Office of the National Coordinator for Health Information Technology

ONC Tech Forum
Clinical Decision Support Series
Session #2

The Future of CDS (part 3)

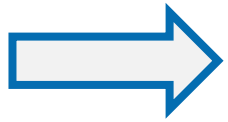
Sept. 27, 2023

Upcoming workshop

Session #3 Creating Value by Modernizing and Measuring Clinical Decision Support

- **Wednesday, Nov. 8, 2023, 12 p.m. – 3 p.m. ET**
- This session will discuss how new technologies can add value to CDS and how the impact of CDS can be measured and evaluated.
- Registration is open.

More information about workshops here



Agenda

- CDS as an option for SDOH, guideline-concordant care, and beyond

CDS as an option for SDOH, guideline-concordant care, and beyond

Priority Wizard Clinical Decision Support @ HealthPartners: Goals and Technical Aspects

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Conflict of Interest

Patrick J. O'Connor reports no industry funding, but has received current or recent Research Grants from NCI, NHLBI, NIDDK, NIA, NICHD, AHRQ, NIMH, NIDA, PCORI, CMS, and other federal sources.

Deepa Appana reports no industry funding.

Goal of Primary Care Decision Support

- Translate Clinical Care Guidelines into Web service
- Identify Patient-Specific Care Gaps
- Prioritize each patient's care gaps
- UI/UX to communicate care options to Clinician and Patient
- Monitor Use
- Update Guidelines as needed (always)
- No mouse clicks for clinician

tals/Current Medications MTM/Pharmacy Outreach Notes

WIZARD© Suggestions FAQ

Clinical Priorities | Mayo Statin Tool

PRIORITY WIZARD © Provider Patient Print

Relevant Conditions: Diabetes

10-year Cardiovascular Risk : 3.4% (Risk of stroke or heart attack over the next 10 years)

#1 LIPID

Goal: Consider statin initiation.

Treatment Considerations

- Statin initiation or intensification is recommended due to diabetes and CV risk. Many experts recommend moderate therapy.

Other Alerts

- Baseline ALT measurement is recommended by many experts prior to statin therapy initiation.

Results		
LDL (mg/dl)	106	10/11/19
HDL (mg/dl)	54	10/11/19
TRIG (mg/dl)	204	10/11/19
TC (mg/dl)	201	10/11/19

No Medications

#2 GLYCEMIC CONTROL

Goal: A1C <= 6.9

Other Alerts

- Need updated A1c to guide recommendations.
- Consider monthly visits and/or interim phone calls until A1c goal achieved.
- Urinary albumin excretion test (e.g. UMACR) may be due.
- Diabetes educator and/or dietitian support is suggested.

Results		
A1C	7.4	8/16/18

Medications

Insulin Aspart Soln Pen-injector 100 Unit/ML
Insulin Glargine Soln Pen-Injector 100 Unit/ML

BMI (WEIGHT)

Treatment Considerations

- Discuss advantages of reducing weight by 10-20 lbs. Potential actions are listed on patient interface.

Results		
Weight(lbs)	220	10/11/19
BMI	29.84	10/11/19

No Medications

RELEVANT INFORMATION AND RECOMMENDATIONS

BLOOD PRESSURE

- Consider adding hypertension to the patient problem list based on meeting guidelines from the American Heart Association.
- A referral for ambulatory BP monitoring can be helpful to guide diagnostic and treatment decisions.

TOBACCO

- Passive smoking exposure is noted. Suggest smoke free home and auto.

ASPIRIN

- Aspirin is not recommended for primary prevention for adults at low to moderate CV risk (10-year CV risk less than 10%)

Results		
BP (mm Hg)	119/75	10/11/19
Last BP (mm Hg)	125/90	5/16/19
Smoking Status/Review Date	PASSIVE	10/11/19
Smokeless Tobacco	NOT ASKED	10/11/19

No medications

s/Vitals/Current Medications MTM/Pharmacy Outreach Notes

WIZARD© Suggestions FAQ

Clinical Priorities | Mayo Statin Tool

PRIORITY WIZARD © Provider Patient Print

TALK TO YOUR DOCTOR ABOUT HOW YOU CAN IMPROVE YOUR HEALTH

Start the conversation! Use the priorities below as a guide to take action to better your health.

High Priority | Needs Attention | Doing well

CHOLESTEROL	Your LDL: 106	A cholesterol lowering drug called a statin may be beneficial for you. Talk to your doctor.
BLOOD SUGAR	Your A1C: 7.4	**Your Goal: A1C less than 7** You may be due for an A1c test. It would be a good idea for you to see a diabetes educator or dietitian.
WEIGHT	Your Weight : 220	For support with weight management contact: HP Nutrition Services (952-967-7616), or visit www.healthpartners.com/healthyliving, or call your clinic.
BLOOD PRESSURE	Your Blood Pressure:(119/75)	**Ideal BP < 120/80**
TOBACCO		**Good work maintaining your health!**

How are you liking the Wizard tool? Please take a quick survey to provide us feedback.
www.healthpartners.com/wizardsurvey

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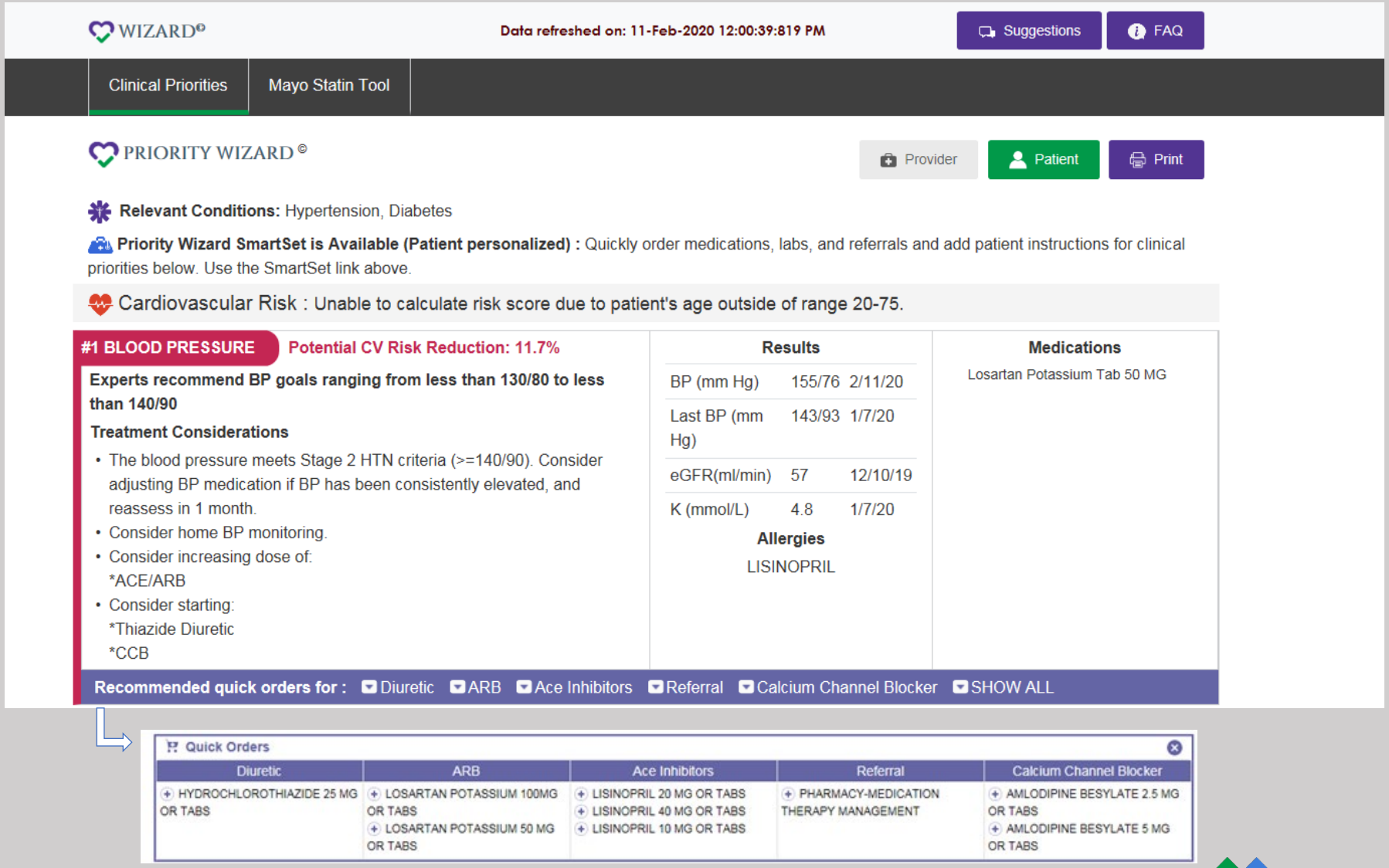
Quick Orders in Active Guideline



