

An Introduction to MPRO

Harolyn Baker, MPH

Director Applied Epidemiology and Evaluation



Michigan's Health Care Quality Improvement Organization

MISSION & VISION

- **Mission**: Improving quality, safety and efficiency **across the healthcare continuum**.
- **Vision**: To become the nation's pre-eminent leader in healthcare quality improvement
- **Values**:
 - Integrity
 - Fiscal Responsibility
 - Innovation
 - Teamwork
 - Mission-Driven
 - Quality
 - Diversity

MPRO Services and Clients

- MPRO has provided utilization review, quality assurance, quality improvement, education, process improvement training, physician office EHR assistance, and other consulting services to multiple clients:
 - Federal (Medicare)
 - State (Medicaid and other state government programs)
 - Private healthcare industry (i.e., health plans, hospitals, employers, medical groups, associations, etc.)

Our Partners

- Collaboration with Local, State and National Groups
 - Healthcare trade associations
 - Medical specialty societies
 - Healthcare coalitions
 - Consumer organizations
 - Governmental health agencies
 - Health professional educational institutions
 - Third-party payers
 - Mental Health Authorities
 - Area Agencies on Aging

MEDICARE IN MICHIGAN



HOW MPRO IS MAKING A DIFFERENCE

83 PHYSICIAN PRACTICES PARTICIPATING IN MPRO'S CARDIAC LAN Jan. 2011 - Dec. 2013



TWO SEPARATE GROUPS OF 24 NURSING HOMES IN MICHIGAN Oct. 2010 - Dec. 2013



REDUCING HOSPITAL READMISSIONS AND ADMISSIONS Oct. 2011 - Sept. 2013



All percentages represent relative rates of improvement.

HISTORY

1984
 Founded as the federally designated Peer Review Organization for Michigan

2002
 Designated as Michigan's Health Care Quality Improvement Organization (HQIO)

2014
 Joined with the HQIOs of WI and MN to form the Lake Superior Quality Innovation Network

Quality Improvement Organizations
Working Together to Improve Health Care

This material was prepared by MPRO, the Medicare Quality Improvement Organization for Michigan. 1050 W-MI-C.10.2-14.5

LSQIN's Quality Improvement Initiatives 2014-2019

1. Better Health

1. Improving cardiac health & reducing disparities
2. Reducing disparities in diabetes care
3. Coordinating prevention through HIT meaningful use

2. Better Care

1. Reducing care-associated infections
2. Reducing care-acquired conditions
3. Coordinating care to reduce readmission and adverse drug events

3. Lower Costs

1. Improving quality through physician value-based modifier and physician feedback reporting program
2. Improving quality through value-based payment, inpatient psychiatric facility and ambulatory surgery center quality reporting

Using SAS to Enable Health Care Quality Improvement – Dynamic Data Exchange (DDE)

Elizabeth Waldman, MPH
Healthcare Data Analyst



Michigan's Health Care Quality Improvement Organization

Work with Providers

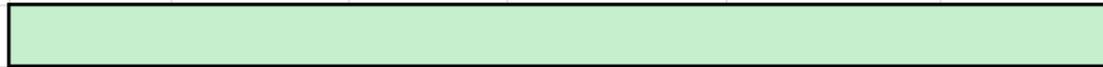
- Hospitals
 - 95 Acute Care Hospitals
- Practices/Physicians
 - Disparities and Cardiac Health (DACH): 31 Practices
 - Cardiac Learning and Action Network (LAN): 68 Practices
 - Physician Quality Reporting System (PQRS): 63 Practices

Dynamic Data Exchange (DDE)

- What is DDE?
 - It is a communication protocol that allows SAS and Excel to talk to each other in a client/server fashion.
 - SAS is the client and initiates a conversation with the server, Excel.
 - SAS then asks Excel to do something specific.
- Outdated mode? Better to use the Output Delivery System (ODS)?

