

Health Information Technology for Quality Improvement



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Outline

- The Promise of EHRs
- Failure to achieve expectations
- Maturation of the field
- Tools for Quality Improvement
- What can we do

The Promise of EHRs

Computers in Medicine: Artificial Intelligence

- MYCIN (1975)
 - Shortliffe, Edward H., et al. "Computer-based consultations in clinical therapeutics: explanation and rule acquisition capabilities of the MYCIN system." *Computers and biomedical research* 8.4 (1975): 303-320. [↗](#)
 - Used the clinical decision criteria of experts to advise physicians regarding **selection of empiric antimicrobial therapy** for hospital patients with bacterial infections based on clinical and historical criteria
- Oncocin (1981)
 - Shortliffe, Edward H., et al. "Oncocin: An expert system for oncology protocol management." *Proceedings of the Seventh IJCAI*, 1981, pp. 876-881. [↗](#)
 - A **cancer chemotherapy planning** program which used the patient's past treatment history to generate a therapy plan
- Internist-1 (1982)
 - Miller, Randolph A., Harry E. Pople Jr, and Jack D. Myers. "Internist-1, an experimental computer-based diagnostic consultant for general internal medicine." *The New England journal of medicine* 307.8 (1982): 468. [↗](#)
 - A computer program capable of making multiple and complete diagnoses in internal medicine
 - Would be given a set of symptoms and lab reports, the computer **made a differential diagnosis and asked pointed questions to narrow the possibilities** until a diagnosis was reached.
 - Its performance on a series of 19 clinicopathological exercises published in the Journal appeared qualitatively similar to that of the hospital clinicians but inferior to that of the case discussants.

Health Information Technology (HIT) Improves Care (1993 – 1994)

- Tierney, William M., et al. “Physician inpatient order writing on microcomputer workstations.” *JAMA: the journal of the American Medical Association* 269.3 (1993): 379-383. [↗](#)
 - **Charges that were 12.7%** lower per admission
 - A mean length of stay was 0.89 day shorter
- Evans, R. Scott, et al. “Improving empiric antibiotic selection using computer decision support.” *Archives of Internal Medicine* 154.8 (1994): 878. [↗](#)
 - a **17% better** antibiotic drug regimen suggested by a computer consultant vs. a physician

CPOE Decreases Medication Errors (1998 – 1999)

- Evans, R. Scott, et al. “A computer-assisted management program for antibiotics and other anti-infective agents.” *New England Journal of Medicine* 338.4 (1998): 232-238. [↗](#)
 - Faster retrieval of relevant patient-specific information 14 minutes vs. 3.5 seconds
 - **Reductions:**
 - 70% Adverse Drug Events (ADEs),
 - 76% in reported allergies
 - 79% Excess drug dosages,
 - 94% Antibiotic-susceptibility mismatches
- Bates, David W., et al. “Effect of computerized physician order entry and a team intervention on prevention of serious medication errors.” *JAMA: the journal of the American Medical Association* 280.15 (1998): 1311-1316. [↗](#)
 - a **55% decrease in serious medication errors**
- Bates, David W., et al. “The impact of computerized physician order entry on medication error prevention.” *Journal of the American Medical Informatics Association* 6.4 (1999): 313-321. [↗](#)
 - 3 years subsequent: an **86% decrease in non intercepted serious medication errors** ($P<.001$ for both)

Early Studies: CPOE Decreases Medication Errors (1998 – 2001)

- Overhage, J. Marc, et al. “A randomized trial of “corollary orders” to prevent errors of omission.” *Journal of the American Medical Informatics Association* 4.5 (1997): 364-375.[↗](#)
 - Greater than **25% improvement in the rates of corollary orders** with implementation of computerized reminders.
- Teich, Jonathan M., et al. “Effects of computerized physician order entry on prescribing practices.” *Archives of Internal Medicine* 160.18 (2000): 2741.[↗](#)
 - Demonstrated **5 prescribing improvements** in types, doses, and frequencies of drug use with the implementation of computerized clinical decision support
- Chertow, Glenn M., et al. “Guided medication dosing for inpatients with renal insufficiency.” *JAMA: the journal of the American Medical Association* 286.22 (2001): 2839-2844.[↗](#)
 - Demonstrated a **13% decrease in inappropriate dose and a 24% decrease in inappropriate frequency** for nephrotoxic drugs in patients with renal insufficiency ($P < .001$ for both).

Continued Evidence of CPOE Benefits

Pre/Post Intervention Studies (2002-2004)

- Mekhjian, Hagop S., et al. “Immediate benefits realized following implementation of physician order entry at an academic medical center.” *Journal of the American Medical Informatics Association* 9.5 (2002): 529-539. [↗](#)
 - A 64% improvement in medication **turn-around times**, 43% in radiology procedure completion times, and 25% in laboratory result reporting times
- Potts, Amy L., et al. “Computerized physician order entry and medication errors in a pediatric critical care unit.” *Pediatrics* 113.1 (2004): 59-63. [↗](#)
 - An overall **error reduction of 95.9%** with ADEs reduced by 40.9%, Medication prescribing errors reduced by 99.4% and rule violations reduced by 97.9%.

Continued Evidence of CPOE Benefits Pre/Post Intervention Studies (2005-2007)

- Kucher, Nils, et al. “Electronic alerts to prevent venous thromboembolism among hospitalized patients.” *New England Journal of Medicine* 352.10 (2005): 969-977. [↗](#)
 - **Reduced risk of deep-vein thrombosis** or pulmonary embolism at 90 days by 41%
- Holdsworth, Mark T., et al. “Impact of computerized prescriber order entry on the incidence of adverse drug events in pediatric inpatients.” *Pediatrics* 120.5 (2007): 1058-1066. [↗](#)
 - A 43% reduction in preventable ADEs and **63% reduction in potential ADEs**

Health Information Technology and Quality, Efficiency and Cost (2006)

- Wu, Shinyi, et al. “Systematic review: impact of health information technology on quality, efficiency, and costs of medical care.” *Annals of internal medicine* 144.10 (2006): 742-752. [↗](#)
- 257 studies met the inclusion criteria of which 25% were from 4 academic institutions with internally developed systems
 - Brigham and Women's Hospital in Boston
 - LDS Hospital in Salt Lake City
 - Vanderbilt University Medical Center in Nashville
 - The Regenstrief Institute in Indianapolis
- Those 4 institutions (and only those 4) demonstrated
 - Benefits on quality:
 - Benefit of outcome improvement
 - Efficiency benefit