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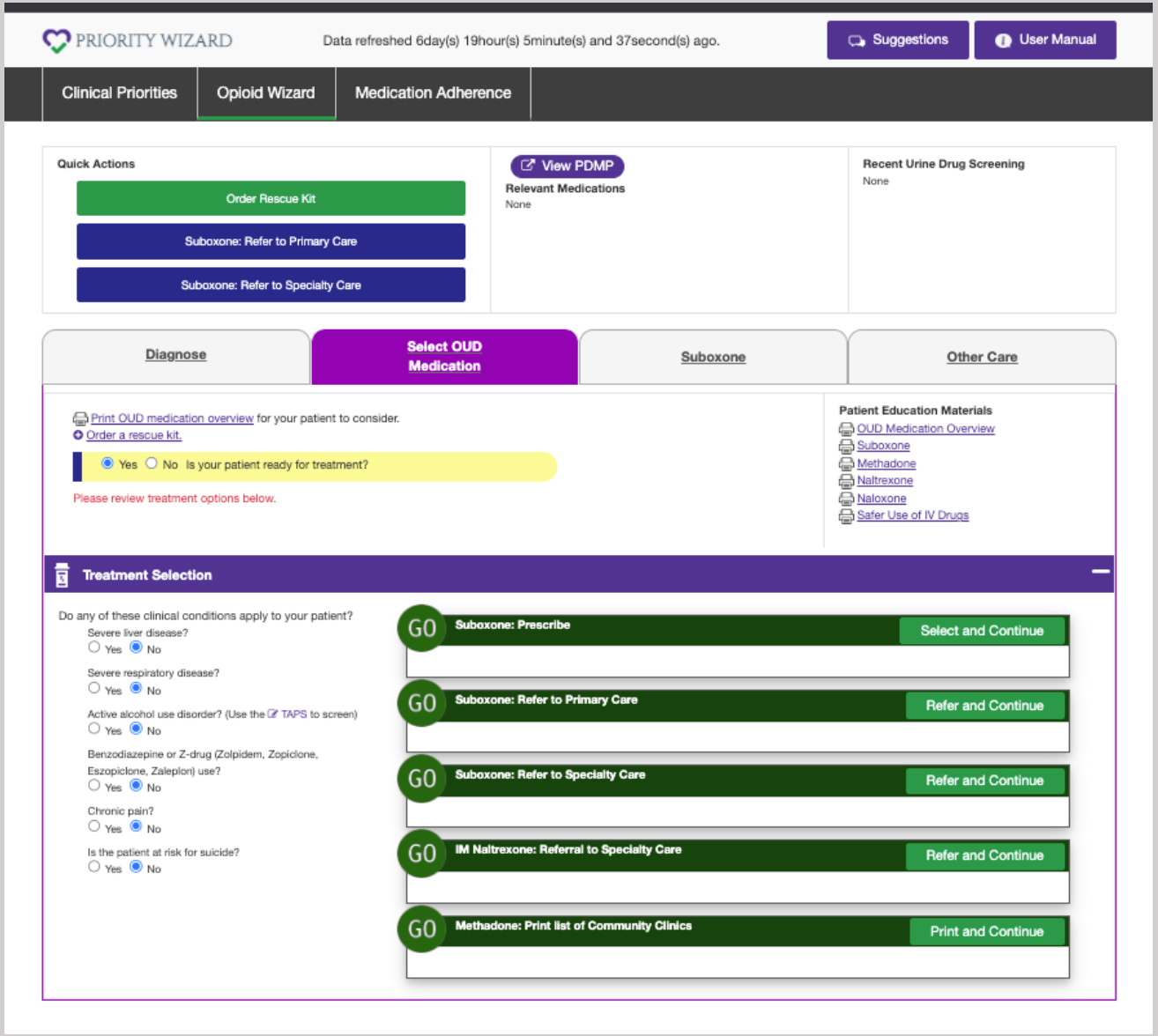
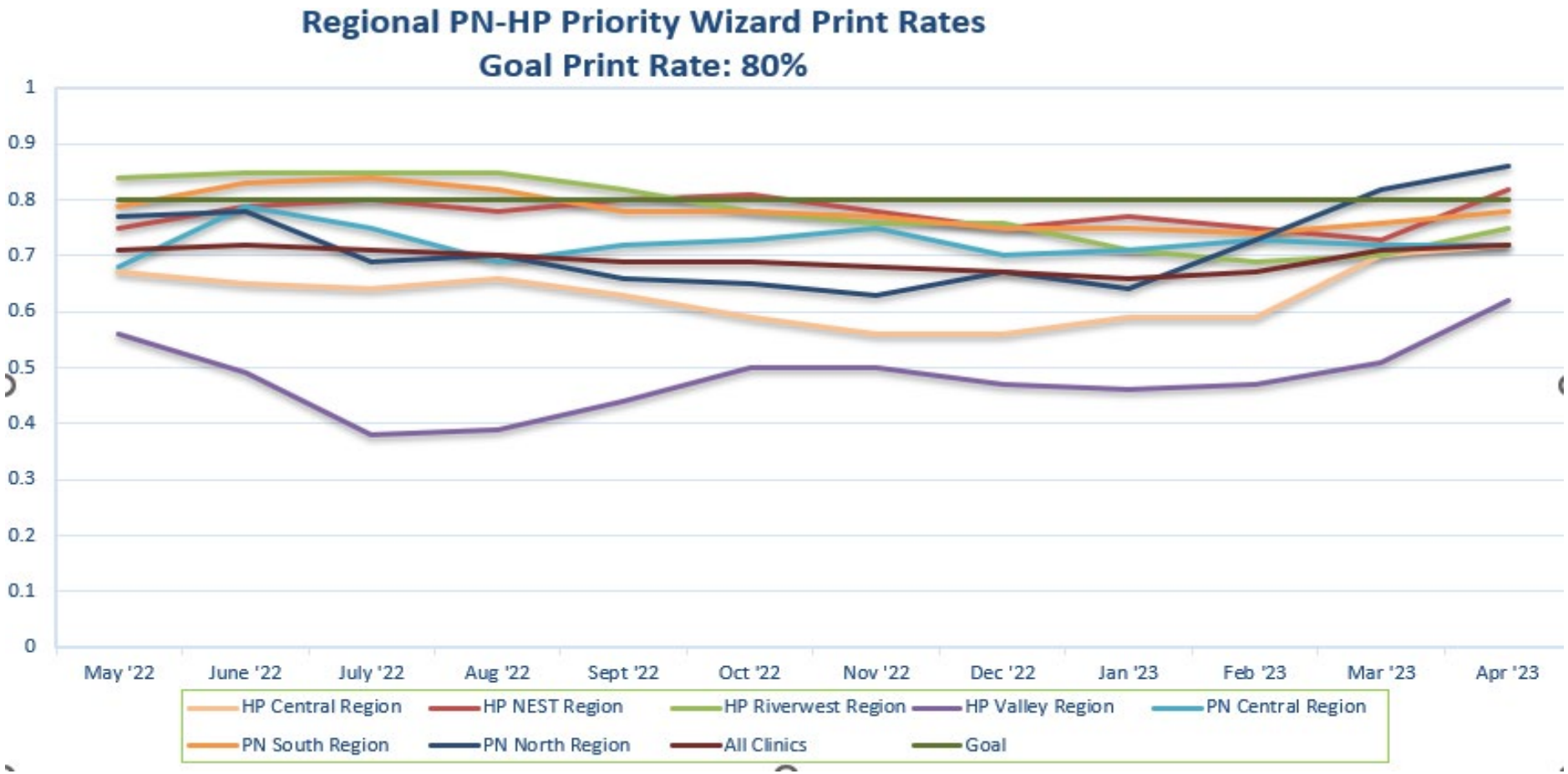
Domain Specific Tools



Does Wizard Work?

