis, including:

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<sup>1</sup> [http://www.health.state.mn.us/healthreform/allpayer/potentially\\_preventable\\_events\\_072115.pdf](http://www.health.state.mn.us/healthreform/allpayer/potentially_preventable_events_072115.pdf)

- Health plan members who were enrolled in a health insurance plan for fewer than 6 months were excluded to avoid bias. Patients without an enrollment history might be otherwise categorized as healthy, non-users of health care services.
- Members who were assigned in the top two CRG health status categories (catastrophic illness, dominant malignancies) were excluded because their complex health care needs would have made preventing an ED visit or hospitalization less likely preventable.<sup>2</sup>

MDH risk adjusted rates of potentially preventable emergency department visits (PPVs), admissions (PPAs) and readmissions (PPRs) at the payer level (Medicare, Medicaid, and commercial payers) by using an indirect standardization method. An “expected rate” was calculated for each type of preventable event within clinical risk category or diagnosis-related group. The expected rate formed the basis against which to compare actual rates of preventable events within each payer type. MDH used this comparison to assess whether payer-specific rates were above or below norms for all payers in aggregate.

For PPAs and PPVs, expected rates were based on counts of events within CRG health status categories. For PPRs, the 3M Potentially Preventable Readmissions (PPR) Software does not assign a CRG health status classification, therefore, we used a mix of clinical risk based on APR DRG, severity of illness (SOI) and the “potential eligibility” of an initial hospitalization to be a readmission. This indirect standardization is based on clinical factors rather than the health status used in the PPA and PPV risk adjustment calculations.

### 3M Population Focused Preventables (PFP) Software

The 3M PFP classification software was used to examine potentially preventable emergency department visits (PPVs) and hospital admissions (PPAs). The PFP software logic has 3 main steps: 1) identify patients with a preventable event, 2) identify and exclude patients not at risk for a preventable event based on their historical claims data, and 3) determine patient health severity for the purposes of risk adjustment. Identifying a patient’s health severity is important because patients with greater illness burden may be more likely to experience a preventable event.

#### PPVs

The PFP software uses an iterative process to analyze an individual’s medical claims to identify PPVs. The process includes:

1. Assigning outpatient visits a 3M Enhanced Ambulatory Patient Group (EAPG) based on the procedure codes present on a claim. EAPGs describe the reason for a patient’s visit to a healthcare provider and are meant to group patients with similar clinical characteristics and resource use.
2. Using revenue codes and procedure codes present on claims to determine if the outpatient visit took place in the emergency room (ED), excluding ED cases that resulted in a hospitalization or where a surgical intervention or procedure was conducted.

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<sup>2</sup> The report notes what additional data or population groups are by design further excluded from the MN APCD. This includes some federal payers, data for the uninsured, and data for health insurers with a comparatively small business footprint in the state.

3. Determining if the visit is a candidate for a PPV by comparing the ED visit's EAPG to a list of EAPGs identified as "ambulatory sensitive." These are conditions for which access to ambulatory care, or primary care, and care management can help avoid an admission.
4. Applying additional criteria to the ED visit for patients admitted from a residential nursing care facility (e.g. SNF, nursing home, inpatient psychiatric facility, etc.), and if the cause of the PPV was a trauma-related condition. For example, some minor infections may be able to be treated at a residential facility, and such facilities should also have measures to prevent trauma-related conditions (e.g. falls).
5. Finally, ED visits that are classified as PPVs are grouped into the following categories:
  - a. potential areas of overuse
  - b. acute infections that could be treated in a primary care setting
  - c. chronic illnesses related to malignancy
  - d. other chronic illnesses except mental health, substance abuse and malignancy
  - e. mental health and substance abuse encounters

## PPAs

The PFP software identifies PPAs first by:

1. Assigning each hospitalization a 3M All Payer Refined Diagnostic Related Group (APR DRG). The software first classifies patients into a "base APR DRG" based on principal diagnosis code or major surgical procedure code present on the patient's administrative claims. Next, the base APR DRG is classified into one of four severity of illness (SOI) categories based on the patient's comorbidities and secondary diagnosis codes. The addition of the SOI category creates the final APR DRG classification. APR DRGs represent the reason for an admission, mortality risk, and the clinical severity of a patient's underlying condition.
2. Determining if the hospitalization is a candidate for a PPA by comparing the hospitalization's APR DRG to one of 25 clinical conditions identified as "ambulatory care sensitive." Certain ambulatory sensitive conditions are excluded from PPA assignment. These include certain conditions and disease states that are either not preventable or would have required intervention years before the hospital admission (e.g. long term diabetes complications, perforated appendix, infants with low birth weight, etc.).
3. Applying additional criteria to the ED visit for patients admitted from a residential nursing care facility.

## 3M Potentially Preventable Readmissions (PPR) Software

The 3M PPR classification software is used to measure potentially preventable readmissions (PPRs). PPRs are admissions to the hospital that are clinically-related to an earlier hospitalization within a 30-day window. When consecutive visits to the hospital within consecutive 30-day windows are clinically related, the initial stay and all subsequent readmissions are grouped together in a "chain" of readmission events.

At a high level, the logic of the software follows these steps:

1. Identifies and excludes admissions related to complex medical conditions which are unlikely preventable and may require extensive follow-up care (e.g. neonatal care, some cancers);
2. Identifies “non-events” which include: admissions to non-acute care facilities, same day admissions to acute care facilities but for non-acute care (e.g. hospice care), malignancies with a chemotherapy or radiotherapy procedure, and admissions to acute care facilities for rehabilitation, aftercare, and convalescence;
3. Restricts admissions to those occurring within 30 days of an Initial Admission;
4. Preliminarily classifies each admission depending on if it is the Initial, Only, Transfer, subsequent admission in a chain, Non-event, or Excluded Admission; and
5. Identifies PPRs by determining if a readmission is clinically related to an Initial Admission, excluding admissions related to a malfunctioning device.