Failure to achieve expectations

EHRs: Problems with Commercial Installations (2005 – 2007)

- Han YY, Carcillo JA, Venkataraman ST, et al. Unexpected increased mortality after implementation of a commercially sold computerized physician order entry system. *Pediatrics*. 2005;116(6):1506–1512 [↗](#)
 - The rapid implementation of a **minimally modified, commercially available CPOE system** in a pediatric critical care unit was associated with an **increase in mortality rate** for children admitted via interfacility transport over a 5-month period.
- Linder, Jeffrey A., et al. “Electronic health record use and the quality of ambulatory care in the United States.” *Archives of Internal Medicine* 167.13 (2007): 1400-1405. [↗](#)
 - Evaluated 50,000 patient records from over 1500 physician practices in 2003 and 2004 and found: “As implemented, EHRs were **not associated with better quality** ambulatory care.”

Continued Lack of Evidence (2011)

- Romano, Max J., and Randall S. Stafford. "Electronic health records and clinical decision support systems: impact on national ambulatory care quality." *Archives of internal medicine* 171.10 (2011): 897.
 - Used data from the National Ambulatory Medical Care Survey (NAMCS, 2005-2007) and the National Hospital Ambulatory Medical Care Survey (NHAMCS, 2005-2007) to examined the impact of EHRs on outpatient care and found that **neither EHRs nor CDS was associated with ambulatory care quality** [↗](#)
- Black, Ashly D., et al. "The impact of eHealth on the quality and safety of health care: a systematic overview." *PLoS Medicine* 8.1 (2011): e1000387. [↗](#)
 - Identified systematic reviews published between 1997 and 2010 that focused on assessing the impact of eHealth interventions on the quality and/or safety. The technologies were: storing, managing, and transmission of data, clinical decision support and facilitating care from a distance
 - Despite support from policymakers, there was relatively **little empirical evidence to substantiate many of the positive claims** made in relation to these technologies.

Discussion

Maturation of the Field

Local Customization of CPOE Improves Quality (2010 – 2012)

- Longhurst, Christopher A., et al. “Decrease in hospital-wide mortality rate after implementation of a commercially sold computerized physician order entry system.” *Pediatrics* 126.1 (2010): 14-21. [↗](#)
 - Pre and Post implementation of a locally modified CPOE and electronic nursing documentation system at quaternary care academic children's hospital demonstrated a monthly adjusted **mortality rate decreased by 20%**
- Bright, Tiffani J., et al. “Effect of clinical decision-support systems: a systematic review.” *Annals of internal medicine* 157.1 (2012): 29-43. [↗](#)
 - A review of 148 randomized, controlled trials of electronic CDSSs implemented in clinical settings, used at the point of care and reported either clinical, health care process, workload, relationship-centered, economic, or provider use outcomes.
 - Both **commercially and locally developed clinical decision-support systems (CDSSs) showed statistical significance in improved health care process measures** related to performing preventive services, ordering clinical studies and prescribing therapies across diverse settings.

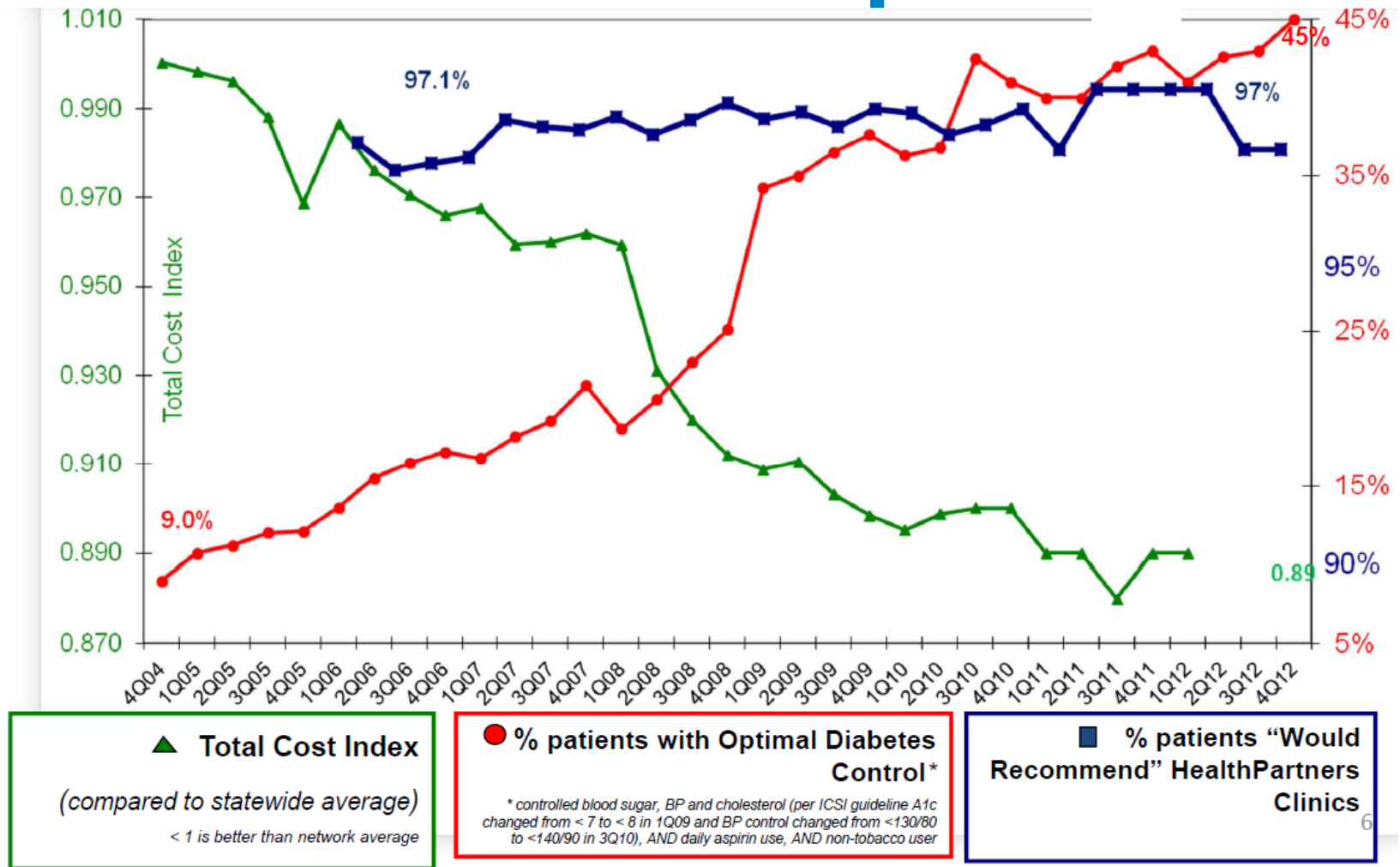
EHRs and Ambulatory Quality (2012)

