


The Value of Computerized Provider Order Entry in Ambulatory Settings

Eric Pan, MD, MSc
Center for IT Leadership
Harvard Quality Colloquium
August 26, 2003




CITL Mission

Produce timely, rigorous market-driven technology assessments which:


- Help providers invest wisely
- Help IT firms understand value proposition

CITL – Improving Healthcare Value



CITL Support

- Non-profit based at Partners Healthcare in partnership with HIMSS
- CGEY, Eclipsys, IDX, InterSystems, McKinsey, Siemens (general)
- CHCF (topic-specific)
- Revenues from publications & meetings



CITL Executive Committee

- David Bates, BWH and Partners
- John Glaser, Partners CIO
- Steve Lieber, HIMSS CEO
- Blackford Middleton, Chairman
- Jan Walker, Executive Director



Research Results

- ACPOE Defined
- Methods
- Findings
- Limitations
- Implications
- Conclusions



Key Findings

- Nationwide adoption of advanced ACPOE systems will:
 - Eliminate more than 2 million Adverse Drug Events (ADEs)/year
 - Avoid more than 190,000 hospitalizations/year
 - Save the US healthcare delivery system \$44 billion/year in reduced medication, radiology, laboratory, and ADE-related expenditures
 - Eliminate more than \$9 billion/year in rejected claims



ACPOE Definition

- Key functional components
 - Drug orders
 - Lab and radiology orders
 - Clinical decision support
 - Alerts, reminders, calculations, guidelines
 - EDI
- Ambulatory care settings:
 - Hospital-based clinics
 - Physician's offices



ACPOE System Classification

Class	Medication (Rx) OE	Diagnostic (Dx) OE
1: Basic Rx-only	Structured data capture, passive references, no patient data, no EDI	
2: Basic Rx-Dx		
3: Intermediate Rx-only	Rx & Order-specific decision support, limited patient data, no EDI	
4: Intermediate Rx-Dx		
5: Advanced Rx-Dx	Sophisticated Rx & Order-specific decision support, maximum patient data, full EDI	



CITL Value Framework

- Financial
 - Cost reductions
 - Revenue enhancements
 - Productivity gains
- Clinical
 - Care process advances
 - Improved patient outcomes
- Organizational
 - Stakeholder satisfaction improvements
 - Risk mitigation



Research Methods

- Literature Review
 - Reviewed nearly 2,000 studies from academic and general/trade literatures; 25 had primary data on ACPOE value
- Market Research
 - Email survey sent to 37 healthcare IT vendors; 8 responses
- Expert Panel
 - Phone/email consultations and day-long meeting
 - Assessed literature findings; estimated ACPOE impact; critiqued projections and conclusions



The “Average” Outpatient Provider

- Full-time ambulatory provider
- Panel size: 1,914
- Annual visits: 3,875
- Capitation rate: 11.6%
- Total Rx, Lab, Radiology expenditures (almost \$1.2M):
 - Rx: \$650K
 - Lab: \$166K
 - Radiology: \$355K



How Much Does ACPOE Cost?

- Goal: Estimate total costs for adopting different categories of ACPOE
- Assumptions:
 - Buy option, not build
 - Cash purchase, no financing
 - Providers are purchasers
 - Model all costs per provider
 - Five year time horizon for calculating annual costs



Modeling Cost Data

- License – initial and maintenance
- Subscription fees
- Interface – initial and maintenance
- Implementation
- Training
- Infrastructure
- Hardware
- Opportunity cost

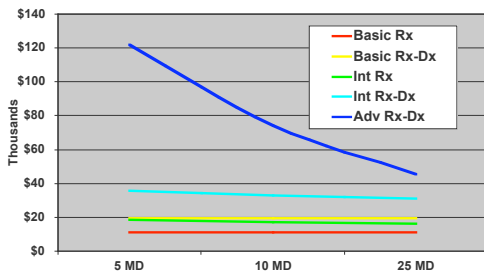


5 year ACPOE Costs Per Provider

MDs	Cost/Year(s)	Basic Rx	Basic Rx-Dx	Int Rx	Int Rx-Dx	Adv Rx-Dx
5	Year 1	\$5,634	\$9,782	\$7,599	\$19,220	\$87,350
	Year 2-5	\$1,690	\$2,414	\$2,732	\$4,105	\$8,652
	Total 5 year	\$12,400	\$19,440	\$18,530	\$35,640	\$122,000