Like PPAs, PPRs are assigned a 3M APR DRG to determine the reason for an admission. The PPR software evaluates the relationship between the APR DRG of the initial admission and the APR DRG of the readmission. In cases where a readmission is not clinically related to the initial admission, the readmission is not classified as a PPR. The readmission is re-classified as an Initial Admission, Transfer Admission, or an Only Admission. The following types of events are excluded from the PPR rate calculation: Non-events, Transfer Admission, Only Admissions that resulted in death, and Selected Malignancies with a Chemotherapy or Radiotherapy Procedure.

## Most Frequent Conditions Associated with Potentially Preventable Health Care Events in Minnesota, by Payer

*PPVs, Top 12 EAPGs*

*Table 1: Frequency distribution of most common EAPGs for Potentially Preventable Emergency Department Visits\**

Total Rank	EAPG Description	Percent of All Cases			
		Total	Medicare	Medicaid	Commercial
1	562: Infections Of Upper Respiratory Tract	8.9	2.7	12.9	9.2
2	628: Abdominal Pain	7.3	5.5	7.3	9.0
3	661: Level II Other Musculoskeletal System & Connective	7.3	8.1	6.8	7.2
4	604: Chest Pain	6.3	7.8	4.3	7.5
5	871: Signs Symptoms & Other Factors Influencing Health	6.0	6.2	6.8	4.8
6	627: Non-Bacterial Gastroenteritis Nausea & Vomiting	4.1	3.3	4.4	4.3
7	576: Level I Other Respiratory Diagnoses	3.5	4.5	3.1	3.0
8	675: Other Skin Subcutaneous Tissue & Breast Disorders	3.4	2.3	4.1	3.6
9	657: Lumbar Disc Disease	3.3	3.2	3.7	2.9
10	674: Contusion Open Wound & Other Trauma To Skin &	2.9	2.8	2.8	2.9
11	530: Headaches Other Than Migraine	2.5	1.9	2.6	3.0
12	564: Level I Other Ear Nose Mouth Throat & Cranial/Facial	2.3	2.3	2.4	2.3
13	All Others	42.2	49.4	38.8	40.3
	<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

\* EAPGs (Enhanced Ambulatory Patient Groups) describe the reason for a patient’s visit to a healthcare provider and are meant to group patients with similar clinical characteristics and resource use.

PPAs, Top 12 APR DRGs

Table 2: Frequency distribution of most common APR DRGs for Potentially Preventable Admissions\*

Total Rank	APR DRG Description	Percent of All Cases			
		Total	Medicare	Medicaid	Commercial
1	139: Other Pneumonia	13.0	14.5	10.5	9.4
2	194: Heart Failure	12.1	16.2	4.9	4.1
3	140: Chronic Obstructive Pulmonary Disease	8.1	9.8	6.3	3.5
4	383: Cellulitis & Other Bacterial Skin Infections	7.1	6.3	8.9	8.5
5	463: Kidney & Urinary Tract Infections	6.6	7.6	5.3	4.4
6	249: Non-Bacterial Gastroenteritis, Nausea & Vomiting	4.8	4.4	5.6	5.8
7	310: Intervertebral Disc Excision & Decompression	3.8	3.5	1.9	6.8
8	137: Major Respiratory Infections & Inflammations	3.5	4.2	2.8	1.8
9	198: Angina Pectoris & Coronary Atherosclerosis	3.3	3.9	2.4	2.1
10	420: Diabetes	3.2	1.9	6.5	4.6
11	304: Dorsal & Lumbar Fusion Proc Except For Curvature Of Back	3.0	3.1	2.0	3.9
12	53: Seizure	2.9	1.8	5.7	4.2
13	All Others	28.6	22.9	37.2	40.7
	<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

\*APR DRGs (All Patient Refined Diagnosis Related Groups) identify the reason for an admission, the clinical severity of a patient’s underlying condition and mortality risk.

PPRs, Top 12 APR DRGs

Table 3: Frequency distribution of most common APR DRGs for Potentially Preventable Readmissions\*

Total Rank	APR DRG Description	Percent of All Cases			
		Total	Medicare	Medicaid	Commercial
1	194: Heart Failure	6.6	10.5	2.8	1.2
2	720: Septicemia & Disseminated Infections	5.1	7.2	2.8	2.4
3	751: Major Depressive Disorders & Other/Unspecified Psychoses	3.5	1.0	7.0	5.7
4	460: Renal Failure	3.3	4.5	1.6	2.2
5	139: Other Pneumonia	3.1	4.4	1.8	1.6
6	721: Post-Operative, Post-Traumatic, Other Device Infections	2.9	2.2	2.5	5.0
7	140: Chronic Obstructive Pulmonary Disease	2.7	4.0	1.8	0.5
8	753: Bipolar Disorders	2.7	0.7	6.2	3.6
9	750: Schizophrenia	2.2	1.2	5.1	1.3
10	133: Pulmonary Edema & Respiratory Failure	2.1	2.8	1.6	0.9
11	254: Other Digestive System Diagnoses	2.0	2.0	1.7	2.5
12	383: Cellulitis & Other Bacterial Skin Infections	2.0	2.1	2.0	1.6
13	All Others	61.8	57.3	63.2	71.6
	<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

\*APR DRGs (All Patient Refined Diagnosis Related Groups) identify the reason for an admission, the clinical severity of a patient’s underlying condition and mortality risk.

Source: MDH/HEP analysis of the MN APCD, using the Potentially Preventable Events technology developed by 3M Health Information Systems