- Kern, Lisa M., et al. "Electronic Health Records and Ambulatory Quality of Care." *Journal of General Internal Medicine* (2012): 1-8. [↗](#)
 - Study compared physicians using EHRs to physicians using paper
 - EHRs were associated with significantly higher quality of care for hemoglobin A1c testing in diabetes, breast cancer screening, chlamydia screening and colorectal cancer screening
 - When all nine measures were combined into a composite, EHR use was associated with **statistically significant higher quality of care**
- Reed, M., et al. "Outpatient electronic health records and the clinical care and outcomes of patients with diabetes mellitus." *Annals of internal medicine* 157.7 (2012): 482. [↗](#)
 - Statistically significant improvements in treatment intensification after HbA1c $\geq 9\%$ or LDL-C values of 100 to 129 mg/dL
 - **Statistically significant reductions in HbA1c and LDL-C levels**, with the largest reductions among patients with the worst control

Studies in reaction to “Meaningful Use” 2012

- Buntin, Melinda Beeuwkes, et al. “The benefits of health information technology: a review of the recent literature shows predominantly positive results.” *Health Affairs* 30.3 (2011): 464-471. [↗](#)
 - 92% of the recent articles on HIT reached overall positive conclusions
 - Benefits only beginning to emerge
 - Provider dissatisfaction remains a problem
- Cebul, Randall D., et al. “Electronic health records and quality of diabetes care.” *New England Journal of Medicine* 365.9 (2011): 825-833. [↗](#)
 - Data for 27,207 diabetic adults seen at 46 practices
 - Statistically significant improvement in diabetes care, outcomes and annal improvement

HealthPartners' Experience



Source: Alan Abramson, MN eHealth Conference May 2013

<http://www.health.state.mn.us/e-health/summit/summit2013/s2013plenary2abramson.pdf>

Tools for Quality Improvement

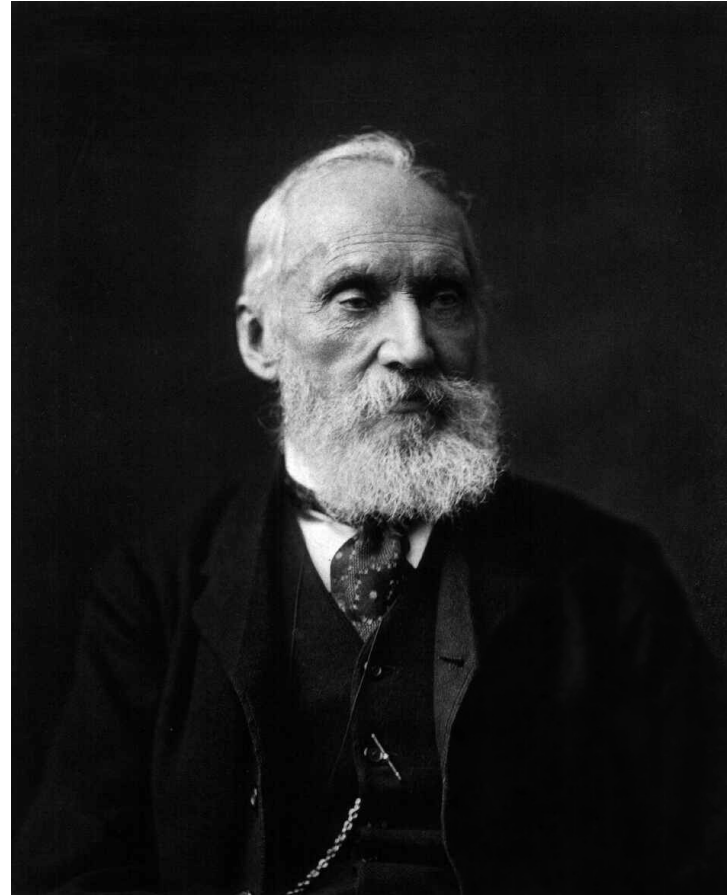
Minnesota

- ...where all the women are strong, all the men are good-looking, and all the children are above average
- But how do we know



