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A Technology-Enabled System to Improve Vaccination in Rheumatoid Arthritis (RA) Patients

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Background

- RA patients are inherently immunocompromised and frequently treated with immunosuppressive making vaccinations critically important

- Vaccination rates among patients with Rheumatoid Arthritis (RA) are quite low

- Quality improvement interventions targeting providers in primary care have effectively improved vaccination rates

Rationale for Project at NU

- Vaccination rates, particularly for pneumococcal vaccine, believed to be low
- GIM, under Dr. Baker, had demonstrated ability to use EHR-based interventions to improve quality measures
- Could we leverage GIM experience, and our rheumatology insights, to improve vaccination rates in our RA population?

Background: Patient Self-Report of Vaccination Status

- Two cycles of telephone surveys: 2013 and again in 2014
- Eligible patients had a diagnosis of RA, at least one clinic visit in each of the previous two years, were ≥ 18 years old, and had English listed as preferred language.
- Survey took 10 minutes and assessed:
  - Self reported receipt of influenza (INFVX), pneumococcal (PVX) and zoster (ZVX) vaccines
  - Attitudes about vaccines, including reasons for not being vaccinated if applicable
  - Provider recommendations about these vaccines
- Electronic health record (EHR) query conducted for participants to ascertain vaccination status from medical chart and presence of biologic on active medication list

Background: Patient Survey Results (2013)

Participant Characteristics (n=102)

Female (%)	**85**
Age, mean (SD)	**57.8 (14.5)**
Self-reported race/ethnicity (%)	
White	**67**
Black	**20**
Hispanic	**9**
Other/missing	**5**
Mean years since dx of RA (SD)	**15.6 (12.3)**
≥1 immunosuppressive drug on active medication list (%)	**91%**

Participants' Report of Provider Recommendations (n=102)

	"Yes"
Doctor told me about increased risk of infection	**75%**
Doctor has talked with me about importance of vaccines	**64%**
Doctor recommended INFVX	**96%**
Doctor recommended PNVX	**61%**
Doctor recommended ZVX	**17%**

Background: Patient Survey Results (2013)

Vaccination Status by Patient Self-Report versus EHR Documentation (n=102)

INFVX in 2011-12 season			**Concordance (Kappa statistic)**
Self Report	**Medical Record**		
	No	Yes	47%
No/Not Sure	20	1	0.16
Yes	53	28	
PNVX (ever)			
Self Report	**Medical Record**		
	No	Yes	69%
No/Not Sure	38	9	0.38
Yes	23	32	
ZVX (ever)			
Self Report	**Medical Record**		
	No	Yes	85%
No/Not Sure	86	8	0.04
Yes	7	1	

Background: Patient Survey Results (2013)

- Vaccination rates were good for INFVX, fair for PNVX and poor for ZVX
- Poor agreement between self-report and EHR data for vaccination status, making true rates unclear
- Vaccination at alternative sites was common. Only 54% of participants received 2011-2012 INFVX at a doctor's office
- Most participants recognized the need for vaccination; 79% thought vaccines were at least somewhat important
- Most common reason patients gave for not receiving PVX and ZVX was that it had not been recommended to them.

Study Objective

Evaluate a multifaceted, system-level intervention leveraging electronic health records to improve vaccination rates among RA patients

Setting & Participants

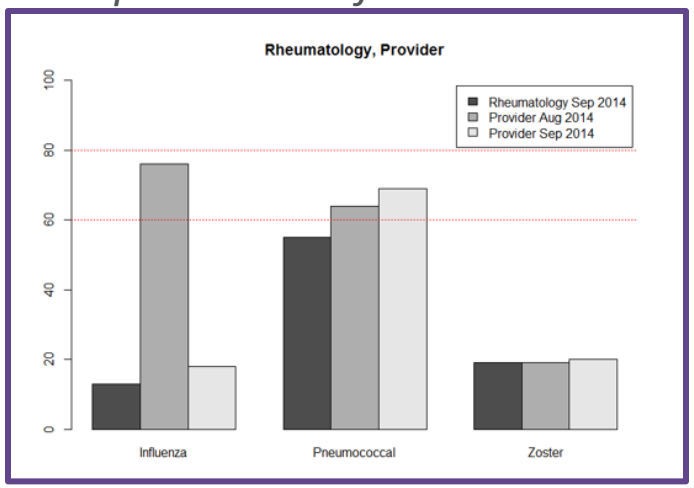
- Northwestern Medicine Rheumatology Clinic
- Study cohort included all adult patients seen in clinic with a diagnosis of RA (n=1255)
- Used 2 visits with ICD-9 code 714.XX to identify RA patients
  - Decided to be more inclusive, rather than use more specific diagnostic criteria developed for the PGRN project

