

Engineering a Learning Healthcare System:
A Look at the Future
Clinical Data Systems and Clinical Decision Support
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Is Information the Answer for Hypertension Control?

Peterson. Archives Internal Medicine. 2008;168:259



“Hint of how electronic data systems may hold the key to achieving better blood pressure control in the future.”

“For a moment, imagine you lived in a world in which an integrated electronic medical record system was the standard in most community practices. With such a system, the blood pressure trajectories of hypertensive patients could be easily tracked. Feedback reports could then quickly update busy caregivers regarding which of their patients fell short of treatment goals and needed closer follow-up. Online pharmacy data would further augment the information loop. Assume such data were readily available in the clinicians office, then a physician could determine the degree to which failure to reach blood pressure control was related to adherence issues. Taken 1 step further, online pharmacy systems, linked to decision support, could also be used to proactively remind patients and/or alert their physician as if important therapies were consistently missed. Therefore, in the future, ambulatory information systems could be applied both as a diagnostic tool (for identifying and understanding patients with uncontrolled hypertension) and as an effective therapeutic intervention (for encouraging adherence and appropriate therapeutic intensification when needed).”

Impediments to Synthesizing and Utilizing Information to Support Enhanced Care Delivery



People

- § Culture of Health Care
- § Clinical Leadership
- § Skills/Education
- § Human factors

Process

- § Increasing complexity of health care
- § Complexity of workflows
- § End-to-end patient-centered view is often missing
- § Business Process Engineering absent
- § Little use of system-engineering tools for design, analysis, and control

Impediments to Synthesizing and Utilizing Information to Support Enhanced Care Delivery



Technology

- § Lack of integrated clinical information systems: Data is “locked away” in various applications (or paper) and databases
- § Lack of data standards
- § Lack of a standardized industry data model
- § Lack of interoperability standards
- § Usability issues
- § Privacy and security concerns

Healthcare System and Environment

- § Structure of Health care in the U.S.
- § Health care financing and reimbursement system
- § System level view missing
- § Cost

Clinical Decision Support Goal



- § Needs to take into account a patient-centered longitudinal view as well as a population view
- § Getting the right information to the right team member (role) at the right time to trigger the right event for care of an individual patient

Clinical Decision Support



“Clinical decision support (CDS) systems have shown great *promise* for reducing medical errors and improving patient care. However, such systems do not always result in improved clinical practice, for reasons that are not always clear.”

BMJ; 2005;330;765

Some Unintended Consequences of Information Technology in Health Care



Errors in the process of entering and retrieving information

- § Human/computer interface issues
- § Cognitive Overload: overemphasis on structured and complete information entry or retrieval

Errors in the communication and coordination process

- § Misrepresenting collective, interactive work as a linear, clear-cut, and predictable workflow
- § Misrepresenting communication as information transfer
- § Decision support overload
- § Loss of prior mechanisms for catching errors

J Am Med Inform Assoc. 2004;11:104-112

Some General Themes of Effective Clinical Decision Support



Put Clinical Decision Support in context of the Planned Care Model
It is about people, process..... and technology

Think broadly

- § **Across the care team members**
- § **Across the continuum of care**
- § **Across the tools/systems available**

Remember, this is a complex system!

What are Some of the Decision Support Opportunities?



Reference information and guidance:

Clinical evidence and guidelines

Direct to Patient Clinical Decision Support:

Engagement of the core team member,
transparency of information

Relevant data presentation:

attention to human-computer interface issues

Documentation forms/templates:

integration of decision support into the workflow

Order entry facilitator:

a key opportunity to influence clinical actions

Protocol/pathway support:

care pathways

Reactive alert and reminders:

