

## SUPPLEMENTARY MATERIALS

### Exhibit 1. SQL script for medication matching adjudication loop

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/*****

PURPOSE: LINK PRESCRIBED TO DISPENSED MEDICATION RECORDS FROM PCORnet COMMON DATA MODEL TABLES
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DETAILS: MATCH RECORDS ON PATID AND PHARMACEUTICAL SUBCLASS, NEAREST IN DATE WHERE ORDER_DATE
<= DISPENSE_DATE

INPUT TABLES:
  - dbo.ORDERED = prescribed meds table. Nomenclature=RxNorm_CUI
  - dbo.DISPENSED = dispensed meds table. Nomenclature=NDC
  - dbo.RXNORM_NDC_XWALK = CROSSWALK BETWEEN RXNORM_CUI AND NDC TERMINOLOGIES CREATED
USING RxMIX WEB APP (https://mor.nlm.nih.gov/RxMix/)

OUTPUT:
  - dbo.ORDERED = updated with DISP_ID column, indicating ID of matched dispensing record
  - dbo.DISPENSED = updated with MATCH_RX column, flag indicating this record matched a
prescription
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/*****
--- 1. SET UP TABLES FOR ADJUDICATION: ADD COLUMNS AND SORT
*****/

--Add additional columns for adjudication
ALTER TABLE [dbo].[ORDERED] ADD ORD_SEQ BIGINT
ALTER TABLE [dbo].[ORDERED] ADD DISP_ID BIGINT
ALTER TABLE [dbo].[DISPENSED] ADD DISP_ID BIGINT
alter table [dbo].[DISPENSED] ADD MATCH_RX BIT

update [dbo].[ORDERED] set disp_id = null
update [dbo].[ORDERED] set ord_seq = null
update [dbo].[DISPENSED] set DISP_ID = null
update [dbo].[DISPENSED] set MATCH_RX = null

--Create sequential Rx ID for each patient's Rx history. This will be used as an index to
iterate through prescriptions
SELECT PRESCRIBINGID, PATID,
ORD_SEQ = ROW_NUMBER() OVER (PARTITION BY PATID ORDER BY rx_order_date ASC)
INTO #RxSeq
FROM [dbo].[ORDERED]

UPDATE o
SET o.ORD_SEQ = s.ORD_SEQ
FROM [dbo].[ORDERED] o
INNER JOIN #RxSeq s ON s.PRESCRIBINGID = o.PRESCRIBINGID

DROP TABLE #RxSeq

-- Sort dispensing records by ascending dispense date
SELECT DISPENSINGID, DISP_ID = ROW_NUMBER() OVER (ORDER BY dispense_date ASC)

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INTO #DispSeq
FROM [dbo].[DISPENSED]

UPDATE d
SET d.DISP_ID = s.DISP_ID
FROM [dbo].[DISPENSED] d
INNER JOIN #DispSeq s ON s.DISPENSINGID = d.DISPENSINGID

DROP TABLE #DispSeq

/*****
--- 2. RUN THE LOOP TO FIND CLOSEST DISPENSE DATE ON OR AFTER EACH ORDERED DATE, WITHIN PATID
AND PHARM_SUBCLASS
*****/

SET NOCOUNT ON;
DECLARE @PROCESS_SEQ INT

DECLARE CurRxSeq CURSOR FAST_FORWARD READ_ONLY
FOR
    SELECT DISTINCT ORD_SEQ -- Cycle through each
    FROM [dbo].[ORDERED]
    ORDER BY ORD_SEQ

OPEN CurRxSeq

    FETCH NEXT FROM CurRxSeq INTO @PROCESS_SEQ

    WHILE @@FETCH_STATUS = 0
        BEGIN

            UPDATE rx1
            SET rx1.DISP_ID = ord.MATCH_DISP_ID
            FROM [dbo].[ORDERED] rx1
            INNER JOIN (
                SELECT
                rx.PRESCRIBINGID, MIN(dsp.DISP_ID) AS
                MATCH_DISP_ID -- Closest Disp
                FROM [dbo].[DISPENSED] dsp
                INNER JOIN [dbo].[RXNORM_NDC_XWALK] x ON x.NDC =
                dsp.NDC
                INNER JOIN [dbo].[ORDERED] rx
                ON rx.PATID = dsp.PATID -- Match on Patient ID
                AND rx.PHARM_SUBCLASS_C =
                x.PHARM_SUBCLASS_C -- and pharmacy subclass
                AND rx.rx_order_date <= dsp.dispense_date -
                - Dispense date on or after ordered date
                WHERE rx.ORD_SEQ = @PROCESS_SEQ -- Loop through Rx
                sequence
                AND dsp.MATCH_RX IS NULL -- Has not yet been
                adjudicated
                GROUP BY rx.PRESCRIBINGID ) ord
            ON ord.PRESCRIBINGID = rx1.PRESCRIBINGID