Intervention Description

- Clinician monthly performance feedback reports for INFVX, PVX, and ZVX
- EHR reminders and linked order set to alert clinicians when a patient needed vaccination and facilitate administration during a visit. Clinicians could record medical and patient exceptions to vaccination
- Outreach to patients needing vaccination via mail or secure messaging through the EHR patient portal regardless of whether they had in-person clinic visits

Intervention Description

Example: Provider feedback

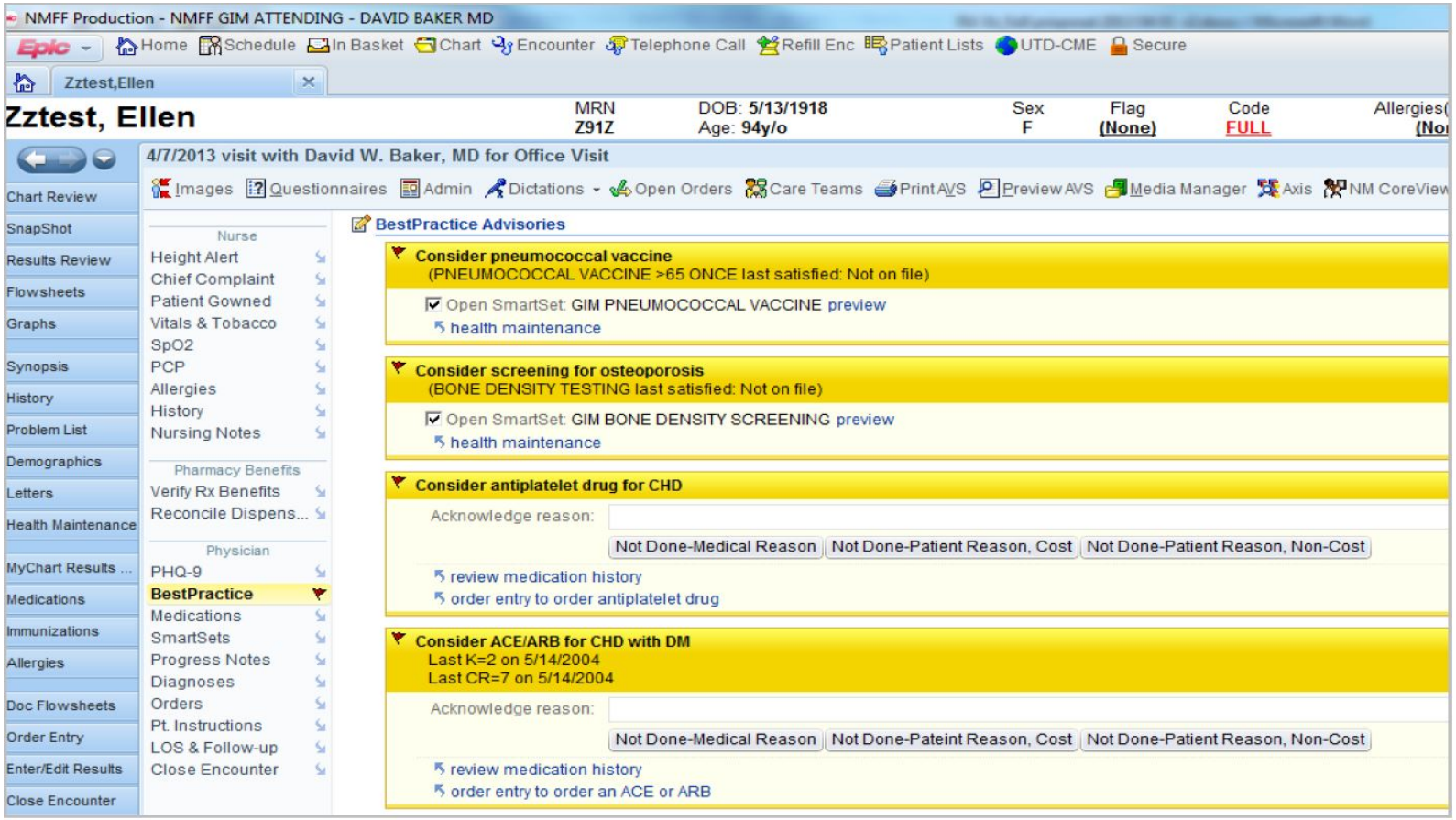


Example: Patient Outreach

Because you have rheumatoid arthritis, it is very important to get the flu shot:

- People with rheumatoid arthritis are prone to infections.
- The medicine you are taking to treat RA weakens your body's ability to fight infection. So you are more likely to get a severe case of the flu.