Hospital Value-Based Purchasing Program (HVBP) Interim Impact Report - FY2015

This ESTIMATE of the impact of the FY 2015 VBP program is provided by MPRO as a service to hospitals.
Value-Based Purchasing (Performance and Improvement) scoring assessment



Clinical Process of Care

Measure ID	Hospital Baseline Score*	Hospital Performance Period Score*	Achievement Threshold	Benchmarks	Hospital Achievement	Hospital Improvement	Hospital Best Performance	
AMI-7a			0.8	1	0	0	0	
AMI-8a			0.95349	1	0	0	0	
HF-1			0.94118	1	0	0	0	
PN-3b			0.94118	1	0	0	0	
PN-6			0.97783	1	0	0	0	
SCIP-Inf-1			0.97175	1	0	0	0	
SCIP-Inf-2			0.98639	1	0	0	0	
SCIP-Inf-3			0.98637	1	0	0	0	
SCIP-Inf_4			0.97494	1	0	0	0	
SCIP-Inf-9			0.95798	0.99767	0	0	0	
SCIP-VTE-2			0.94891	0.99991	0	0	0	
SCIP-Card-2			0.95918	1	0	0	0	
Eligible Domains :		0				Clinical Process of Care Score :		N/A - <4 measures

** Hospital Baseline and/or performance scores: Values 0.00 - 1.00, if not eligible, leave blank.*

This estimate provided by MPRO is our "best guess" of the impact of the value based purchasing program on the identified hospital. This does not represent CMS policy nor is this a representation of CMS' calculation under this program. Based on VBP final rule published April 2011.

Dynamic Data Exchange (DDE)

- SAS and Excel must be up and running for DDE to work
- Need to establish a connection between SAS and Excel

```
/*Open Excel*/  
options noxwait noxsync;  
x "'C:\Program Files (x86)\Microsoft Office\Office14\excel.exe'";  
filename cmds dde 'EXCEL|SYSTEM';  
data test; x=sleep(3); run;
```

Dynamic Data Exchange (DDE)

- Determine which facilities you are running a report for and the number of times the report will need to be run

```
/*Creating a distinct list of hsp_id's*/  
proc sql;  
    select distinct provider_number into: hsp_id_list separated by  
    ! * !  
    from iqr_base_combine_b;  
    select count(unique provider_number) into: hsp_id_cnt  
    from iqr_base_combine_b;  
quit;
```

Dynamic Data Exchange (DDE)

- Tell SAS how many times to run the report and which facilities to run the report for

```
%macro reports;  
%do i=1 %to &hsp_id cnt;  
%let facid = %scan(&hsp_id_list, &i, *);
```

- Open Excel template

```
data _null_;  
file cmds;  
put '[open("S:\SARG\10SOW\C.7 Improve Individual Patient  
Care\VBP\Report_071213\NHCQF  
Template\Updated\NHCQF_Template_VBP_FY2015.xls")]';  
run;  
data test; x=sleep(3); run;
```

Dynamic Data Exchange (DDE)

- Restrict dataset to one hospital and one measure and then run a proc freq on the variable of interest (score_dec)

```
/*Restricting the table to one hsp_id*/  
data hosp;  
    set igr_base_combine_b;  
    where provider number = "&facid";  
run;  
  
/*Output for each measure*/  
/*ami_7a*/  
data hosp b;  
    set hosp;  
    where measure_code = "AMI_7a";  
run;  
proc freq data = hosp b;  
    table score_dec;  
run;
```

Dynamic Data Exchange (DDE)

- Tell SAS what and where to put the data in the Excel template

```
data _null_;  
set hosp_b;  
  filename file1a dde  
  "EXCEL|[NHCQF_Template_VBP_FY2015.xls|FY2015_HVBP|r11c3";  
  file file1a notab;  
  put score dec;  
run;
```

Dynamic Data Exchange (DDE)