- Priorities Wizard developed since 2006 with 12 NIH Grants ($40 M)
- Currently Used at adult and pediatric encounters in 12 medical groups in 10 states caring for about 3 million patients
- **Tested for impact in a series of clinic-randomized trials**
  - Better glucose and BP control in diabetes patients
  - Better BP care/control in high-risk safety net patients
  - Improves CVD risk in adults without DM or CVD
  - Improves reversible CVD risk in Serious mental Illness
  - Increased adherence to BP and Diabetes Meds
  - May reduce Health Care Disparities based on race
  - No impact on Prediabetes Care, Cancer Screening
- Persistent High Use Rates and Clinician Satisfaction

Use Rates


Regional PN-HP Priority Wizard Print Rates
Goal Print Rate: 80%
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
May '22
June '22
July '22
Aug '22
Sept '22
Oct '22
Nov '22
Dec '22
Jan '23
Feb '23
Mar '23
Apr '23
HP Central Region
HP NEST Region
HP Riverwest Region
HP Valley Region
PN Central Region
PN South Region
PN North Region
All Clinics
Goal

Primary Care Clinician Satisfaction with CV Wizard

Wizard User Comments (N=47)	% Agree/Strongly Agree
Improved CV risk factor control	98%
Saved time when talking to patients about CV risk reduction	93%
Efficiently elicited patient treatment preferences	90%
Useful for shared decision-making	95%
Influenced treatment recommendations	89%
Helped initiate CV risk discussions	94%
My patients liked the Wizard	85%

Data

DATA

- Patient Demographics
- Vitals
- Labs
- Allergies
- Prescriptions
- Imaging
- Immunizations
- Procedures
- Diagnosis/Problem list
- Care Episodes
- Visit history
- Family History
- Referrals

DOMAINS

- BP
- A1C
- Lipids
- Smoking
- Aspirin
- Weight
- Opioid Use
- Cancer
- CKD
- Adherence
- Cognitive Impairment
- Pre-diabetes

Current Architecture

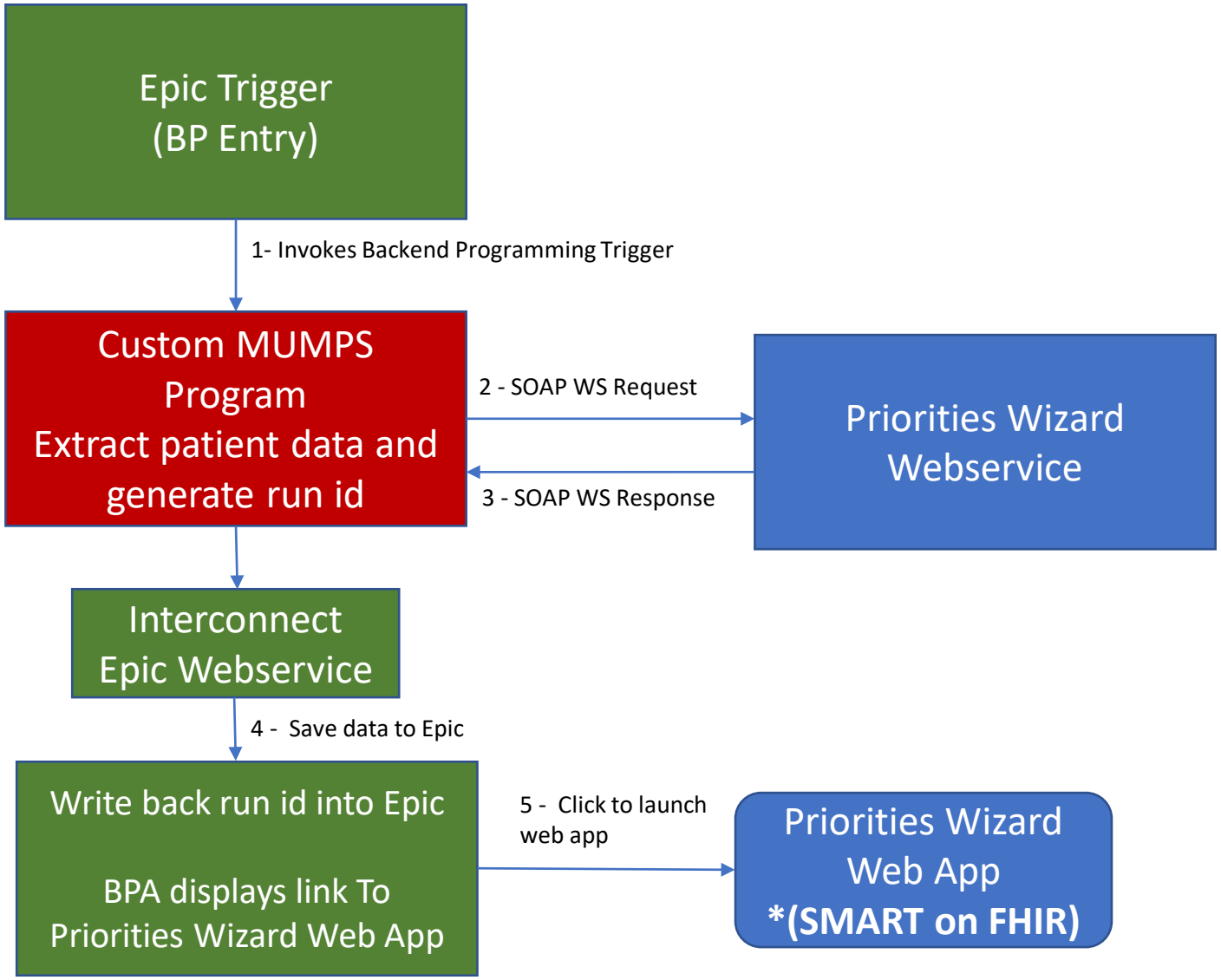
Technology

- Custom code in EHR
- Mapping client specific codes
- Security based on IP Whitelisting and SSL
- Reliance on EHR specific rules
- < 300 ms response time

Challenges

- Limited to Epic
- Long implementation 6-18 months
- Reluctance to maintain custom code
- Not many developers with the skillset at the implementation site

Current Architecture



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FHIR

- CDS Hooks
- SMART on FHIR App Launch
- Writeback
- Standardized code sets

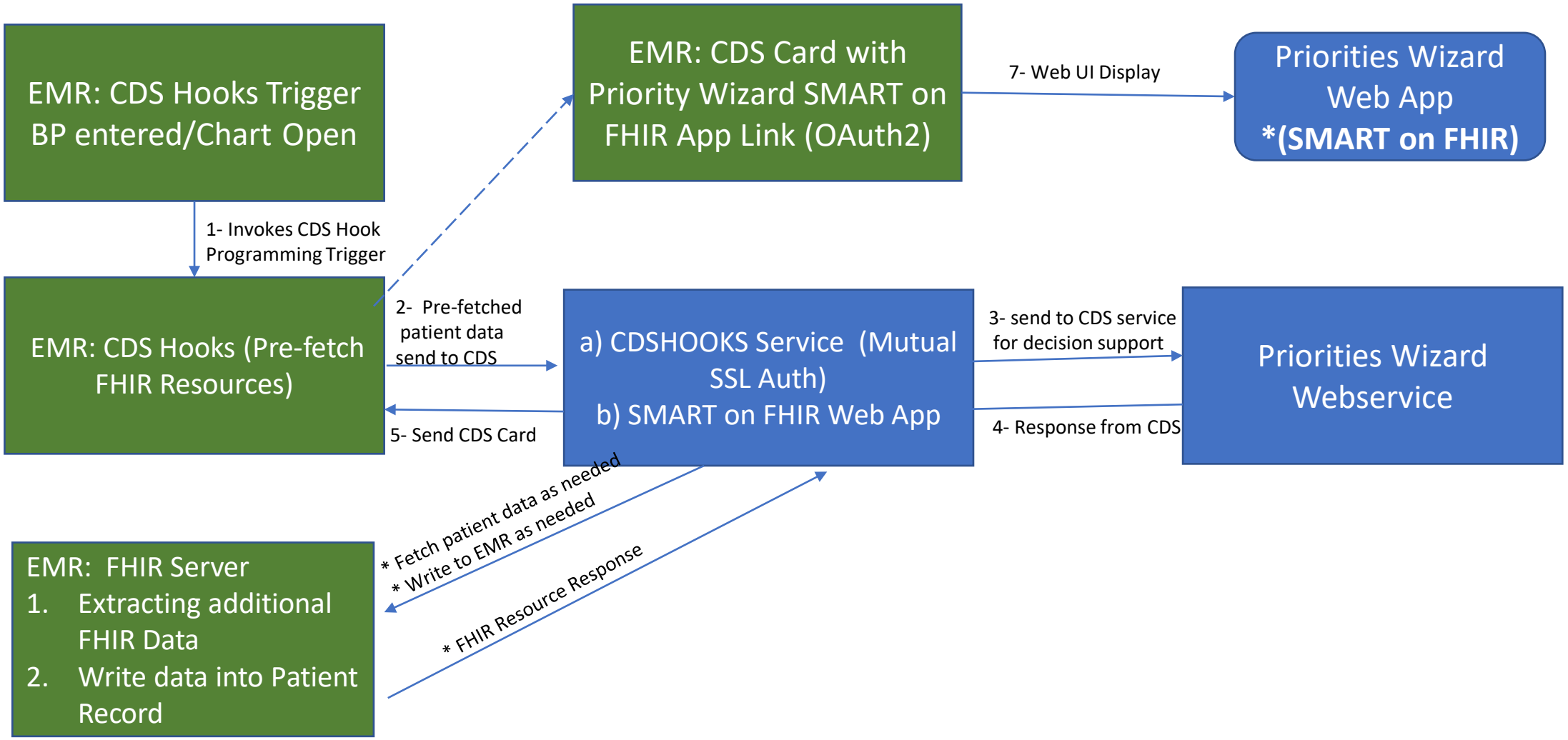
Advantages

- EHR Agnostic
- Quicker implementation
- Less build in the EHR

Challenges

- Limited trigger points
- Limited flexibility (diagnosis, patient data)
- Latency
- Non-standard data is hard to find
- Not all orgs have the code sets implemented uniformly
- Implementation is not standard
- dotPhrase functionality