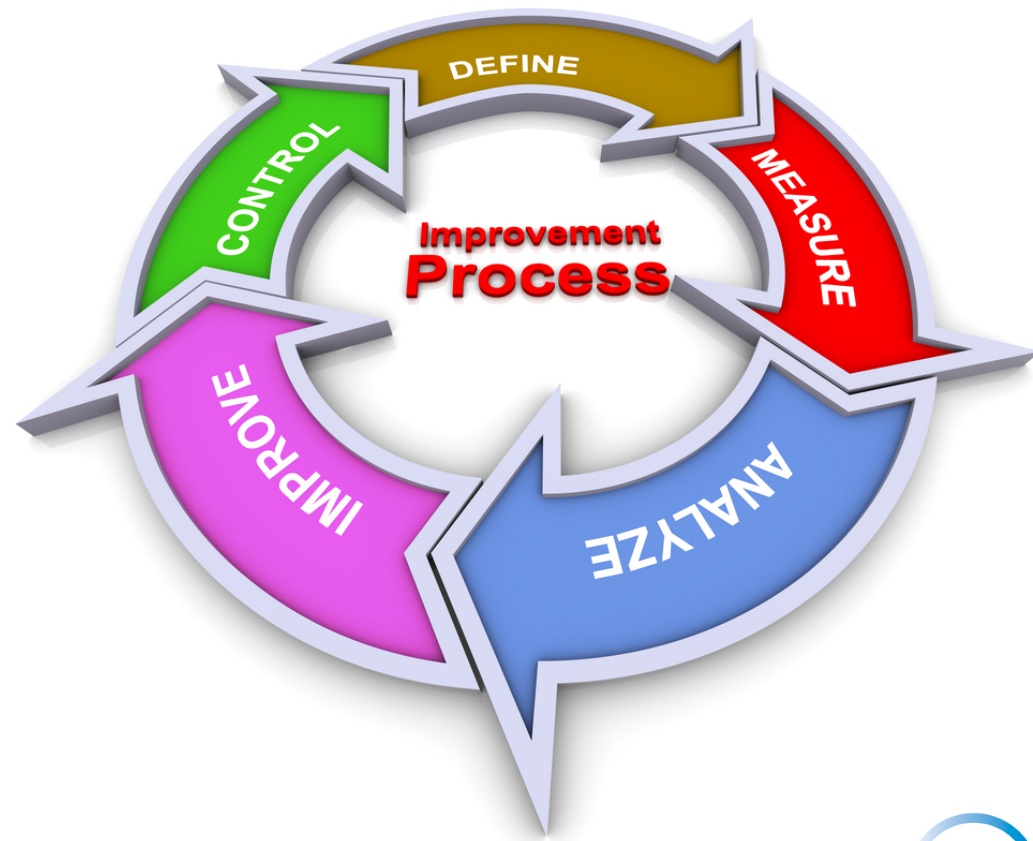
To prove it, one needs data

- “If you can not measure it, you can not improve it.”
 - **William Thomson**
(Lord Kelvin) Lecture on "Electrical Units of Measurement" (3 May 1883) paraphrased



For Quality Improvement

- Patient list by specific condition
- Decision Support
- Reporting Quality Measures

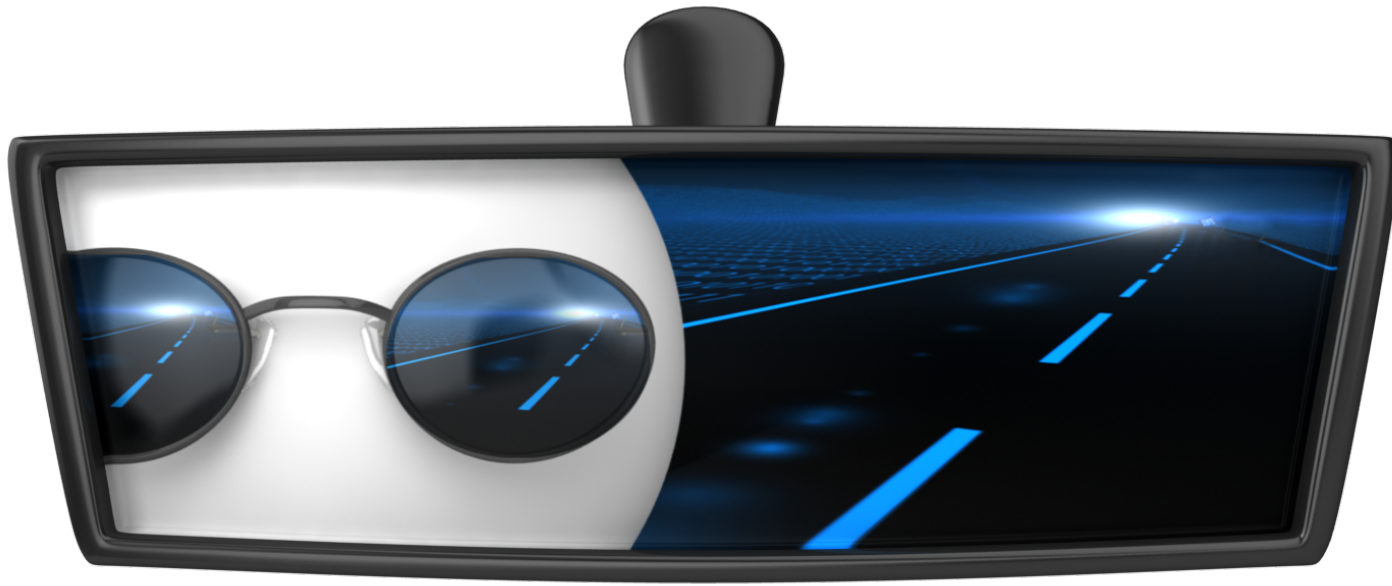


For Population Health

- Submission of electronic data to immunization registries.
- Submission of reportable labs to public health. Report to cancer registries
- Report to specialized registries



Meaningful Use CQMs not good enough



Tracking Populations

14
Hypertension Patients With and Without Cardiovascular Disease by Site and Organization
With Dr. Blue's Individual Data
3rd Quarter, 2010

HTN CV/HTN	MN State Average	Organization				CLINIC 1				CLINIC 2				CLINIC 3				CLINIC 4				Dr. Blue			
Quarters		3	3	4	4	3	3	4	4	3	3	4	4	3	3	4	4	3	3	4	4	3	3	4	4
Patient Count																									
HTN With CV/HTN WO CV		681	418			348	184			225	174			35	33			73	27			54	52		
LDL <100/<130	64%/NA	29%	36%			32%	46%			21%	17%			17%	24%			45%	56%			35%	56%		
LDL >100/>130		49%	16%			43%	16%			45%	11%			60%	33%			49%	4%			43%	12%		
LDL None/None		22%	48%			25%	38%			34%	72%			23%	43%			6%	40%			22%	32%		
HDL <40		16%				16%				16%				9%				22%				24%			
HDL >40		63%				59%				52%				69%				73%				54%			
HDL None		21%				25%				32%				22%				5%				22%			
BP <130/80/<140/90	58%/70%	33%	64%			34%	72%			26%	51%			20%	58%			53%	74%			24%	65%		
Tobacco Free	81%	57%	55%			59%	58%			56%	45%			43%	70%			70%	48%			70%	54%		
Smoker		17%	19%			13%	13%			13%	20%			17%	15%			24%	26%			10%	17%		
No Smoking Status Documentation		26%	26%			28%	29%			31%	35%			40%	15%			6%	26%			20%	29%		
ASA Use/ Contraindication	92%	75%	54%			80%	52%			63%	51%			66%	45%			92%	70%			85%	44%		
Patient Not on ASA		19%	35%			18%	42%			30%	44%			20%	45%			8%	8%			10%	48%		

Tracks all the quality measures of interest to them for their hypertensive patients comparing the organization, 3 clinics and one provider to the state statistics