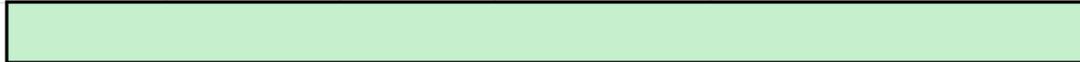
- Save and close the template

```
/* This will re-save the template with a different file name */
/*save*/
data _null_;
file cmds;
put %unquote(%str(%' [SAVE.AS "S:\SARG\10SOW\C.7 Improve Individual
Patient Care\VBP\Report_071213\Output\&facid..xls"]%'));
run;
data test; x=sleep(3); run;
/*close*/
data _null_;
file cmds;
put %unquote(%str(% [CLOSE("S:\SARG\10SOW\C.7 Improve Individual
Patient Care\VBP\Report_071213\Output\&facid..xls"]%'));
run;
data test; x=sleep(3); run;

%end;
%mend;
%reports;
```

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Measure ID	Hospital Baseline Score*	Hospital Performance Period Score*	Achievement Threshold	Benchmarks	Hospital Achievement	Hospital Improvement	Hospital Best Performance	
AMI-	.	.	0.8	1	n/a	n/a	n/a	
AMI-	0.8700	0.9500	0.95349	1	0	6	6	
HF	0.9500	0.9300	0.94118	1	0	0	0	
PN-	0.9800	0.9900	0.94118	1	8	5	8	
PN	0.9300	0.9600	0.97783	1	0	4	4	
SCIP-Inf	0.9700	0.9900	0.97175	1	6	6	6	
SCIP-Inf	1.0000	1.0000	0.98639	1	10	0	10	
SCIP-Inf	0.9600	0.9800	0.98637	1	0	5	5	
SCIP-Inf	.	.	0.97494	1	n/a	n/a	n/a	
SCIP-Inf	0.9000	0.9800	0.95798	0.99767	5	8	8	
SCIP-VTE	0.8900	0.9900	0.94891	0.99991	8	9	9	
SCIP-Card	0.9100	0.9700	0.95918	1	3	6	6	
Eligible Domains :		10				Clinical Process of Care Score :		62.00

*** Hospital Baseline and/or performance scores: Values 0.00 - 1.00, if not eligible, leave blank.**

This estimate provided by MPRO is our "best guess" of the impact of the value based purchasing program on the identified hospital. This does not represent CMS policy nor is this a representation of CMS' calculation under this program. Based on VBP final rule published April 2011.

Using SAS to Enable Health Care Quality Improvement

Data Analysis for Medication Reconciliation Project

Yongmei Qin, MD, MS
Healthcare Data Analyst



Michigan's Health Care Quality Improvement Organization

Work with Hospitals, Nursing Homes, and communities

- Hospitals
 - 46 Acute Care Hospitals to reduce Healthcare-Associated Infections
- Nursing Homes
 - 320 Nursing Homes to reduce Antipsychotic Use, increase Mobility, and improve Other Quality Measure Scores
- Communities
 - 9 communities to reduce readmission and adverse drug events

Medication Reconciliation Project in Geriatric Patient Center

- Medication Reconciliation Definition: The process of identifying the most accurate list of all medications a patient is taking, including name, dosage, frequency and route, and using this list to provide correct medications for patients
 - Goal: Reduce potential Adverse Drug Event (pADE) and Adverse Drug Event(ADE)

Methodology

- Phone medication reconciliation was conducted by one of the pharmacist
- Eligible patient: patient discharged from the emergency department (ED), observational unit, or inpatient hospital stay
 - Case group: Patients were reached by a medication reconciliation phone call after discharge
 - Control group: Patients not reached by medication reconciliation phone call after discharge
- Utilize CMS Medicare-Fee-For-Service(FFS) Claims data
- Data analysis was performed to evaluate 30-day readmission rate between case and control groups
 - 30-day hospital readmissions
 - 30-day total hospital utilization readmissions

Running Inpatient and Outpatient Medicare Claims Data

```
proc sql;
create table abase1 as
select *,
      (substr(bene_clm_num,1,12) in (select medicare from control)) as
rosa_control, (hse_clm_stus_cd in ('20' '40' '41' '42')) as died
from abase_&mystate..&abase

where "&startdate."d<=hse_clm_thru_dt and
      hse_clm_from_dt<="&enddate."d +30

and nch_clm_type_cd in('40' '60' '61')
having rosa_control=1
order by finder_claim_num, hse_clm_thru_dt desc, hse_clm_from_dt desc, died
desc, nch_clm_type_cd desc, hcfa_clm_proc_dt desc;
quit;
```