            -- Flag dispensed record as already adjudicated to avoid remapping it
            UPDATE d
            SET d.MATCH_RX = 1
            FROM [dbo].[DISPENSED] d
            INNER JOIN [dbo].[ORDERED] o ON d.DISP_ID = o.DISP_ID

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WHERE o.ORD_SEQ = @PROCESS_SEQ
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FETCH NEXT FROM CurRxSeq INTO @PROCESS_SEQ
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END
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CLOSE CurRxSeq
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DEALLOCATE CurRxSeq
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/***/
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**Table 1. Sensitivity analysis: dispensing percentages in subpopulations**

	Full sample	Excluding aspirin	Excluding patients ever uninsured in study period	Excluding Hispanic patients	Excluding patients with only one visit
<b>Cardiovascular drugs, total</b>	76.0%	--	79.1%	78.3%	76.3%
ACEs, ARBs, and DRIs	75.7%	--	79.5%	78.4%	76.0%
Statins	76.6%	--	80.1%	80.0%	76.9%
Diuretics	77.9%	--	80.4%	76.4%	78.1%
Beta Blockers	79.2%	--	82.0%	80.2%	79.4%
Platelet Inhibitors	67.6%	74.9%	68.7%	69.4%	67.7%
Calcium Channel Blockers: Dihydropyridine, oral	77.4%	--	79.6%	78.0%	77.7%
Other Dyslipidemia Drugs	73.4%	--	77.3%	76.4%	73.6%
Antianginals	78.0%	--	80.5%	79.9%	78.2%
Calcium Channel Blockers: Non-Dihydropyridine, oral	78.3%	--	80.9%	77.8%	78.3%
<b>Diabetes drugs, total</b>	74.4%	--	78.7%	77.6%	74.7%
Miscellaneous Antidiabetic Agents (Metformin)	74.9%	--	79.5%	78.5%	75.2%
Insulins	74.6%	--	78.3%	77.0%	74.8%
Sulfonylureas	74.9%	--	80.2%	79.0%	75.1%
DPP-4 Inhibitors	65.9%	--	69.4%	70.8%	66.0%
Thiazolidinediones	80.4%	--	84.0%	81.7%	80.5%
SGLT2 Inhibitors	55.6%	--	60.0%	56.9%	55.6%
GLP-1 Receptor Agonists	62.8%	--	62.2%	62.6%	62.9%

**Table 2. Dispensing percentages and odds of dispense by patient-, encounter-, and facility-level factors**

	% dispensed	Odds of dispense (95% CI)
Patient-level factors		
Sex		
Female	76.3%	<b>1.14 (1.09, 1.20)</b>
Male	74.2%	Ref
Age		
20-39	73.7%	ref
40-54	74.8%	<b>1.12 (1.04, 1.21)</b>
55-64	76.3%	<b>1.20 (1.11, 1.29)</b>
Race/ethnicity		
Hispanic	67.5%	<b>0.49 (0.46, 0.53)</b>
Non-Hispanic white	81.2%	Ref
Non-Hispanic black	72.1%	<b>0.87 (0.79, 0.96)</b>
Non-Hispanic other	76.1%	<b>0.79 (0.69, 0.90)</b>
Missing/unknown	77.8%	--
FPL		
≤138%	75.3%	<b>1.42 (1.32, 1.53)</b>
>138%	71.4%	ref
Missing/unknown	81.9%	--
Urbanicity		
Urban	75.1%	ref
Small town/rural	71.6%	0.89 (0.79, 1.01)
Missing/unknown	80.6%	--
Insurance		
Medicaid only	81.3%	ref
Medicare only	78.1%	<b>0.75 (0.69, 0.81)</b>
Private only	73.9%	<b>0.64 (0.58, 0.70)</b>
Multiple types	75.1%	<b>0.82 (0.74, 0.90)</b>
Partial uninsured	66.4%	<b>0.50 (0.47, 0.54)</b>
Newly insured in 2014		
No	77.4%	ref
Yes	68.7%	<b>0.68 (0.64, 0.72)</b>
Primary care provider (PCP) assigned		
No	75.4%	ref
Yes	70.0%	<b>2.07 (1.42, 3.00)</b>
% visits with PCP		
≤25%	68.8%	ref
26-50%	74.6%	<b>1.40 (1.27, 1.56)</b>
51-75%	76.9%	<b>1.63 (1.48, 1.80)</b>
75-100%	75.5%	<b>1.49 (1.36, 1.64)</b>
State of residence		
Medicaid expansion (2014)	78.2%	<b>3.04 (1.36, 6.78)</b>
Non-expansion state (through 2015)	59.9%	ref
Charlson comorbidity score		
0-2		ref
3-4		
5-7		
≥8		