Source: Jeffery Scrivner, M.D., Big Fork Clinic, Scenic River Health Services

Low Tech



Slide from Chris Tashjian, MD, Ellsworth and Spring Valley Medical Clinics

HIGH TECH

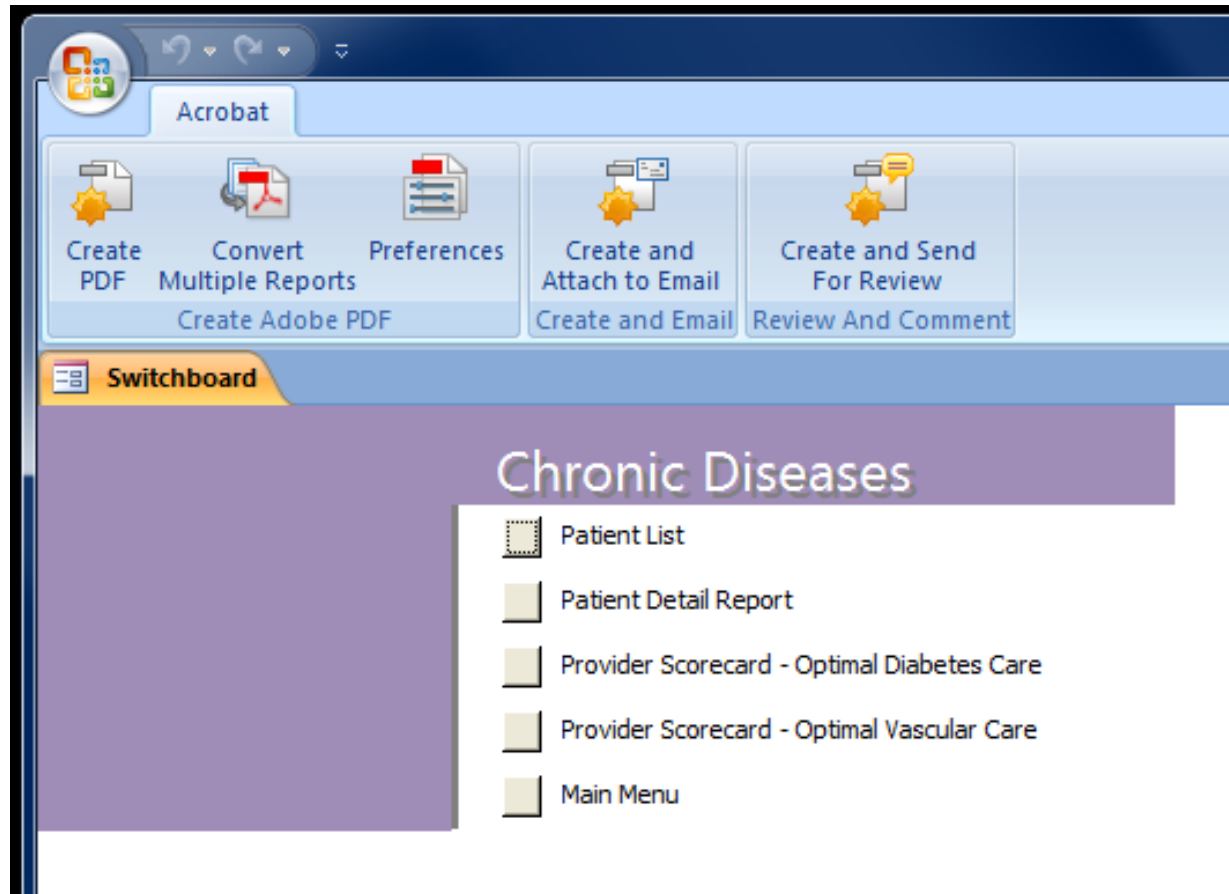
Export Data from EHR to Excel

The screenshot displays a Microsoft Excel window titled 'vtmp1302654.xlsx - Microsoft Excel'. The spreadsheet contains patient data with the following columns: Primary Nbr, Primary Provider, MRN, Birth Date, Age, First Name, Middle Name, Last Name, and Address. The data is sorted by Primary Nbr. A status bar at the bottom indicates 'Records read: 6,224 Selected: 6,224 Pages: 123'.

Primary Nbr	Primary Provider	MRN	Birth Date	Age	First Name	Middle Name	Last Name	Address
1105	4	1654	04/12/1940	72	MARYLOU		Testpatient	
1106	4	257	04/12/1940	72	HELGA	F	Testpatient	
1107	4	4286	04/12/1951	61	ISADORE	C	Testpatient	
1108	4	1879	04/12/1942	70	THOMAS	H	Testpatient	
1109	4	4139	04/12/1955	57	WILLIAM	R	Testpatient	
1110	4	716	04/12/1959	53	TAMMY	L	Testpatient	
1111	4	2881	04/12/1939	73	SYLVESTER	A	Testpatient	
1112	4	2114	04/12/1968	44	SUSAN	J	Testpatient	
1113	4	1968	04/12/1944	68	ROBERT	J	Testpatient	
1114	4	3783	04/12/1955	57	ROBERT	J	Testpatient	
1115	4	3748	04/12/1952	60	DAVID	E	Testpatient	
1116	4	4404	04/12/1968	44	DANIEL	M	Testpatient	
1117	4	5525	04/12/1969	43	ROBBIE	D	Testpatient	
1118	4	2874	04/12/1956	56	SHARON	K	Testpatient	
1119	4	2532	04/12/1938	74	RICHARD	D	Testpatient	
1120	4	899	04/12/1932	80	ANNE	M	Testpatient	
1121	5	5791	04/12/1954	58	DONALD	D	Testpatient	
1122	5	828	04/12/1953	59	DIRK	A	Testpatient	
1123	5	3514	04/12/1954	58	JAMES	M	Testpatient	
1124	5	5971	04/12/1954	58	NANCY	G	Testpatient	
1125	5	4525	04/12/1965	47	JEFFREY	A	Testpatient	
1126	5	4418	04/12/1953	59	TALMADGE	L	Testpatient	
1127	5	1266	04/12/1974	38	JENNIFER	R	Testpatient	
1128	5	3198	04/12/1960	52	HOWARD	J	Testpatient	
1129	5	3236	04/12/1939	73	WAYNE	A	Testpatient	
1130	5	6070	04/12/1974	38	NATHAN	E	Testpatient	
1131	5	5688	04/12/1969	43	BRENDA	A	Testpatient	
1132	5	5450	04/12/1954	58	LYNN	R	Testpatient	
1133	5	5391	04/12/1953	59	ALLEN	G	Testpatient	
1134	5	5389	04/12/1955	57	KRISTINE	I	Testpatient	