Effect of Practice Size on 5 Yr Total Cost Per Provider



ACPOE Costs: The Upshot

- Cost rapidly increases with system functionality
- Advanced ACPOE costs essentially include license for ambulatory EMR
- Adopting practice size has large implications for ACPOE costs
 - Huge economies of scale for Advanced ACPOE by spreading costs over more providers

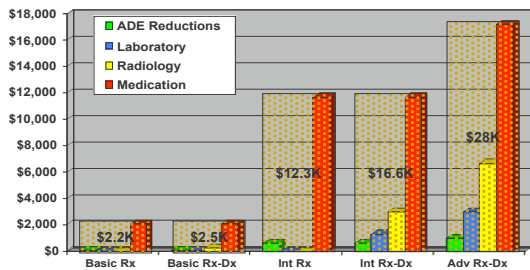


How Does ACPOE Produce Financial Benefits?

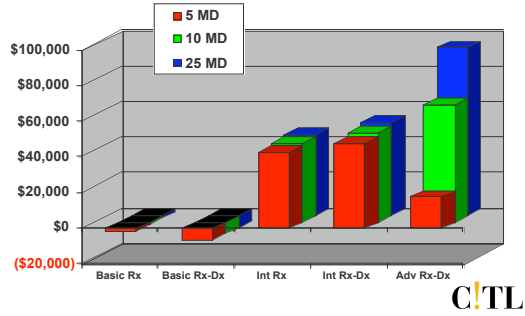
- Eliminated over-use, under-use, and misuse
- Check for duplicate medications, tests, and studies
- Suggest:
 - Brand to generic drug substitutions
 - Alternative cost-effective therapies
 - Care guidelines
 - Drug formulary compliance
- Lab and radiology charge display



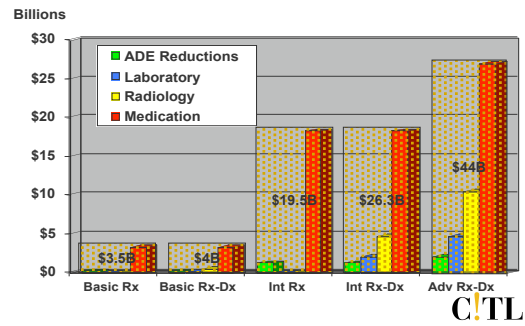
Per "Average" Provider Annual Cost Saving Projections



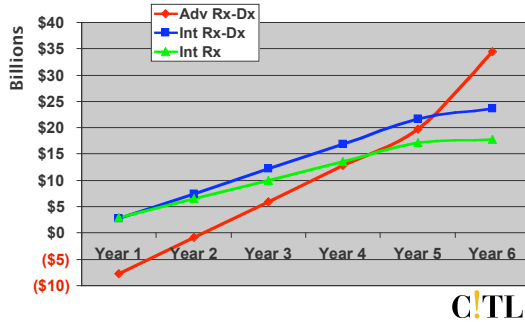
Per "Average" Provider Net Financial Benefit



National Annual Cost Saving Projections



National Annual Net Financial Benefit



Additional ACPOE Financial Benefits

- Revenue Enhancements
 - Eliminate more than \$10 in rejected claims per outpatient visit
 - Address drug, procedure and coding issues through advanced clinical decision support
- Productivity Gains
 - Neutral effect on provider time with improved staff productivity



How Does ACPOE Improve Clinical Outcomes?