Intervention Description: Example of Best Practice Alert



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Evaluation Design

- We assessed vaccination rates monthly from six months prior to the intervention in October 2013 through September 2014 using EHR data
- We assessed the statistical significance of differences in vaccination rates pre and post intervention using chi-square tests
- NU IRB approved the study with a waiver of informed consent so all eligible patients were studied

Results

Participant Characteristics (n=1255)

	N (%)
Female	1048 (83.5)
Ethnicity/Race	
- Hispanic or Latino	138 (11.0)
- White	633 (50.4)
- Black	200 (15.9)
- Other	63 (5.0)
- Unknown/Declined/Missing	221 (17.6)
On any of Biologic medication	753 (60.0)

Vaccination Rates Pre and Post Intervention

VACCINATION	Pre-Intervention (%)	Post-Intervention (%)
Influenza* (102, 101)		
- Ever Received	92 (90.2)	87 (86.1)
- Previous season	81 (79.4)	79 (78.2)
Pneumococcal (N) †	**362 (28.8)**	**635 (50.6)**
- Ever received, any type	360 (28.7)	573 (45.7)
• PPSV 23 only	351 (28.0)	291 (23.2)
• PCV 13 only	5 (0.4)	151 (12.0)
• PPSV 23 and PCV 13	4 (0.3)	131 (10.4)
- No PPSV, medical exception	0 (0)	9 (0.7)
- No PPSV, patient exception	2 (0.2)	51 (4.1)
- Done Elsewhere, Unknown Type	0 (0)	2 (0.2)
Herpes Zoster (N) †	**32**	**227 (18.1)**
- Ever received	32 (2.5)	57 (4.5)
- Prescription to do elsewhere, no record of receipt	0 (0)	28 (2.2)
- No HZV, medical exception	0 (0)	102 (8.1)
- No HZV, patient exception	0 (0)	46 (3.7)

**From patient survey data*
† From EHR data

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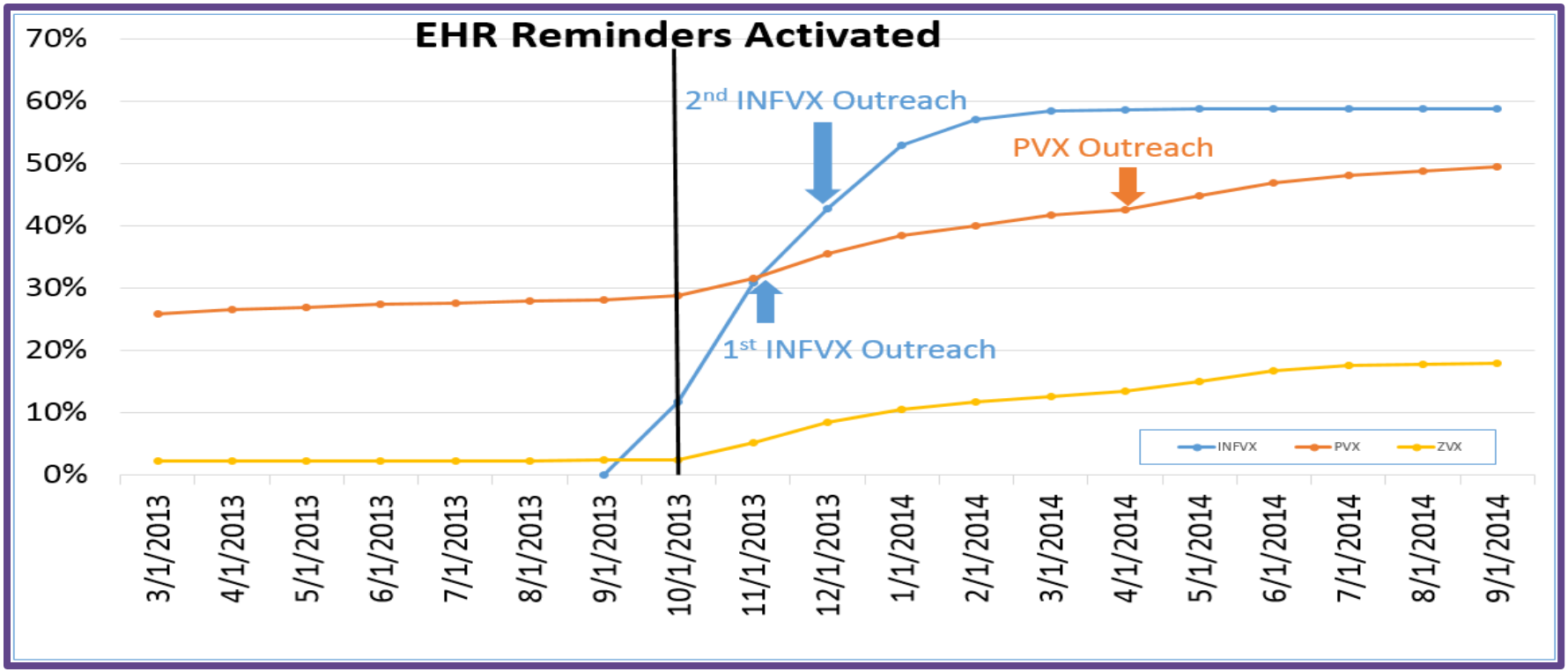
PVX (either PCV13 or PPSV23) and ZVX Vaccination Rates