Slide from Chris Tashjian, MD, Ellsworth and Spring Valley Medical Clinics

Excel to Access Database



Slide from Chris Tashjian, MD, Ellsworth and Spring Valley Medical Clinics

Generate Patient Lists

Acrobat

Create PDF Convert Multiple Reports Preferences Create and Attach to Email Create and Send For Review

Switchboard CDR - Patient List

Provider Name: * ALL * ☐ DM ☐ HTN ☐ IVD Issues: ☐ Ages 18-75 Source: EMR PAR Refresh Date: 04/11/2012 Excel View

DM	HTN	IVD	MRN	DOB	Patient Name	Date BP	BP	Date A1c	A1c	Date LDL	LDL	ASA	Tobacco	Next Visit
	X		1771	04/12/1987	AARON D Testpatient	01/21/12	130/64					No	Yes	12/15/2012
	X		1327	04/12/1977	AARON J Testpatient	02/06/12	108/70			02/06/12	133	No	No	12/15/2012
	X		2346	04/12/1967	AARON R Testpatient	11/28/11	126/78					No	No	12/15/2012
	X		5445	04/12/1976	AARON S Testpatient	06/16/11	110/70			06/18/11	97	No	No	12/15/2012
X			3439	04/12/1994	ABBY P Testpatient	10/31/11	100/78	11/09/11	6.7			No	No	12/15/2012
	X	X	3899	04/12/1922	ADA K Testpatient	09/08/11	136/76					No	No	12/15/2012
X			5797	04/12/1984	ADAM A Testpatient	09/28/10	126/84					No	No	12/15/2012
	X		468	04/12/1964	ADAM A Testpatient	09/21/11	128/78	09/26/11	5.6	09/26/11	109	No	Yes	12/15/2012
	X		4049	04/12/1973	ADAM C Testpatient	02/23/12	108/70			02/25/12	101	No	No	12/15/2012
	X		5104	04/12/1977	ADAM J Testpatient	05/28/11	142/96					No	No	12/15/2012
	X		896	04/12/1973	ADAM J Testpatient	12/13/11	120/88					No	No	12/15/2012
X			5534	04/12/1980	ADAM R Testpatient	04/06/12	112/70	04/06/12	15.5	04/06/12	102	No	Yes	12/15/2012
		X	267	04/12/1985	ADAM S Testpatient	03/23/12	116/80					No	No	12/15/2012
X			5248	04/12/1950	ADELAIDE C Testpatient	12/04/10	144/82	10/30/10	5.8	10/30/10	135	No	No	12/15/2012
	X		2396	04/12/1918	ADELAIDE O Testpatient	03/26/12	120/74					No	No	12/15/2012
X	X	X	1687	04/12/1919	ADELINE M Testpatient	04/07/12	110/50	02/14/12	5.9	08/31/11	63	No	No	12/15/2012
	X		5856	04/12/1925	ADENA C Testpatient	10/10/11	132/70			11/18/10	91	No	No	12/15/2012
X	X		5268	04/12/1964	ADENA T Testpatient	04/03/12	140/82	12/23/11	6.3	12/23/11	142	Yes	No	12/15/2012
	X		3283	04/12/1941	ADOLPHN D Testpatient	09/19/11	128/78	10/05/11	5.9	10/05/11	75	No	No	12/15/2012
	X		5247	04/12/1956	ADRIAN M Testpatient	06/30/10	138/82					No	No	12/15/2012
X			3802	04/12/1998	AFTON A Testpatient		/					No	No	12/15/2012
	X		3444	04/12/1963	AINSWORTH E Testpatient	12/01/10	118/70			12/01/10	116	No	No	12/15/2012
	X		5932	04/12/1932	ALAN D Testpatient	08/29/11	112/74			11/30/11	168	No	No	12/15/2012
	X		3335	04/12/1954	ALAN D Testpatient	03/19/12	144/86			03/19/12	144	No	No	12/15/2012
	X		2977	04/12/1961	ALAN D Testpatient	12/22/11	142/90			12/20/11	175	No	No	12/15/2012
X	X		695	04/12/1947	ALAN E Testpatient	10/18/11	122/68	10/18/11	10.7	04/15/11	58	Yes	No	12/15/2012

Record: 1 of 5886 No Filter Search

Form View Num Lock Powered by Microsoft Office Access

Slide from Chris Tashjian, MD, Ellsworth and Spring Valley Medical Clinics

Use of Filters

Acrobat

Create PDF Convert Multiple Reports Preferences Create and Attach to Email Create and Send For Review Create Adobe PDF Create and Email Review And Comment

Switchboard **CDR - Patient List**

Provider Name: ☐ DM ☐ HTN ☒ IVD Issues: 1 ☒ Ages 18-75 Source: EMR PAR Refresh Date: 04/11/2012 Excel View

DM	HTN	IVD	MRN	DOB	Patient Name	Date BP	BP	Date A1c	A1c	Date LDL	LDL	ASA	Tobacco	Next Visit
	X		671	04/12/1947	ALAN N Testpatient	10/04/11	108/70			02/25/11	70	Yes	No	
X	X		2712	04/12/1946	JACK M Testpatient	03/12/12	118/60			02/08/12	117	Yes	No	
	X		2500	04/12/1947	JAMES E Testpatient	11/10/11	114/66			11/10/11	68	Yes	Yes	
X	X		3605	04/12/1950	JOHAN C Testpatient	12/15/11	110/82			12/15/11	67	Yes	No	
X	X		3322	04/12/1945	LAURENCE W Testpatient	09/08/11	104/50			09/30/10	70	Yes	No	
X	X	X	4239	04/12/1956	WILLIAM J Testpatient	01/09/12	138/70	01/13/12	11.4	01/09/12	113	Yes	No	

Records: 1 of 6 No Filter Search

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Patient Scorecards

Patient: LAURENCE W Testpatient MRN 3322
DOB: 04/12/1945
Age: 67

GLENWOOD CITY, WI 54013

Provider: 18 Helmen MD, Kevin D.