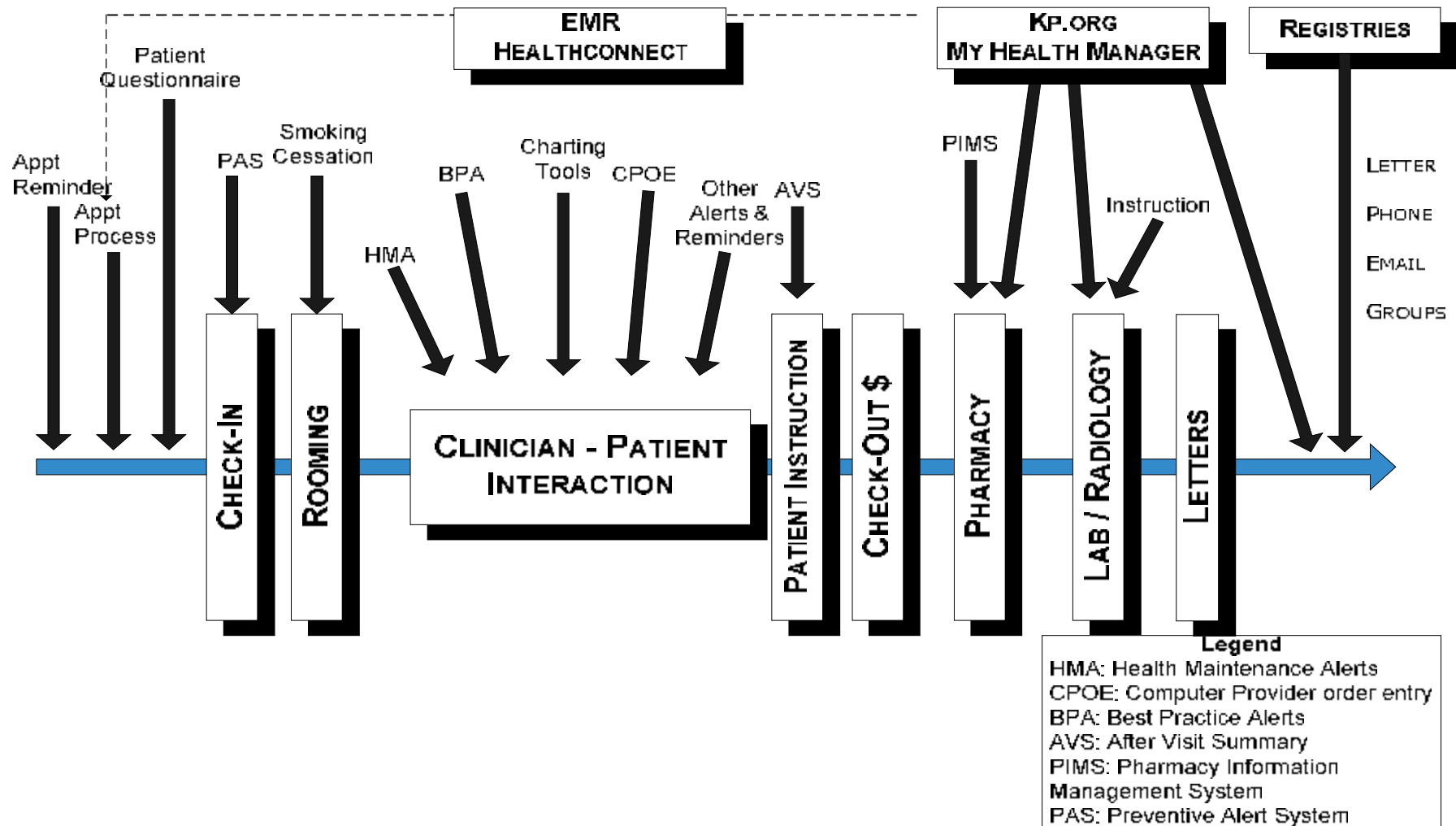
use judiciously

Use of Clinical Data:

clinical registries to support the Planned Care
Model

Dean Sittig Ph.D. personal communication

Clinical Decision Support Opportunities



IT Functions Needed to Support Patient-centered Population-based Care



- § EMR: structured chart documentation, electronic data capture
- § Clinical Registries: population identification
- § Population stratification
- § Patient tracking
- § Panel management
- § Care/Case Management
- § Complex decision support
- § Bulk/batch utilities
- § In-reach and Outreach: mass customized
- § Self-care/self-management
- § Patient provided and remote device information
- § Measurement and performance reporting

Kaiser Permanente Colorado Cardiac Rehabilitation and Clinical Pharmacy Cardiac Risk Service



- § Nurses and Clinical Pharmacists coordinates the provision of cardiac risk reduction activities by supporting and working collaboratively with patients, primary care physicians and cardiologist focusing on activities that have been shown to improve patient outcomes
- § Follows 12,000 patients with Cardiovascular Disease
- § Current outcomes
 - § Average LDL 78
 - § Beta-blocker post MI: 95%
 - § Anti-platelet medication: 99%
 - § Smoking 11%
 - § Average BP 126/72

KPCO Cardiac Rehabilitation and Clinical Pharmacy Cardiac Risk Service



People

- § Culture of physicians, nurses and clinical pharmacist working together focused on the patient
- § Clinical Leadership: Clinical Pharmacists, Nurses, Physicians and IT
- § Focused roles and accountabilities
- § Training
- § Collaboration between information technologists and clinicians

Process

- § Clear evidenced-based guidelines and clinical pathways
- § Alternate ways of communication/care with the patients: phone, mail, secured messaging, groups and direct patient internet access to the medical record including laboratory results, medications, and patient instructions
- § Clear handoffs and communication with other team members including primary care and cardiologists

KPCO Cardiac Rehabilitation and Clinical Pharmacy Cardiac Risk Service



Technology

- § Electronic Medical Record
- § Aggregation, identification, and stratification of data for use by the clinical registry
- § Clinical Registry
- § Alert and reminder systems
- § Clearly define clinical model and process which informs the technology approach
- § Collaboration with IT to make systems adjustments as the clinical model transitions
- § Performance measurement

Healthcare System and Environment

- § Integrated delivery system with system level view
- § Program design not constrained by the financing/reimbursement system

Is Information the Answer?



Yes, information technology is *part* of the answer.....

Along with attention to the **people/culture**, the **process** and the **healthcare system/environment**.