FHIR



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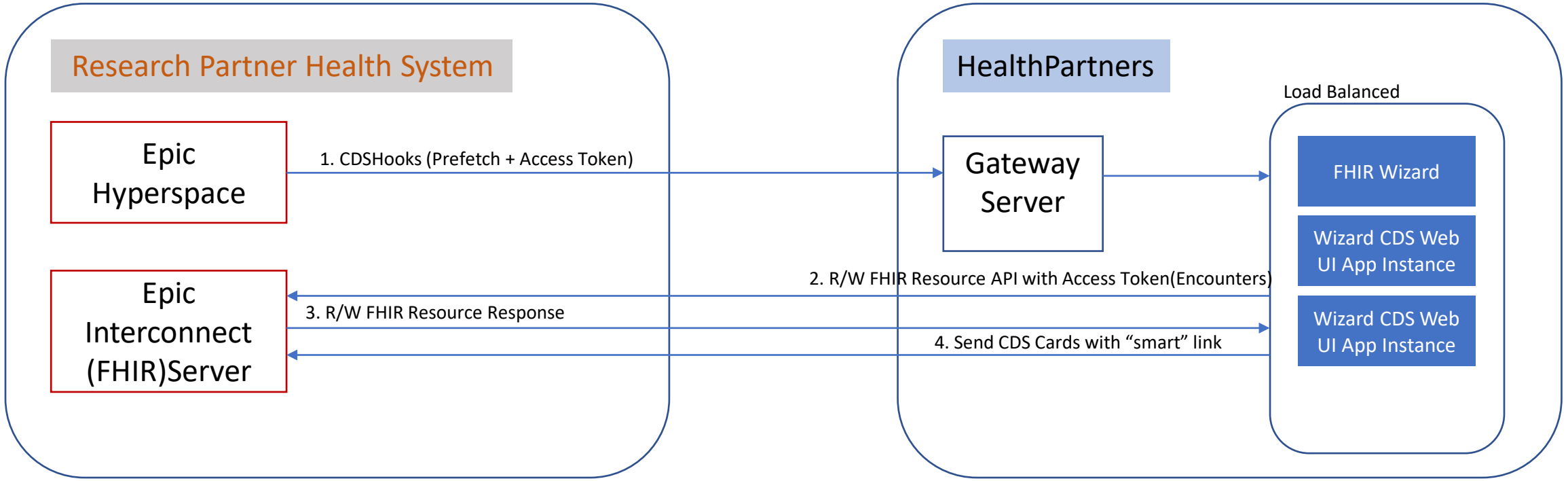
Wizard CDSHooks Launch Design



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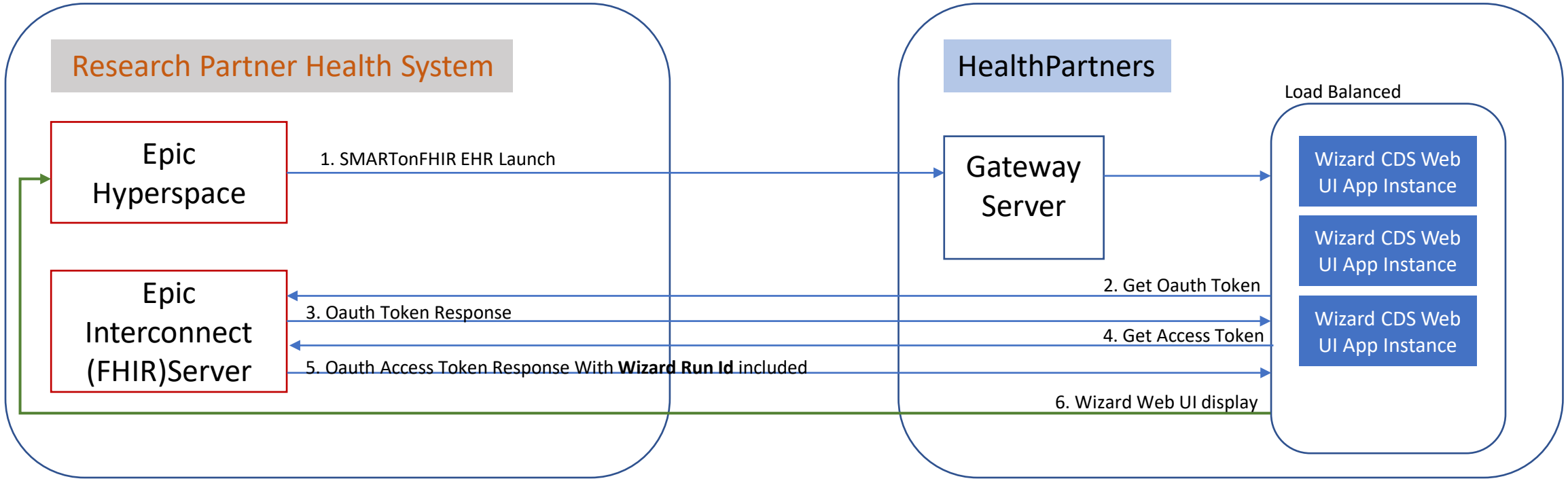
Wizard Web UI SMARTonFHIR Launch Design



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FHIR

Latency

- Huge impact on user experience
- 19 sec vs 300 ms
- Split data extraction to 2 points in time
- Data caching
- Used prefetch

Standard codes

- Some things can only be accessed via URN which changes in each environment and client – eg writeback to flowsheet
- All codes systems are sent back. Makes message heavy

Wish List

- More standard trigger points
- Specify code system
- Prefetch has more search parameters
- Option to limit data in resource
- Option to gather data across encounters
- Search by base name (limitation of LOINC)
- Ask for subset of data

Ongoing Challenges

- **Single Unified Source of Care Priorities: Chronic & Preventive Care**
- **Prioritizing Across Clinical Domains is Challenging**
- **Access and Update via Patient Portal**
- **World-Wide Wizard: Web-based, anybody can input and access**
- **Patient and Clinician Archetypes**
- **Tailor Patient Output to Patient Numeracy, Language, Culture**

Publications

Hauschildt J, Lyon-Scott K, Sheppler CR, Larson AE, McMullen C, Boston D, O'Connor PJ, Sperl-Hillen JM, Gold R. Adoption of shared decision-making and clinical decision support for reducing cardiovascular disease risk in community health centers. JAMIA Open. 2023 Mar 10;6(1):ooad012. doi: 10.1093/jamiaopen/ooad012. PMID: 36909848; PMCID: PMC10005607. https://pubmed.ncbi.nlm.nih.gov/36909848/

Saman DM, Allen CI, Freitag LA, Harry ML, Sperl-Hillen JM, Ziegenfuss JY, Haapala JL, Crain AL, Desai JR, Ohnsorg KA, O'Connor PJ. Clinician perceptions of a clinical decision support system to reduce cardiovascular risk among prediabetes patients in a predominantly rural healthcare system. BMC Med Inform Decis Mak. 2022 Nov 19;22(1):301. doi: 10.1186/s12911-022-02032-z. PMID: 36402988; PMCID: PMC9675125. https://pubmed.ncbi.nlm.nih.gov/36402988/

Rebecca C. Rossom, A. Lauren Crain, Patrick J. O'Connor, Eric Wright, Irina V. Haller, Stephanie A. Hooker, JoAnn M. Sperl-Hillen, Anthony Olson, Katrina Romagnoli, Leif Solberg, Steven P. Dehmer, Jacob Haapala, Caitlin Borgert-Spaniol, Lorraine Tusing, Jule Muegge, Clayton Allen, Heidi Ekstrom, Kristen Huntley, Jennifer McCormack, Gavin Bart. Design of a pragmatic clinical trial to improve screening and treatment for opioid use disorder in primary care. Contemporary Clinical Trials. Volume 124, 2023,107012. https://doi.org/10.1016/j.cct.2022.107012. https://www.sciencedirect.com/science/article/pii/S155171442200338X