Counts 30 days out from the index admission date to include within 30-day readmissions

Calculating 30-day Readmission Rates

```
data readm30;
  set fabase;
  by finder_claim_num descending hse_clm_thru_dt descending fromdt;
  ddate=hse_clm_thru_dt;
  nextadate=lag(fromdt);
  nextddate=lag(ddate);
  nexthsp_id=lag(hsp_id);
  if first.finder_claim_num then do;
    days=.;
    nextadate=.;
    nextddate=.;
    nexthsp_id='';
  end;
  if nextadate ne . then days=nextadate-ddate;
  transfer=(days=0);
  adm=(transfer=0);
  readm30=(hse_clm_stus_cd not in('20' '40' '41' '42') and transfer=0 and
0<days<=30);
  format fromdt ddate nextadate nextddate mmddy10.;
run;
```

Overwrite the lag with a missing value where no previous claim is present

Defines readmissions where the days between hospital stays is 30 or less

Risk-Standardized Readmission Rate (RSRR)

Lili Deng , MD, MA
Healthcare Data Analyst



Michigan's Health Care Quality Improvement Organization

Why do we need to do the Risk adjustment?

- How is it possible to evaluate a hospital's performance on patient outcomes more fairly?
- How is it possible to compare one hospital's performance on patient outcomes to another more fairly?
- Since one hospital patient population may differ from the total patient population or from another hospital patient population in a number of patient characteristics, comparisons are meaningless without considering disparities of patient mix among hospitals.
- Risk adjustment is a statistical technique that is used to overcome the effect of differences among hospitals so that comparisons of health care quality provided are more fair.

What data does CMS use to calculate the risk-standardized outcome measures?

- The risk-standardized AMI, HF, and PN 30-Day Readmission measures were developed by a team of clinical and statistical experts from Yale University, using a methodology that has been published in peer reviewed literature.
- The 30-Day Readmission measures for AMI, HF, and PN are produced from Medicare claims and VA (Veterans Health Administration) administrative data.

How to calculate RSRR

- All-Cause readmission within a 30-day of discharge (outcome variable)
- The 15,000+ International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) (diagnosis codes, procedure codes, and external cause of injury codes (E-codes)).
- 149 condition categories (CCs)
- Collapsing 149 CCs into 35 MODIFIED CC (MCCs)
- 37 Risk-Adjustment Variables (i.e. age, sex, comorbid diseases, and indicators of patient frailty)

Heart Failure (HF)

```
DGNS_CD_26 = DGNS_E_CD_1;  
DGNS_CD_27 = DGNS_E_CD_2;  
DGNS_CD_28 = DGNS_E_CD_3;
```

```
ARRAY ICD9CODE{1:28} $ DGNS_CD_1-DGNS_CD_28;  
DO I=1 TO 28;  
DIAG=ICD9CODE(I);  
if HF= 0 and I <28 then do;  
    IF DIAG IN ('40201' '40211' '40291' '40401' '40403' '40411' '40413' '40491' '40493') OR DIAG='428' THEN HF=1;  
end;  
END;
```

How to calculate RSRR

Creating some CC variables

```
/*The following steps create some CC variables based on ICD9 code*/
ARRAY ICD9P{1:25} $ PRCDR_CD_1-PRCDR_CD_25;
  DO J=1 TO 25;
    PROC=ICD9P(J);
    if cabg = 0 and J < 25 then do;
      if PROC in ('3610' '3611' '3612' '3613' '3614' '3615' '3616')
        then CABG = 1;
    end;
  END;

ARRAY ICD9CODE{1:28} $ DGNS_CD_1-DGNS_CD_28;
  DO I=1 TO 28;
    DIAG=ICD9CODE(I);

    if CABG= 0 and I <28 then do;
      IF DIAG = 'v4581' then CABG=1;
    end;

    if CC79= 0 and I <28 then do;
      IF DIAG in ('42741' '42742' '4275' '5184' '5185' '51881' '51882' '51883' '51884' '78550' '78551' '7980'
'7981' '7982' '7989' '79901' '79902') THEN cc79=1;
    end;

    .....

    if cc149= 0 and I <28 then do;
    IF DIAG IN ('70710' '70711' '70712' '70713' '70714' '70715' '70719' '7078' '7079') THEN cc149=1;
    end;
  END;
```