Diabetes	Problem:	Code:	Type
	Diagnosis:	Code:	Type
Hypertension		401.9	
	Diagnosis: 02/19/2012	Code: 401.9	
IVD	Problem: 09/29/2010	Code: 414.00	
	Diagnosis: 02/19/2012	Code: 414.00	

Advanced Directive Date:

Care Coordinator Note Date: 01/27/2012

Measures	Date	Result
Last Visit:	09/27/2011	
Blood Pressure	09/08/2011	104/50
A1c		
LDL	09/30/2010	70
Tobacco Use:	09/08/2011	No
Tobacco Cessation:		
Aspirin Order:	07/05/2011	aspirin Aspirin 81 oral enteric coated tablet
	Allergy:	No
Microalbumin:		
Creatinine Ratio:		
Foot Exam:		

Next Appointment Info:

Date: Time:

Provider:

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Tashjian, MD, Ellsworth
and Spring Valley
Medical Clinics

Provider Scorecards

Provider Statistics - Optimal Vascular Care										
Health Partners - Partners in Excellence Award Levels: GOLD:60% - SILVER:55%										
	Patients	BP	LDL	ASA	Tobacco	4/4	3/4	2/4	1/4	0/4
0004	90	60 67%	56 62%	77 86%	68 76%	33 37%	28 31%	18 20%	9 10%	2 2%
0005	79	59 75%	47 59%	67 85%	65 82%	31 39%	26 33%	15 19%	6 8%	1 1%
0006	58	38 66%	32 55%	48 83%	50 86%	16 28%	24 41%	14 24%	4 7%	0 0%
0008	53	32 60%	35 66%	49 92%	46 87%	20 38%	20 38%	9 17%	4 8%	0 0%
0018	25	18 72%	16 64%	24 96%	22 88%	13 52%	6 24%	4 16%	2 8%	0 0%
0029	10	4 40%	6 60%	8 80%	8 80%	3 30%	2 20%	3 30%	2 20%	0 0%
0032	41	31 76%	28 68%	37 90%	33 80%	20 49%	11 27%	7 17%	2 5%	1 2%
0037	19	13 68%	11 58%	15 79%	16 84%	6 32%	8 42%	2 11%	3 16%	0 0%
0051	60	34 57%	34 57%	46 77%	46 77%	17 28%	18 30%	15 25%	8 13%	2 3%
0056	33	25 76%	20 61%	29 88%	29 88%	13 39%	12 36%	7 21%	1 3%	0 0%
0067	12	9 75%	5 42%	10 83%	11 92%	4 33%	3 25%	5 42%	0 0%	0 0%
0072	54	31 57%	31 57%	46 85%	51 94%	13 24%	28 52%	10 19%	3 6%	0 0%
0073	11	10 91%	6 55%	10 91%	9 82%	5 45%	4 36%	1 9%	1 9%	0 0%
0074	44	21 48%	27 61%	37 84%	33 75%	10 23%	15 34%	14 32%	5 11%	0 0%
0079	11	6 55%	3 27%	8 73%	9 82%	0 0%	4 36%	7 64%	0 0%	0 0%
0086	7	6 86%	3 43%	6 86%	7 100%	2 29%	4 57%	1 14%	0 0%	0 0%
0100	1	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	1 100%
0636	5	2 40%	1 20%	3 60%	3 60%	0 0%	2 40%	1 20%	1 20%	1 20%
NONE	16	2 13%	1 6%	8 50%	12 75%	0 0%	2 13%	6 38%	5 31%	3 19%
	629	401 64%	362 58%	528 84%	518 82%	206 33%	217 34%	139 22%	56 9%	11 2%

Slide from Chris
Tashjian, MD, Ellsworth
and Spring Valley
Medical Clinics

Results!

- In just four years, Ellsworth Medical Clinic reported the following improvements in blood pressure control:
 - Among patients with diabetes, hypertension control increased from 73% to 97% (2007–2011)
 - Among patients with cardiovascular disease, BP control increased from 68% to 97% (2007–2011)
 - Currently as of December 2012
ALL patients with hypertension controlled at 90%

Clinical Decision Support (CDS)

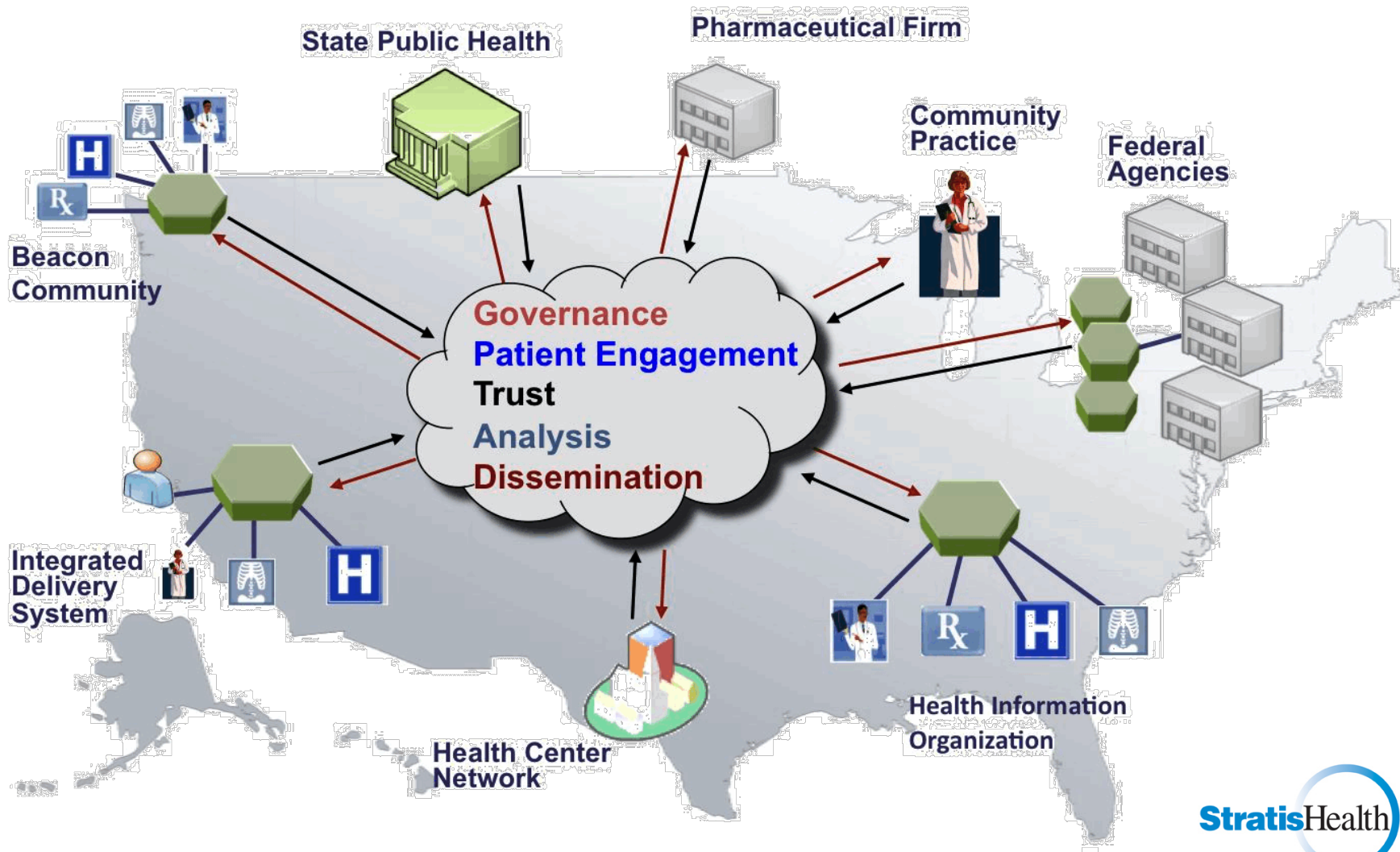
- Alerts and reminders
- Drug-drug and Drug-allergy interactions
- Documentation forms or templates
- Situation-specific flow sheets
- Relevant data presentation
- Referential information
- Interactive sequential advice
- Order sets
- Protocols and Pathways
- Automatic dose calculators