Sperl-Hillen JM, Anderson JP, Margolis KL, Rossom RC, Kopski KM, Averbeck BM, Rosner JA, Ekstrom HL, Dehmer SP, O'Connor PJ. Bolstering the Business Case for Adoption of Shared Decision-Making Systems in Primary Care: Randomized Controlled Trial. JMIR Form Res. 2022 Oct 6;6(10):e32666. doi: 10.2196/32666. PMID: 36201392; PMCID: PMC9585448. https://formative.jmir.org/2022/10/e32666

Desai J, Saman D, Sperl-Hillen JM, Pratt R, Dehmer SP, Allen C, Ohnsorg K, Wuorio A, Appana D, Hitz P, Land A, Sharma R, Wilkinson L, Crain AL, Crabtree BF, Bianco J, O'Connor PJ. Implementing a prediabetes clinical decision support system in a large primary care system: Design, methods, and pre-implementation results. Contemp Clin Trials. 2022 Mar;114:106686. doi: 10.1016/j.cct.2022.106686. Epub 2022 Jan 25. PMID: 35091135. https://pubmed.ncbi.nlm.nih.gov/35091135/

Melissa L. Harry, Stephen E. Asche, Laura A. Freitag, JoAnn M. Sperl-Hillen, Daniel M. Saman, Heidi L. Ekstrom, Ella A. Chrenka, Anjali R. Truitt, Clayton I. Allen, Patrick J. O'Connor, Steven P. Dehmer, Joseph A. Bianco & Thomas E. Elliott (2022) Human Papillomavirus vaccination clinical decision support for young adults in an upper midwestern healthcare system: a clinic cluster-randomized control trial, Human Vaccines & Immunotherapeutics, DOI: 10.1080/21645515.2022.2040933. PMID: 35302909 https://www.tandfonline.com/doi/full/10.1080/21645515.2022.2040933

Rossom RC, Crain AL, O'Connor PJ, et al. Effect of Clinical Decision Support on Cardiovascular Risk Among Adults With Bipolar Disorder, Schizoaffective Disorder, or Schizophrenia: A Cluster Randomized Clinical Trial. JAMA Netw Open. 2022;5(3):e220202. doi:10.1001/jamanetworkopen.2022.0202. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2789688

Rossom RC, Hooker SA, O'Connor PJ, Crain AL, Sperl-Hillen JM. Cardiovascular Risk for Patients With and Without Schizophrenia, Schizoaffective Disorder, or Bipolar Disorder. J Am Heart Assoc. 2022 Mar 15;11(6):e021444. doi: 10.1161/JAHA.121.021444. Epub 2022 Mar 9. PMID: 35261265; PMCID: PMC9075298.https://www.ahajournals.org/doi/abs/10.1161/JAHA.121.021444

Elliott TE, Asche SE, O'Connor PJ, et al. Clinical Decision Support with or without Shared Decision Making to Improve Preventive Cancer Care: A Cluster-Randomized Trial. Medical Decision Making. February 2022. doi:10.1177/0272989X221082083. PMID: 35209775 https://journals.sagepub.com/doi/10.1177/0272989X221082083

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Publications

Gold R, Larson AE, Sperl-Hillen JM, Boston D, Sheppler CR, Heintzman J, McMullen C, Middendorf M, Appana D, Thirumalai V, Romer A, Bava J, Davis JV, Yosuf N, Hauschildt J, Scott K, Moore S, O'Connor PJ. Effect of Clinical Decision Support at Community Health Centers on the Risk of Cardiovascular Disease: A Cluster Randomized Clinical Trial. JAMA Netw Open. 2022 Feb 1;5(2):e2146519. doi: 10.1001/jamanetworkopen.2021.46519. PMID: 35119463. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2788645

Pratt R, Saman DM, Allen C, Crabtree B, Ohnsorg K, Sperl-Hillen JM, Harry M, Henzler-Buckingham H, O'Connor PJ, Desai J. Assessing the implementation of a clinical decision support tool in primary care for diabetes prevention: a qualitative interview study using the Consolidated Framework for Implementation Science. BMC Med Inform Decis Mak. 2022 Jan 15;22(1):15. doi: 10.1186/s12911-021-01745-x. PMID: 35033029. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8760770/

Harry ML, Chrenka EA, Freitag LA, Saman DM, Allen CI, Asche SE, Truitt AR, Ekstrom HL, O'Connor PJ, Sperl-Hillen JAM, Ziegenfuss JY, Elliott TE. Primary care clinicians' opinions before and after implementation of cancer screening and prevention clinical decision support in a clinic cluster-randomized control trial: a survey research study. BMC Health Serv Res. 2022 Jan 6;22(1):38. doi: 10.1186/s12913-021-07421-0. PMID: 34991570; PMCID: PMC8739981. https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-021-07421-0

Solberg LI, Hooker SA, Rossom RC, Bergdall A, Crabtree BF. Clinician Perceptions About a Decision Support System to Identify and Manage Opioid Use Disorder. J Am Board Fam Med. 2021 Nov-Dec;34(6):1096-1102. doi: 10.3122/jabfm.2021.06.210126. PubMed PMID: 34772765. https://www.jabfm.org/content/34/6/1096.long

Sperl-Hillen JM, Crain AL, Chumba L, Ekstrom HL, Appana D, Kopski KM, Wetmore JB, Wheeler J, Ishani A, O'Connor PJ. Pragmatic clinic randomized trial to improve chronic kidney disease care: Design and adaptation due to COVID disruptions. Contemp Clin Trials. 2021 Oct;109:106501. doi: 10.1016/j.cct.2021.106501. Epub 2021 Jul 13. PMID: 34271175; PMCID: PMC8276567. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8276567/

Rossom RC, Sperl-Hillen JM, O'Connor PJ, Crain AL, Nightingale L, Pylkas A, Huntley KV, Bart G. A pilot study of the functionality and clinician acceptance of a clinical decision support tool to improve primary care of opioid use disorder. Addict Sci Clin Pract. 2021 Jun 15;16(1):37. doi: 10.1186/s13722-021-00245-7. PMID: 34130758; PMCID: PMC8207778. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8207778/

Saman DM, Harry ML, Freitag LA, Allen CI, O'Connor PJ, Sperl-Hillen JM, Bianco JA, Truitt AR, Ekstrom HL, Elliott TE. Patient Perceptions of Using Clinical Decision Support for Cancer Screening and Prevention: "I wouldn't have thought about getting screened without it.". J Patient Cent Res Rev. 2021 Oct 18;8(4):297-306. doi: 10.17294/2330-0698.1863. PMID: 34722797; PMCID: PMC8530236. https://pubmed.ncbi.nlm.nih.gov/34722797/

Saman DM, Chrenka EA, Harry ML, Allen CI, Freitag LA, Asche SE, Truitt AR, Ekstrom HL, O'Connor PJ, Sperl-Hillen JM, Ziegenfuss JY, Elliott TE. The impact of personalized clinical decision support on primary care patients' views of cancer prevention and screening: a cross-sectional survey. BMC Health Serv Res. 2021 Jun 21;21(1):592. doi: 10.1186/s12913-021-06551-9. PMID: 34154588; PMCID: PMC8215810. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8215810/

Elliott TE, O'Connor PJ, Asche SE, Saman DM, Dehmer SP, Ekstrom HL, Allen CI, Bianco JA, Chrenka EA, Freitag LA, Harry ML, Truitt AR, Sperl-Hillen JM. Design and rationale of an intervention to improve cancer prevention using clinical decision support and shared decision making: a clinic-randomized trial. Contemp Clin Trials. 2021 Jan 24;102:106271. PMID: 33503497. DOI: 10.1016/j.cct.2021.106271. https://www.sciencedirect.com/science/article/pii/S1551714421000070?via%3Dihub

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Publications

Gold R, Middendorf M, Heintzman J, Nelson J, O'Connor P, Sperl-Hillen J, Appana D, Geissal E, Thirumalai V, Sheppler C, Dunne M. Challenges involved in establishing a web-based clinical decision support tool in community health centers. Healthc (Amst). 2020 Dec;8(4):100488. doi: 10.1016/j.hjdsi.2020.100488. Epub 2020 Oct 22. PMID: 33132174; PMCID: PMC7680381. https://pubmed.ncbi.nlm.nih.gov/33132174/

Harry ML, Saman DM, Truitt AR, Allen CI, Walton KM, O'Connor PJ, Ekstrom HL, Sperl-Hillen JM, Bianco JA, Elliott TE. Pre-implementation adaptation of primary care cancer prevention clinical decision support in a predominantly rural healthcare system. BMC Med Inform Decis Mak. 2020 Jun 23;20(1):117. doi: 10.1186/s12911-020-01136-8. PMID: 32576202; PMCID: PMC7310565. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7310565/

Dehmer SP, Sinaiko AR, Trower NK, Asche SE, Ekstrom HL, Nordin JD, O'Connor PJ, Kharbanda EO. Clinical Decision Support for Recognizing and Managing Hypertensive Blood Pressure in Youth: No Significant Impact on Medical Costs. Acad Pediatr. 2020 Aug;20(6):848-856. doi: 10.1016/j.acap.2020.01.011. Epub 2020 Jan 28. PMID: 32004709; PMCID: PMC7872738. https://pubmed.ncbi.nlm.nih.gov/32004709/

Rossom RC, O'Connor PJ, Crain AL, Waring S, Ohnsorg K, Taran A, Kopski K, Sperl-Hillen JM. Pragmatic trial design of an intervention to reduce cardiovascular risk in people with serious mental illness. Contemp Clin Trials. 2020 Apr;91:105964. doi: 10.1016/j.cct.2020.105964. Epub 2020 Feb 20. PMID: 32087336; PMCID: PMC7263956. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7263956/

O'Connor PJ, Sperl-Hillen JM. Current Status and Future Directions for Electronic Point-of-Care Clinical Decision Support to Improve Diabetes Management in Primary Care. Diabetes Technol Ther. 2019 Jun;21(S2):S226-S234. doi: 10.1089/dia.2019.0070. PMID: 31169426.