How to calculate RSRR

Collapsing 149 CCs into 35 MCCs

```
*****;  
* The following step collapses some CC variables based on clinical evaluation for HF. *  
* MCC: MODIFIED CC *  
*****;  
ARRAY CC{1:149} CC1 - CC149;  
ARRAY MCC{1:149} MCC1-MCC149;  
  
DO I=1 TO 149;  
    MCC(I)=CC(I);  
END;  
  
/* CC8, 9, 10, 11, & 12 collapsed into MCC8 */  
MCC8=CC8 OR CC9 OR CC10 OR CC11 OR CC12;  
DO I=9 TO 12;  
    MCC(I)=0;  
END;  
  
.....  
  
/* CC148, & 149 collapsed into MCC149 */  
MCC149=CC148 OR CC149;  
DO I=149;  
    MCC(I)=0;  
END;
```

How to calculate RSRR

35 Risk-Adjustment Variables

```
DIABETES=MCC15;  
DIS_FLUID=MCC22;  
IRON_DEFICIENCY=MCC47;  
CARDIO_RESPIRATORY=MCC79;  
CHF=MCC80;  
VASDIS_WCOMP=MCC104;  
COPD=MCC108;  
PNEUMONIA=MCC111;  
RENAL_FAILURE=MCC131;  
OTHER_UTD=MCC136;  
DECUBITUS_ULCER=MCC148;  
OTHER_GI=MCC36;  
ACS=MCC81;  
VAL_RHE_HEART=MCC86;  
ARRHYTHMIAS=MCC92;  
ASTHMA=MCC110;  
PEPTIC_ULCER=MCC34;  
CANCER=MCC8;  
DRUG_ALCOHOL=MCC51;  
MAJOR_PSYCH=MCC54;  
ESRD_DIALYSIS=MCC129;  
HEMATOLOGICAL=MCC44;  
.  
.  
.  
OTHER_PSYCH=MCC60;  
LUNG_FIBROSIS=MCC109;  
MALNUTRITION=MCC21;  
DEPRESSION=MCC58;
```

How RSRR is calculated

- The measures estimate hospital-level 30-day all-cause RSRRs for each condition using **hierarchical logistic regression models**. In brief, the approach simultaneously models two levels of data (patient and hospital) to account for the variance in patient outcomes within and between hospitals.
- **The RSRR were obtained as the ratio of the number of “predicted” to “expected” readmissions, multiplied by the Michigan unadjusted readmission rate for the time period in question.**
 - ❖ The predicted number of readmissions for each hospital was estimated using the risk model given its own patient mix and with its own hospital-specific intercept.
 - ❖ The expected number of readmissions for each hospital was estimated with its own patient mix and the average hospital-specific intercept based on all hospitals in our sample

How to calculate RSRR

```
ODS SELECT PARAMETERESTIMATES;
PROC GLIMMIX DATA=RAW.READM_pre_HF NOCLPRINT MAXLMMUPDATE=100;
CLASS HSP_ID;
ODS OUTPUT PARAMETERESTIMATES=RAW.EST_Pre(KEEP=EFFECT ESTIMATE STDERR);
MODEL readm30(event=last)=AGE_65 MALE CABG DIABETES DIS_FLUID IRON_DEFICIENCY
    CARDIO_RESPIRATORY CHF VASDIS_WCOMP COPD PNEUMONIA
    RENAL_FAILURE OTHER_UTD DECUBITUS_ULCER OTHER_GI ACS
    VAL_RHE_HEART ARRHYTHMIAS ASTHMA PEPTIC_ULCER CANCER
    DRUG_ALCOHOL MAJOR_PSYCH ESRD_DIALYSIS HEMATOLOGICAL
    NEPHRITIS ESLD MCANCER STROKE DEMENTIA CAD_ANGINA
    OTHER_HEART OTHER_PSYCH PARALYSIS_FUNCTDIS
    LUNG_FIBROSIS MALNUTRITION DEPRESSION
    /dist=binary LINK=LOGIT ddfm=bw SOLUTION;

XBETA=_XBETA_;
LINP=_LINP_;
RANDOM INTERCEPT/SUBJECT=HSP_ID SOLUTION;
RANDOM _RESIDUAL_;
OUTPUT OUT=RADM30_Pre
    PRED(BLUP ILINK)=PREDPROB PRED(NOBLUP ILINK)=EXPPROB;
ID XBETA LINP HSE_UNIQUE_ID HSP_STATE_CODE HF hsp_id finder_claim_num readm30 race_cat age_cat
MALE los_cat;
NLOPTIONS TECH=NRRIDG;
run;
```