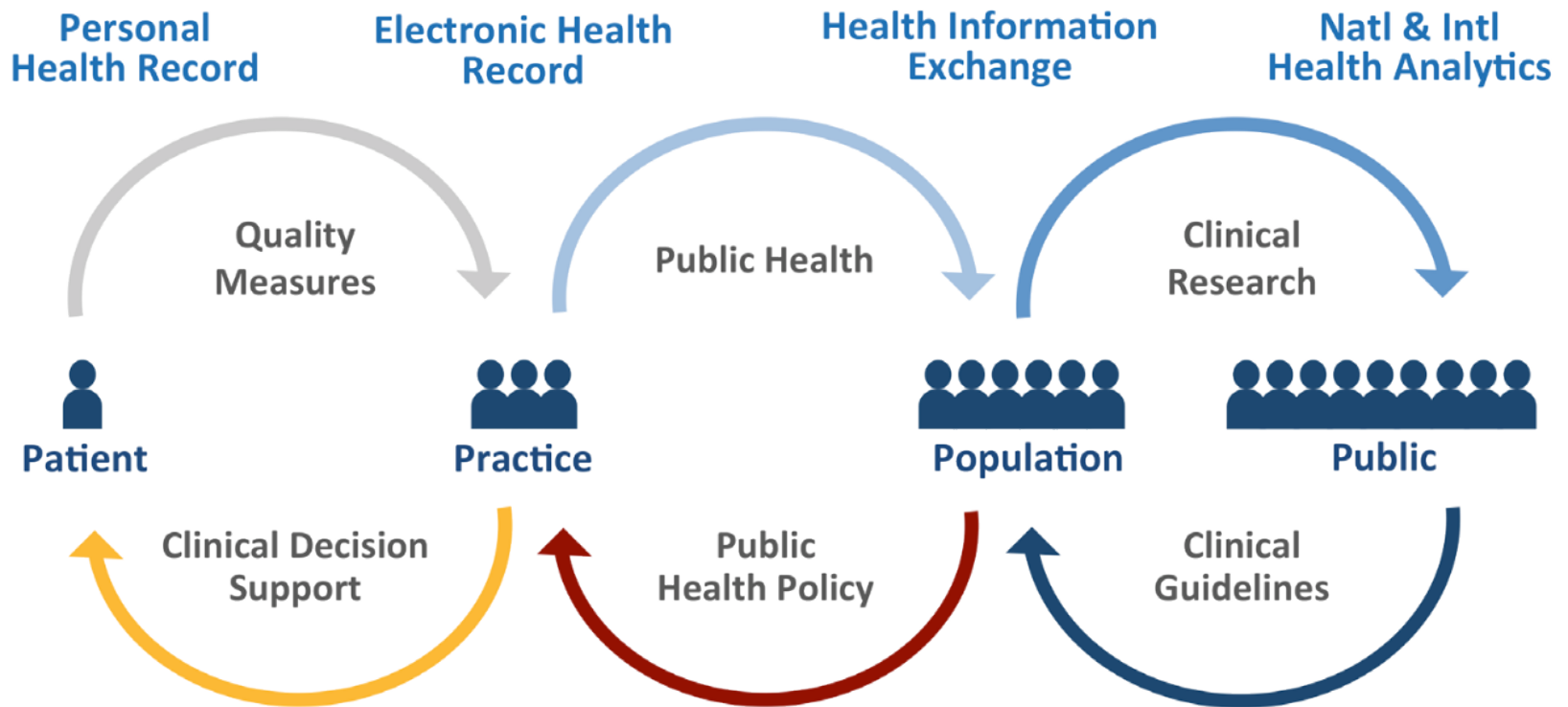
We Work in Silos Often Without the Information We Need



A Learning Health System for the Nation



ONC Vision of the Health IT Ecosystem



<http://www.healthit.gov/sites/default/files/HITEnabledQualityImprovement-111214.pdf>

ONC Vision of the Health IT Quality Improvement Ecosystem



<http://www.healthit.gov/sites/default/files/HITEnabledQualityImprovement-111214.pdf>

What can we do

What can we do

- Plug and pray is not a recipe for success
- Active involvement in workflow and process redesign is a necessary component
- Interoperability across the care continuum needs to be supported
- Break down the barriers across EHR vendors and IDNs

Discussion

Thank you!

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Stratis Health is a nonprofit organization that leads collaboration and innovation in health care quality and safety, and serves as a trusted expert in facilitating improvement for people and communities.

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