	Oct 2013 N(%)	Sept 2014 N(%)	p-value
PVX receipt	359 (28.6)	572 (45.6)	P<0.001
ZVX receipt*	31 (2.5)	55 (4.4)	P=0.01

** Received ZVX in clinic or prescription to receive elsewhere*

Rates of Vaccination and Recorded Exceptions Over the Study Period



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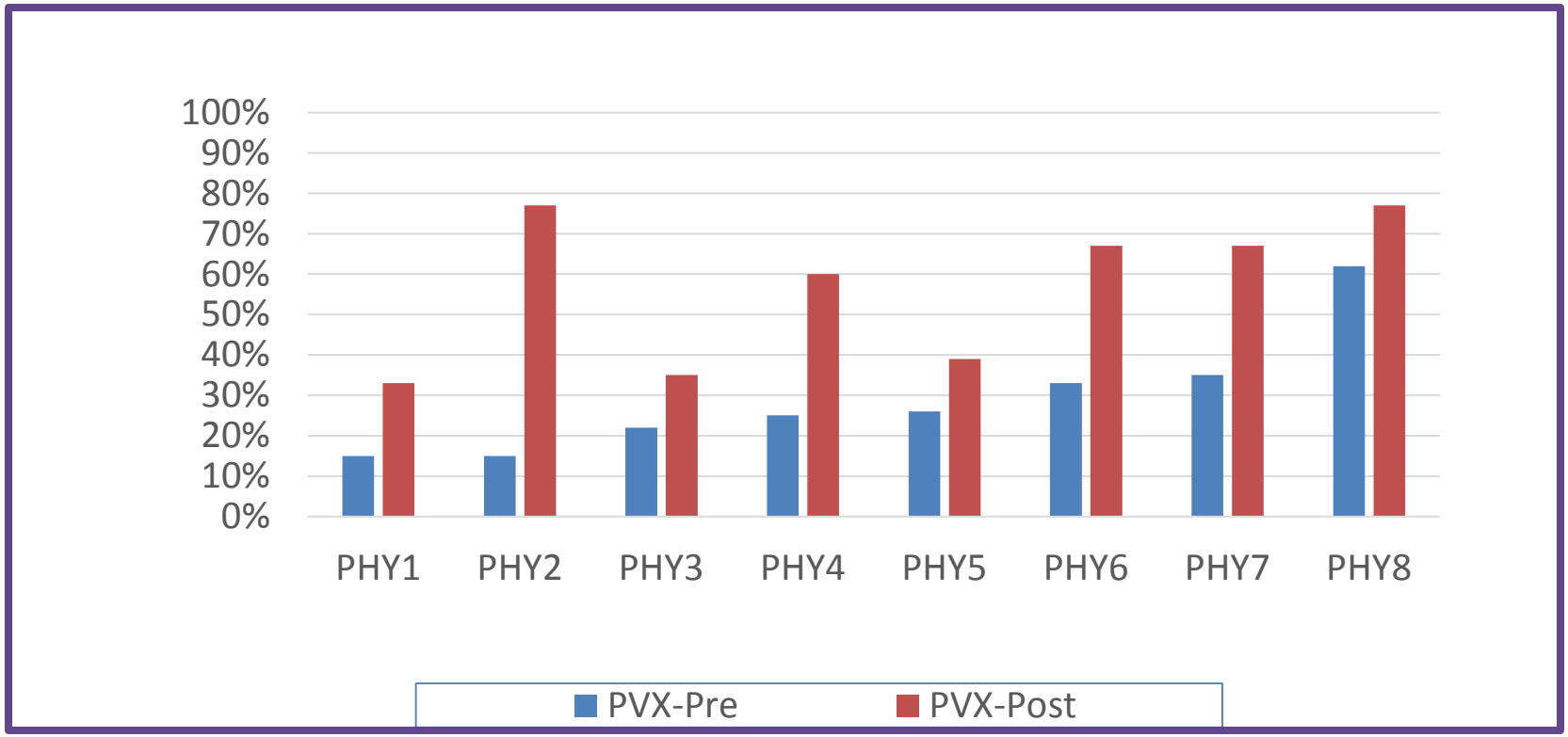
Variation in PVX Rate at Baseline and Follow-up for Individual Rheumatologists