How to calculate RSRR

```
/*The Michigan unadjusted readmission rate for the time period*/
```

```
PROC SQL NOPRINT;
```

```
SELECT MEAN(RADM30) INTO: YBAR FROM RADM30;
```

```
QUIT;
```

```
*****;  
* DERIVING RSRR FOR EACH HOSPITAL *;  
*****;
```

```
PROC SQL;
```

```
CREATE TABLE RSRR AS
```

```
SELECT DISTINCT PROVID, MEAN(RADM30) AS OBS,  
    MEAN(PREDPROB) AS PRED,  
    MEAN(EXPPROB) AS EXP,  
    (CALCULATED PRED)/(CALCULATED EXP) AS SRR,  
    (CALCULATED SRR)*&YBAR AS RSRR,  
    COUNT(PROVID) AS VOLUME
```

```
FROM RADM30
```

```
GROUP BY PROVID;
```

```
QUIT;
```

ID	OBS	PRED	EXP	RSRR	Volume
1	0.2963	0.2954	0.2630	0.3033	3733
2	0.2849	0.2842	0.2649	0.2896	2664
3	0.2546	0.2544	0.2497	0.2751	3260
4	0.3053	0.3014	0.2504	0.3250	1330
5	0.2597	0.2592	0.2452	0.2855	3115
6	0.3266	0.3250	0.2647	0.3315	3736
7	0.3102	0.3090	0.2597	0.3213	4359
8	0.2690	0.2686	0.2610	0.2779	2078
9	0.3250	0.3167	0.2188	0.3907	1203
10	0.2638	0.2612	0.2299	0.3067	1266

Measure Specifications from CMS

HF Cohort Codes

ICD-9-CM	Description
402.01	Malignant hypertensive heart disease with congestive heart failure (CHF)
402.11	Benign hypertensive heart disease with CHF
402.91	Hypertensive heart disease with CHF
404.01	Malignant hypertensive heart and renal disease with CHF
404.03	Malignant hypertensive heart and renal disease with CHF & renal failure (RF)
404.11	Benign hypertensive heart and renal disease with CHF
404.13	Benign hypertensive heart and renal disease with CHF & RF
404.91	Unspecified hypertensive heart and renal disease with CHF
404.93	Hypertension and non-specified heart and renal disease with CHF & RF
428.0	Congestive heart failure, unspecified
428.1	Left heart failure
428.20	Systolic heart failure, unspecified
428.21	Systolic heart failure, acute
428.22	Systolic heart failure, chronic
428.23	Systolic heart failure, acute or chronic
428.30	Diastolic heart failure, unspecified
428.31	Diastolic heart failure, acute
428.32	Diastolic heart failure, chronic
428.33	Diastolic heart failure, acute or chronic
428.40	Combined systolic and diastolic heart failure, unspecified
428.41	Combined systolic and diastolic heart failure, acute
428.42	Combined systolic and diastolic heart failure, chronic
428.43	Combined systolic and diastolic heart failure, acute or chronic
428.9	Heart failure, unspecified