Harry, Melissa L, Anjali R Truitt, Daniel M Saman, Hillary A Henzler-Buckingham, Clayton I Allen, Kayla M Walton, Heidi L Ekstrom, Patrick J O'Connor, JoAnn M Sperl-Hillen, and Joseph A Bianco. 2019. 'Barriers and facilitators to implementing cancer prevention clinical decision support in primary care: a qualitative study', BMC Health Serv Res, 19: 534. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6668099/

Saman, Daniel M., Kayla M. Walton, Melissa L. Harry, Stephen E. Asche, Anjali R. Truitt, Hillary A. Henzler-Buckingham, Clayton I. Allen, Heidi L. Ekstrom, Patrick J. O'Connor, JoAnn M. Sperl-Hillen, Jeanette Y. Ziegenfuss, Joseph A. Bianco, and Thomas E. Elliott. 2019. 'Understanding primary care providers' perceptions of cancer prevention and screening in a predominantly rural healthcare system in the upper Midwest', BMC Health Serv Res, 19: 1019. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6937782/

Sperl-Hillen, JoAnn M, Rebecca C Rossom, Elyse O Kharbanda, Rachel Gold, Erik D Geissal, Thomas E Elliott, Jay R Desai, D Brad Rindal, Daniel M Saman, and Stephen C Waring. 2019. 'Priorities wizard: multisite web-based primary care clinical decision support improved chronic care outcomes with high use rates and high clinician satisfaction rates', eGEMs, 7. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6450247/

Kharbanda, EO and Ekstrom HL. Recognizing childhood and adolescent hypertension: A new clinical decision support tool. Minnesota Physician, Volume XXXIII, No 6, September 2019. http://mppub.com/mp-s4-0919.html

Kharbanda EO, Asche SE, Sinaiko A, et al. Improving hypertension recognition in adolescents, a small but important first step in cardiovascular disease prevention. Academic Pediatrics. Academic Peds Progress Report. Aug 2019. DOI: https://doi.org/10.1016/j.acap.2019.08.010 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7032989/

Kharbanda EO, Asche SE, Dehmer SP, et al. Impact of updated pediatric hypertension guidelines on progression from elevated blood pressure to hypertension in a community-based primary care population. J Clin Hypertens. 2019; 21:560–565. https://doi.org/10.1111/jch.13539

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Publications

Kharbanda EO, Asche SE, Sinaiko AR, Ekstrom HL, Nordin JD, Sherwood NE, Fontaine PL, Dehmer SP, Appana D, O'Connor P. Clinical Decision Support for Recognition and Management of Hypertension: A Randomized Trial. Pediatrics. 2018 Feb; 141(2):e20172954. doi: 10.1542/peds.2017-2954. PubMed PMID: 29371241; PubMed Central PMCID: PMC5810603. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5810603/

Kharbanda EO, Asche SE, Sinaiko A, Nordin JD, Ekstrom HL, Fontaine P, Dehmer SP, Sherwood NE, O'Connor PJ. Evaluation of an Electronic Clinical Decision Support Tool for Incident Elevated BP in Adolescents. Acad Pediatr. 2018 Jan-Feb;18(1):43-50. doi: 10.1016/j.acap.2017.07.004. Epub 2017 Jul 16. PubMed PMID: 28723587; PubMed Central PMCID: PMC5756693. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5756693/

Sperl-Hillen JM, Crain AL, Margolis KL, Ekstrom HL, Appana D, Amundson G, Sharma R, Desai JR, O'Connor PJ. Clinical decision support directed to primary care patients and providers reduces cardiovascular risk: a randomized trial. J Am Med Inform Assoc. 2018 Sep 1;25(9):1137-1146. doi: 10.1093/jamia/ocy085. PMID: 29982627; PMCID: PMC6658854. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6658854/

Kharbanda EO, Nordin JD, Sinaiko AR, Ekstrom HL, Stultz JM, Sherwood NE, Fontaine PL, Asche SE, Dehmer SP, Amundson JH, Appana DX, Bergdall AR, Hayes MG, O'Connor PJ. TeenBP: Development and Piloting of an EHR-Linked Clinical Decision Support System to Improve Recognition of Hypertension in Adolescents. EGEMS (Wash DC). 2015 Jul 9;3(2):1142. PMCID: PMC4537153. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4537153/

Desai JR, Pawloski PA, Sperl-Hillen JM, O'Connor PJ. Personalized and prioritized diabetes treatment recommendations to reduce cardiovascular risk. Diabetes Manage. 2014;4(2):105-8. https://www.openaccessjournals.com/articles/personalized-and-prioritized-diabetes-treatment-recommendations-to-reduce-cardiovascular-risk.pdf

Desai JR, Sperl-Hillen JM, O'Connor PJ. Patient preferences in diabetes care: overcoming barriers using new strategies. J Comp Eff Res. 2013 Jul;2(4):351-4. https://www.futuremedicine.com/doi/10.2217/cer.13.36

O'Connor PJ, Desai JR, Butler JC, Kharbanda EO, Sperl-Hillen JM. Current status and future prospects for electronic point-of-care clinical decision support in diabetes care. Curr Diab Rep. 2013 Apr;13(2):172-6. PMCID: PMC3595375. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3595375/

Gilmer TP, O'Connor PJ, Sperl-Hillen JM, Rush WA, Johnson PE, Amundson GH, Asche SE, Ekstrom HL. Cost-effectiveness of an electronic medical record based clinical decision support system. Health Serv Res. 2012 Dec;47(6):2137-58. PMCID: PMC3459233. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3459233/

O'Connor P. Opportunities to Increase the Effectiveness of EHR-Based Diabetes Clinical Decision Support. Appl Clin Inform. 2011 Aug 31;2(3):350-4. PMCID: PMC3631926. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3631926/

O'Connor PJ, Sperl-Hillen JM, Rush WA, Johnson PE, Amundson GH, Asche SE, Ekstrom HL, Gilmer TP. Impact of electronic health record clinical decision support on diabetes care: a randomized trial. Ann Fam Med. 2011 Jan-Feb;9(1):12-21. PMCID: PMC3022040. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3022040/

Sperl-Hillen JM, Amundson JH, O'Connor PJ, Ekstrom HL, Rush WA. Outpatient EHR-Based Diabetes Clinical Decision Support that Works: Lessons Learned from Implementing Diabetes Wizard. Diabetes Spectr. 2010 Jul;23(3):150-4. https://diabetesjournals.org/spectrum/article/23/3/150/32023/Outpatient-EHR-Based-Diabetes-Clinical-Decision

HealthPartners® Institute

Thank you!