Hypertension on problem list		
No	73.3%	ref
Yes	75.9%	<b>1.21 (1.14, 1.28)</b>
Lipid disorder on problem list		
No	72.8%	ref
Yes	76.1%	<b>1.17 (1.11, 1.24)</b>
Length of time with DM/pre-DM		
≤1 yr	72.6%	ref
2-3 yr	74.5%	<b>1.07 (1.01, 1.15)</b>
4-5 yr	79.6%	<b>1.19 (1.10, 1.30)</b>
≥6 yr	75.6%	<b>1.13 (1.01, 1.27)</b>
Encounter-level factors		
Medication class		
DM med	74.4%	ref
CVD med	76.0%	1.01 (0.99, 1.02)
Encounter type		
Ambulatory visit	71.8%	ref
Other ambulatory	78.6%	<b>1.02 (1.01, 1.34)</b>
Provider type (visit provider)		
MD	77.4%	ref
PA/NP	73.3%	<b>0.97 (0.94, 0.99)</b>
Other	73.9%	<b>0.95 (0.93, 0.97)</b>
Prescribing provider is PCP		
No	72.3%	ref
Yes	76.0%	<b>1.11 (1.08, 1.14)</b>
E-prescribed		
No	66.6%	ref
Yes	77.1%	<b>1.18 (1.14, 1.22)</b>
Refill		
No	73.1%	ref
Yes	75.7%	<b>1.03 (1.01, 1.04)</b>
DM encounter		
No	74.4%	ref
Yes	71.2%	0.98 (0.96, 1.00)
Hypertension encounter		
No	72.4%	ref
Yes	73.2%	1.02 (0.99, 1.05)
Lipid encounter		
No	72.4%	ref
Yes	74.7%	<b>1.04 (1.00, 1.09)</b>
N encs at same facility in past year		
0	72.3%	ref
1-2	71.4%	0.96 (0.93, 1.00)
3-5	74.5%	0.99 (0.95, 1.02)
≥6	78.5%	0.97 (0.93, 1.01)
Facility-level factors		
Clinic type/specialty		
Primary care/family practice	75.3%	Ref
Other	79.2%	0.93 (0.82, 1.07)
Clinic size: N providers		
Q1 (1st-25th percentile)	67.2%	Ref
Q2	79.2%	<b>1.23 (1.13, 1.33)</b>
Q3	76.0%	<b>1.13 (1.05, 1.21)</b>

Q4	79.2%	<b>1.12 (1.03, 1.21)</b>
Length of time on EHR		
<2 years	72.7%	ref
2-5 years	74.2%	<b>1.18 (1.07, 1.30)</b>
>5 years	77.2%	<b>1.19 (1.09, 1.31)</b>
Meaningful Use attestation		
No	72.6%	ref
Yes	75.4%	<b>1.36 (1.20, 1.53)</b>

Odds ratios and 95% CIs from GEE models with a logit link; robust standard error estimator applied to account for repeated measures within patients and patients nested within health centers. All models adjusted for sex, age group, and race/ethnicity. FPL predictor model restricted to facilities with sufficient variation for model conversion. **BOLD**=odds ratio statistically different from 1.0.