Measure Specifications from CMS

Risk Variables	Variable	Code(s)	Condition(s)		
			AMI	HF	Pneumonia
Demographic					
	Age-65 (years above 65, continuous)	n/a	X	X	X
	Male	n/a	X	X	X
Cardiovascular					
	History of PTCA	ICD-9-CM V45.82, 00.66, 36.01, 36.02, 36.05, 36.06, 36.07	X		
	History of CABG	ICD-9-CM V45.81, 36.10–36.16	X	X	X
	Congestive heart failure	CC 80	X	X	X
	Acute coronary syndrome	CC 81, 82	X	X	X
	Angina pectoris/old myocardial infarction	CC 83	X	X	X
	Coronary atherosclerosis/other chronic ischemic heart disease	CC 84	X	X	X
	Valvular and rheumatic heart disease	CC 86	X	X	X
	Arrhythmias	CC 92, 93	X	X	X
	Vascular or circulatory disease	CC 104-106	X	X	X
	Cardio-respiratory failure and shock	CC 79	X	X	
	Other and unspecified heart disease	CC 94	X		
	Anterior myocardial infarction	ICD-9-CM 410.00-410.19	X		
	Other location of myocardial infarction	ICD-9-CM 410.20-410.69	X		

Measure Specifications from CMS

Variable	Code(s)	Condition(s)		
		AMI	HF	Pneumonia
Comorbidities				
Metastatic cancer and acute leukemia	CC 7	x	x	x
Lung, upper digestive tract, and other severe cancers	CC 8	x		
Lymphatic, head and neck, brain, and other major cancers; breast, prostate, colorectal and other cancers and tumor	CC 9-10	x		
Cancer	CC 8-12	x	x	
Diabetes and DM complications	CC 15-20, 119, 120	x	x	x
Protein-calorie malnutrition	CC 21	x	x	x
Disorders of fluid/electrolyte/acid-base	CC 22, 23	x	x	x
Iron deficiency and other/unspecified anemias and blood disease	CC 47	x	x	x
Dementia and senility	CC 49, 50	x	x	x
Hemiplegia, paraplegia, paralysis, functional disability	CC 67-69, 100-102, 177, 178	x	x	x
Stroke	CC 95, 96	x	x	x
COPD	CC 108	x	x	x
Asthma	CC 110	x	x	x
Pneumonia	CC 111-113	x	x	x
End-stage renal disease or dialysis	CC 129, 130	x	x	x
Renal failure	CC 131	x	x	x
Other urinary tract disorders	CC 136	x	x	x
Decubitus ulcer or chronic skin ulcer	CC 148, 149	x	x	x
History of infection	CC 1, 3-6	x	x	
Other gastrointestinal disorders	CC 36	x	x	
Drug/alcohol abuse/dependence/psychosis	CC 51-53	x	x	
Major psychiatric disorders	CC 54-56	x	x	

Measure Specifications from CMS

Variable	Code(s)	Condition(s)		
		AMI	HF	Pneumonia
Comorbidities				
Major psychiatric disorders	CC 54-56		x	x
Other psychiatric disorders	CC 60		x	x
Fibrosis of lung and other chronic lung disorders	CC 109		x	x
Severe hematological disorders	CC 44		x	x
Cerebrovascular disease	CC 97-99, 103			
Peptic ulcer, hemorrhage, other specified gastrointestinal disorders	CC 34		x	
Nephritis	CC 132		x	
Liver and biliary disease	CC 25-30		x	
Depression	CC 58		x	
Septicemia/shock	CC 2			x
Pleural effusion/pneumothorax	CC 114			x
Other lung disorders	CC 115			x
Urinary tract infection	CC 135			x
Vertebral fractures	CC 157			x
Other injuries	CC 162			x

Source

1. 2012 Measures Maintenance Technical Report: Acute Myocardial Infarction, Heart Failure, and Pneumonia 30-Day Risk-Standardized Readmission Measure.
2. Frequently Asked Questions (FAQs): CMS 30-Day Risk-Standardized Readmission Measures for Acute Myocardial Infarction (AMI), Heart Failure (HF), and Pneumonia
3. SAS/STAT® 9.2 User's Guide The GLIMMIX Procedure