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From Evidence to Practice

Shareable CDS and CDS Hooks for Workflow Integration

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Outline

- Guidelines vs. clinical decision support
- Shareable and executable guidelines
- Workflow integration
- Maintenance

Yale New Haven **Health** & Yale School of Medicine

$6.7B
revenue*

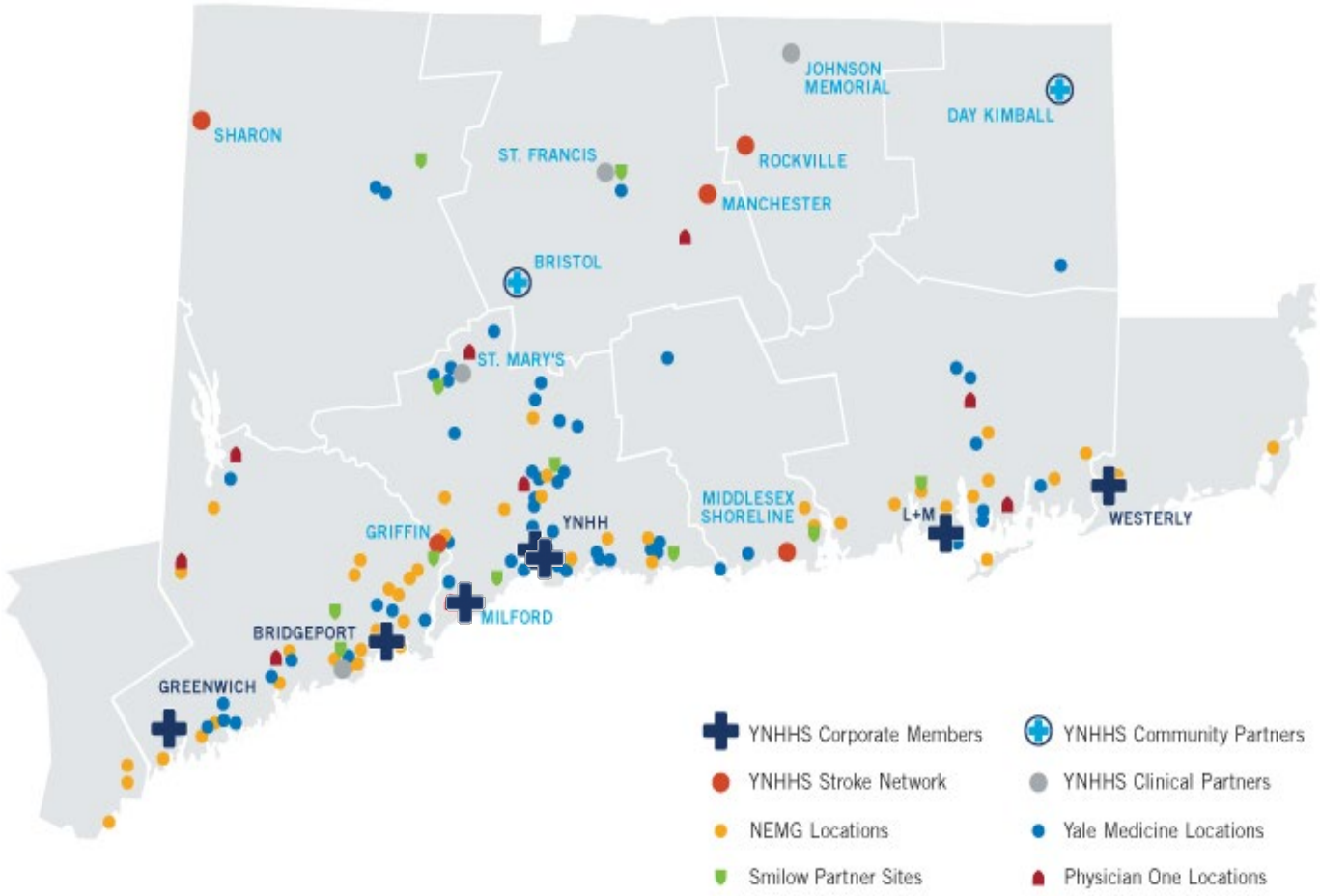
2,681
beds

271
care sites

7
hospital campuses

7,113
medical staff

26,000
employees



462,998
ED visits

172,105
inpatient admits

2.7M
ambulatory encounters

2,021 active research studies

691,930
unique patients FY19

MAGNET RECOGNIZED
AMERICAN NURSES CREDENTIALING CENTER

BEST HOSPITALS
U.S.News RANKINGS

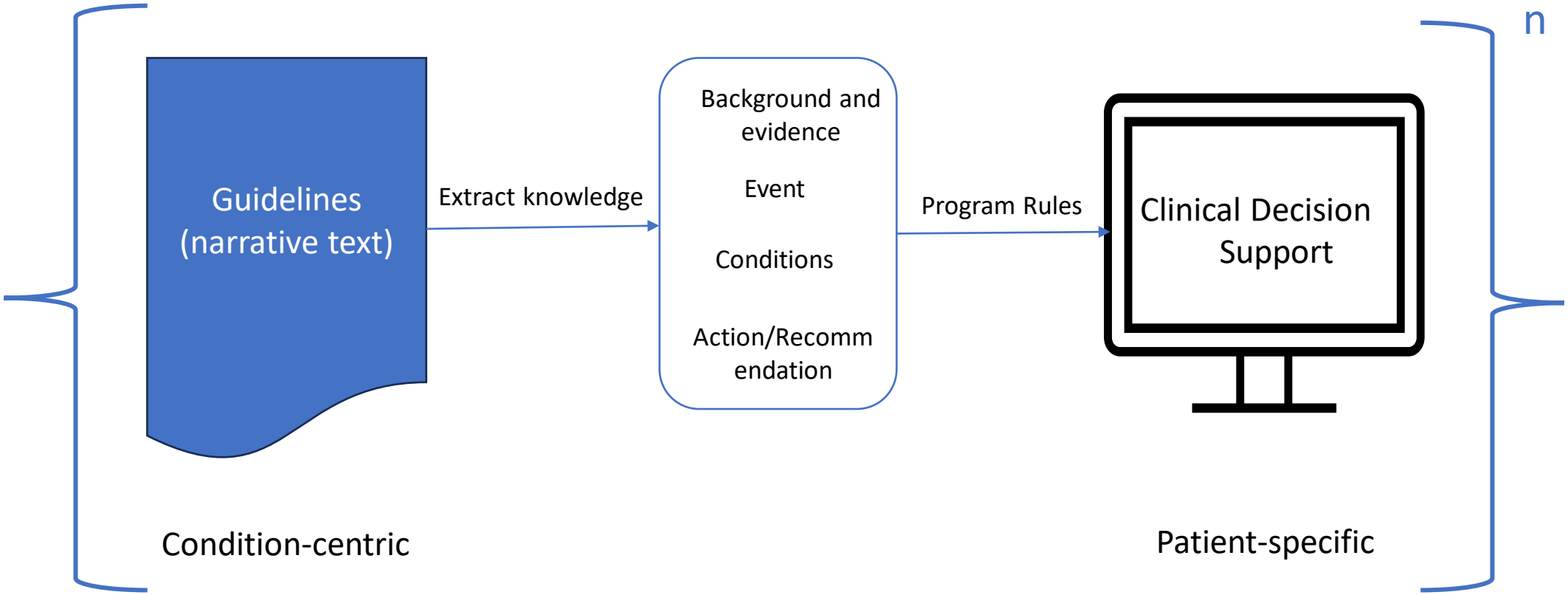
HIMSS Analytics
STAGE 7

CHIME
HealthCare's most wired

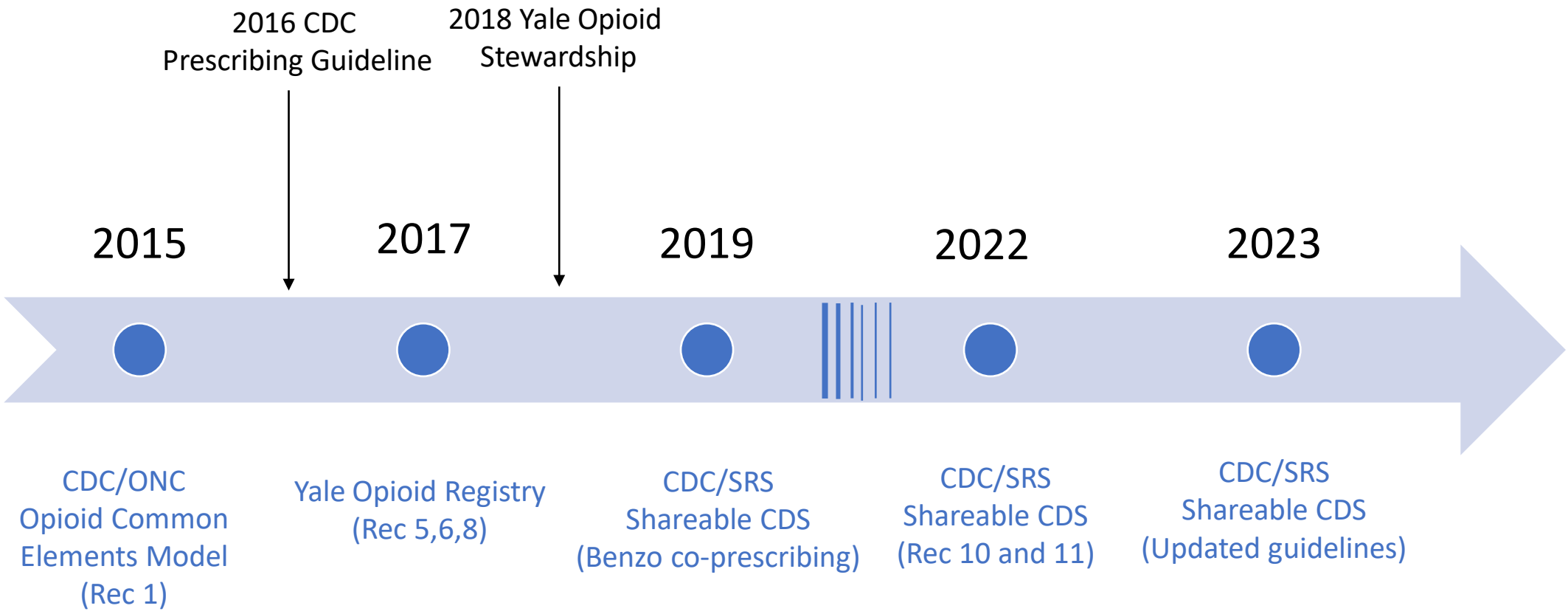
HIMSS
Davies Award

HEALTHCARE EQUALITY INDEX
LGBTQ HEALTHCARE EQUALITY
2019
LEADER

Guidelines vs. clinical decision support



Yale Opioid Decision Support Journey



CDC Clinical Practice Guideline for Prescribing Opioids for Pain

Determining when to initiate or continue opioids for chronic pain
1. Nonpharmacologic and Nonopioid Pharmacologic Therapy Consideration
2. Opioid Therapy Goals Discussion
3. Opioid Immediate Release Form When Starting Opioid Therapy

Opioid selection, dosage, duration, follow-up, and discontinuation
4 and 5 - Lowest Effective Dose
6. Prescribe Lowest Effective Dose and Duration
7. Opioid Therapy Risk Assessment

Assessing risk and addressing harms
8. Naloxone Consideration
9. Consider Patient's History of Controlled Substance Prescriptions
10. Urine Drug Testing
11. Concurrent Use of Opioids and Benzodiazepines
12. Evidence-based Treatment for Patients with Opioid Use Disorder

FHIR Implementation guide provides detailed documentation of logic, build and pilot experiences

https://build.fhir.org/ig/cqframework/opioid-cds-r4/documentation.html

Pilot Shareable and Executable Logic

Overall Goal
Provide point-of-care support for CDC Guideline for Prescribing Opioids for Chronic Pain

Sponsor: CDC
Contributors: ONC, AHRQ, Yale, Indiana University, Duke, Security Risk Solutions, Epic, Cerner, and many others.