- Streamline, structure order process
- Ensure completeness, correctness
- Indication-based ordering
- Supply patient data
- Perform drug interaction checks
- Calculate and adjust doses based upon age, weight, renal function
- Consequent or corollary orders

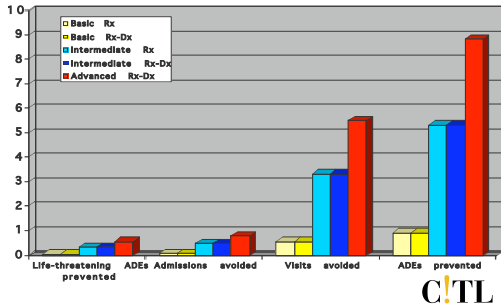


How Many Outpatient ADEs?

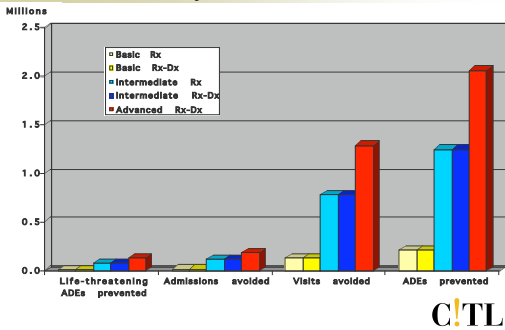
- 38 ADEs per provider-year on average
 - 14 preventable
 - 2 life-threatening
- 8 million ADEs in U.S. per year
 - > 3 million preventable
 - > 500,000 life-threatening
- During this hour...
 - > 1,000 ADE occurred nationally
 - 92 people hospitalized for ADE



Improved Patient Outcomes: Per Provider Projections



Improved Patient Outcomes: National Projections



How Does ACPOE Create Organizational Benefits?

- Poorly documented in literature; no projections in model
- Some evidence indicates:
 - Patients do not mind presence of computer during visit
 - Providers accept ACPOE over time
- Discussed in detail in full report



Limitations

- Our model combines evidence from the academic literature, experts, and market data
- We extrapolate to make national projections
- The model may be incomplete and important determinants missing

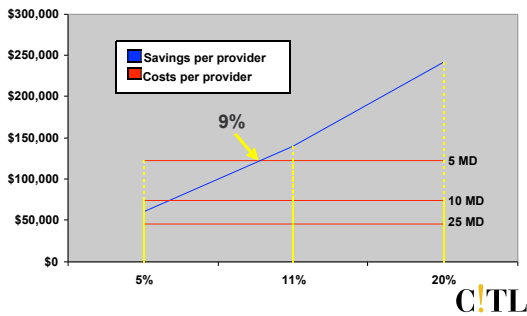


Limitations

- There is no “average” provider
- Benefits accrual to providers most sensitive to:
 - Practice size (number of providers)
 - Visit volume
 - Percent of capitation of patient panel



Impact of Capitation on 5 Year Advanced ACPOE Savings

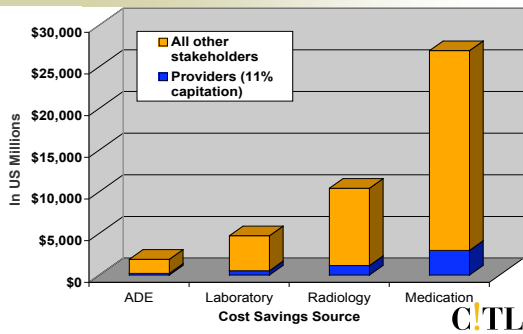


Limitations

- National benefits may be difficult to realize
 - Provider adoption slowed by benefits accruing to other healthcare stakeholders
 - Example: Drug substitution and lab utilization savings go largely to payers



National Cost Savings to Providers and Other Healthcare Stakeholders



US Healthcare System Will Benefit

- National adoption of Advanced ACPOE systems would prevent...
 - >2 million ADE/yr
 - 190,000 ADE admission/yr
 - 130,000 life-threatening ADE/yr
- Nationwide implementation of advanced ACPOE could:
 - Breakeven during implementation
 - Save the US \$34 billion annually



Thank You! EPan@CITL.ORG

Doug Johnston, MA
Eric Pan, MD, MSc
Jan Walker, RN, MBA
David Bates, MD, MSc
Blackford Middleton, MD, MPH, MSc