Summary of Results

- The proportion of patients up to date on PVX increased from 28.6 % to 45.6%
- The proportion of patients up to date on ZVX also increased but remained low (2.5% to 4.4%).
- Reasons for not vaccinating patients were recorded frequently.
    - For PVX, 11 patients had a documented medical exception and 58 had a documented refusal(49 non-cost, and 9 because of cost).
    - For ZVX, 106 patients had a medical exception and 48 had a patient exception (38 non-cost and 10 cost) recorded.
- After the intervention began, PVX and ZVX rates (or documented exceptions) increased more rapidly than during the 6 months before the intervention
- The amount of improvement for pneumococcal vaccination varied widely across physicians

Limitations and Challenges

- EHR data may underestimate the true rate of vaccination
  - Database is not inclusive. Improved by using EDW rather than just Epic (included vaccination in hospital).
  - Bump in rates when NMPG came on-line in Epic, confirming the fact that vaccinations outside NMFF clinics not picked up accurately
- Clinical confusion about recent PVX recommendations
  - Uncertainty about differences between vaccines
  - Uncertainty about recommendations, timing
  - Difficulty setting up BPA's that addressed both vaccines
- Uncertainty regarding ZVX administration in immunocompromised patients under age 60
  - Safety with biologic and non-biologic DMARDs
  - Confusion at pharmacy about safety of administering vaccines

Discussion

- Vaccination rates increased substantially following implementation of this multifaceted intervention.
- However, the rate of PVX vaccination remained much lower than rates we have achieved using similar interventions in our primary care clinic.
- ZVX rates remained quite low, even after accounting for patients currently on biologic therapy
- Reasons for suboptimal vaccination rates are unclear but could be due to rheumatologists' limited time to discuss prevention with patients or beliefs that vaccination is the responsibility of primary care MDs.

ACR Presentations

- Similar projects presented from several academic medical centers, seeking to improve pneumococcal vaccination rates
- Loyola: Presentation and pocket guides with current CDC guidelines
  - Rate increased from 19.9% to 31.6%
- Pittsburgh: BPA that fired for **MA or nurse** when patients roomed
  - Rate increased from 44.4% to 51.4%
  - Rate of HZ vaccination up to 15.7% with similar process
- Dartmouth: Staff and provider education, support staff could order vaccines per protocol
  - Rate increased from 3.0% to 33.3% PCV-13, 58.1% to 64.9% PPSV-23
- Mass General instituted decision support tool in EHR as part of mandatory prior authorization at first biologic prescription

ACR Presentations – Common Themes

- No single intervention successful
- Successful components:
  - Education
  - EHR prompts
  - Utilization of support staff
  - “Internal” prior authorization process
  - “Shaming” physicians
- Common issues:
  - Confusion around two pneumococcal vaccines
  - Cost and availability of HZ vaccine
  - Difficulty verifying external vaccination rates

Comments & Questions

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Thank You

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