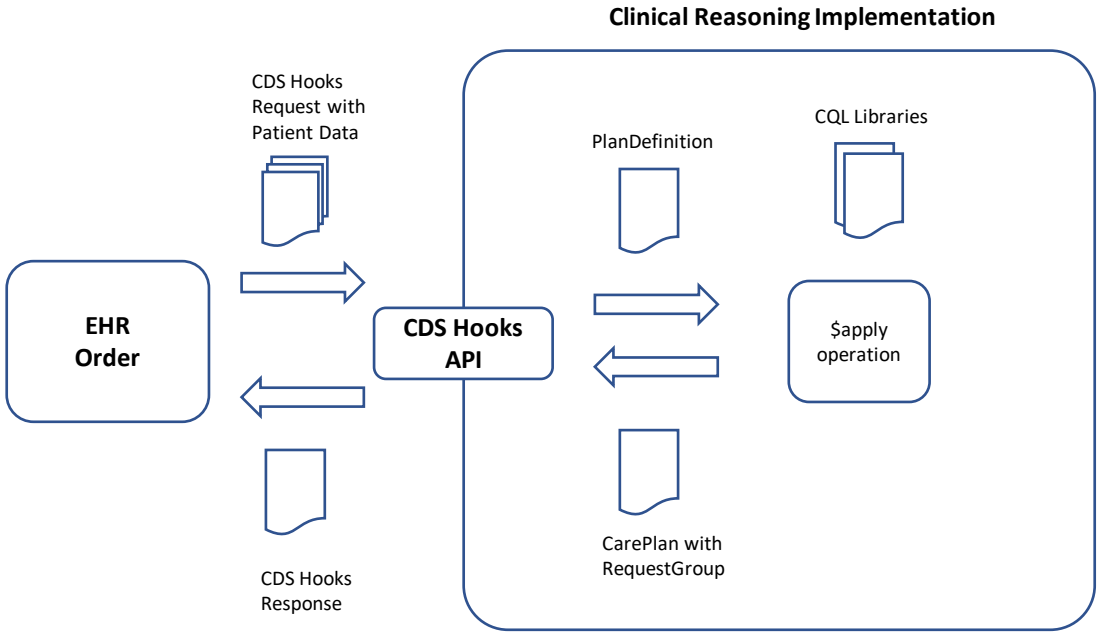
Approach
Leverage health IT standards for representing clinical knowledge & integrating into EHRs

Yale Pilot Purpose
To evaluate the feasibility clinical reasoning module and CDS Hooks in EHR

Yale Pilot Scope
Clinical reasoning module (CQF Ruler) developed centrally, deployed locally
Use CDS Hooks from Yale's Epic instance to connect to CQF Ruler and trigger CDS.

Prime Order Number: HHSP233201800320G

CDS Hooks Set Up



Epic EMR setup

Create Best Practice Alert (BPA) criteria rules

Link BPA to created CDS Hooks web service

Epic Interconnect Setup

Create an Epic Interconnect queue

Setup an E0A Record

Local implementation of CQF-Ruler

Provision dedicated server (VM) per CQF-Ruler requirements
* inside YNHH DMZ network

Setup a backup routine

Validate external access to CQF-Ruler server

Setup the enviroment to support CQF-Ruler

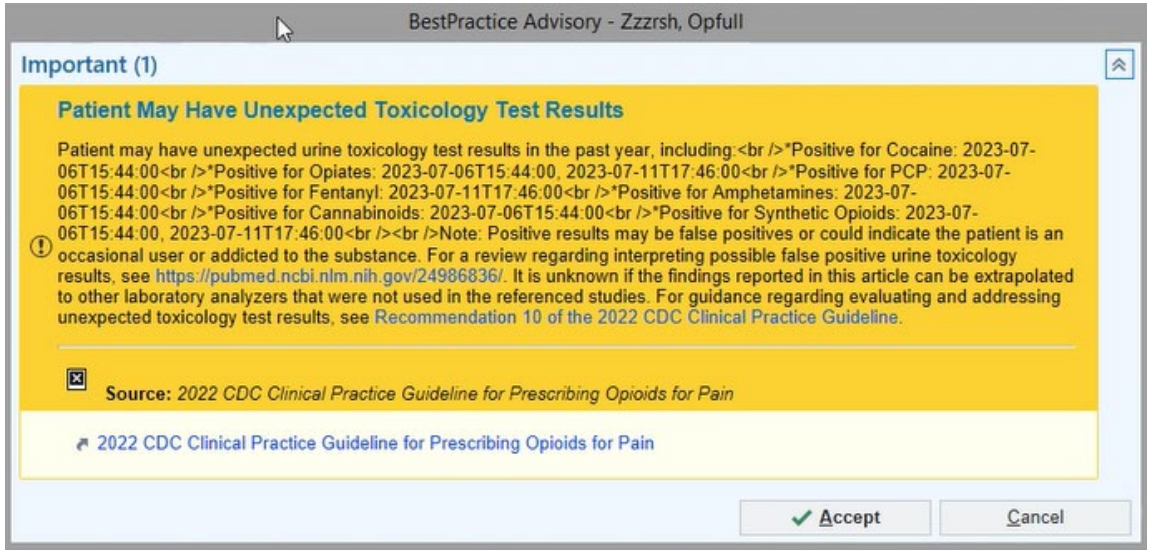
Install CQF-Ruler and required dependencies

Internal validation of CQF-Ruler installation

Rec. 10 CDS Alert Displays

- CDS alert displays when prescriber signs order for opioid AND
  no urine drug screen results are available in last one year
- Recommends user order urine drug screen
- Link to CDC opioid prescribing guideline
- Urine drug screen order is pre-selected to be placed when alert is accepted.

- Moved to 2022 guidelines
- Additional logic to include alert for **unexpected UDS result:** Cocaine, PCP, Opiates, Fentanyl, Synthetic opioids, Amphetamine, THC



https://www.cdc.gov/opioids/healthcare-admins/ehr/cmio.html

Lessons Learned

1. Packaging test patients and script in CQF instruction reduces local time
2. The depth of local skills and time commitment needed is reduced.
3. Multiple systems undergoing asynchronous upgrades adds to the complexity.
4. Vendor and SME engagement is critical for early progress.
5. CDS Hooks is emerging standard. Will continue to mature.
6. Knowledge updates reviewed and developed centrally. Local focus on retesting and performance assessment.

Shareable CDS can reduce time taken to deploy CDS
>> expedite guideline adoption.

Discussion

Office of the National Coordinator for Health Information Technology

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