Finding Value in IT – Near Future or False Hope?

David Lubarsky MD MBA
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Grand Rounds
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Finding Value in IT – Near Future or False Hope?

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University of Miami School of Business
In order to answer the question

- One has to understand
  - Where our (MD) concept of “IT” fits in the IT world
  - What IT does/should do in healthcare
  - The evolution of IT in the Western World (healthcare is just another industry trying to catch up with the rest of business)
  - 4 models of Value Creation using IT
  - Some applied examples – expanded in case conference
Systems Experience

- Not a computer expert (at all!) but about 500,000 computerized records over 14 years
- Developed many different custom applications for Arkive @ Duke University (30 OR). Bankrupt.
- Enhanced/deployed Saturn Drager intraop system @ Duke. After 2 years, deployed PACU module.
- Worked @ Duke with in-house Lotus notes preop system (> 15,000 patients/yr) which crashed after 2-3 years.
- Inherited and made functional large (40 OR/25,000 patients per year) PICIS system @ University of Miami, and deployed linked PICIS preoperative module (eVal) for 17,000 clinic visits/year.
Clear and Sound Corporate Strategic Direction
Business Unit-wide Synchronization of Business Plans, Systems, and Operations
Senior Management Support, Joint-Ownership, and Communication of IS Strategic Vision and Plans
Appropriate Information Systems Leadership, Skills, and Staffing Levels
Durable Infrastructure and Sound Standards
Systems Integration & Control
Applications
User focus is typically at the “surface” - on their own expected benefits
How well systems provide these benefits depends upon a solid, usually “below the surface” foundation
Reliable Data
Shared MIS Vision and Road Map
Appropriate Context and Confidence
From Sandy Phillips, CIO, Jackson Memorial Hospital
What IT does or should do

- Charting
- Audit Functions
- Decision Support/Artificial Intelligence
Early IT product innovation

WE COULD DESIGN THE PRODUCT WITH A SIMPLE POINT-AND-CLICK INTERFACE
Early IT product innovation

OR WE COULD REQUIRE THE USER TO CHOOSE AMONG THOUSANDS OF POORLY DOCUMENTED COMMANDS, EACH OF WHICH MUST BE TYPED EXACTLY RIGHT ON THE FIRST TRY.
Early IT product innovation

BEAR IN MIND, WE'LL NEVER MEET A CUSTOMER Ourselves

MAKE IT SO THEY HAVE TO REBOOT AFTER EVERY TYPO
The users have to like using it – all else is secondary
What IT does pretty well

- Charting – receives most commercial focus
  - Varying success with user interface/ease of use
    - most are seen as adding work
  - Legibility
  - Accessibility (no lost records) – in/out of OR
  - In some cases, capable of accessing some (but not all) pertinent hospital information (labs, EKG, radiology) and downloading/attaching to patient record so all information in one place. Nihon Kohden nice example.
What IT can do pretty well with lots of user input/effort

- Audit Function
  - Administrative
  - Economic
  - QA

- Not supported well by the industry. Requires lots of user programming and expertise currently
What IT can do pretty well with lots of user input/effort

- Audit Function
  - Administrative
    - Documentation standards
    - Personnel Management
      - Statistical analysis to minimize overtime, maximize productivity (www.CalculatOR.com)
      - Equalizing duty hours/complaint coefficient decreases
      - Tracking resident experience
What IT can do pretty well with lots of user input/effort

- Audit Function
  - Administrative
  - Economic
    - Following/influencing resource utilization
    - Informing supply management
      - Pharmacy
      - Materials management
      - PICIS, PYXIS, OMNICELL
    - Full/appropriate billing capture
What IT can do pretty well with lots of user input/effort

- Audit Function
  - Administrative
  - Economic
  - QA
    ✦ Easily reported/collated
    ✦ No good automated involuntary system yet (Innova?)
- Not supported well by the industry
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What IT should do but usually cannot

- Decision Support/Artificial Intelligence
  - Providing relevant point of care information
  - Helping adhere to practice guidelines/algorithms
  - Alerting practitioner even when they do not ask as to suggested courses of action - preventing mistakes
  - Requires seamless communication among systems and intelligent programming
Why are we so far behind the rest of the industries in the developed world?

How did industries like the airlines or automakers or computer companies get to their current advanced state?
Measuring Value of IT Investment 1960’s and 1970’s

- Standard ROI easy to calculate at beginning as mainframes automate manual tasks
- Easy to predict budget effect of automation
- Body count and clerical task #’s = enhanced productivity, decreased labor offsetting budget investment in IT
- Financial healthcare systems (1980’s & 90’s)
Measuring Value of IT Investment
1980’s

- Microcomputers yield some uncoordinated individual/small unit productivity gains
- Successful installation had to be followed by successful use of system by often non-technical front line managers
- Shift of accountability to front-line units to justify expense (difficult)
- No enterprise wide strategy (bottom of MIS Pyramid), no common platform (middle of MIS pyramid). Lack of communication among programs actually inhibits productivity
Figure 2: IT Investment and Productivity Slowdown
Where health care is today with clinical systems
Duke University System 2000

Thank you Iain Sanderson
Measuring Value of IT Investment

1990’s

- IT is indispensable tool/enabler of new strategy and ongoing operational control
- Instituting a new business plan, cost of technology is part of entire plan, not separate
- Enterprise wide use, common platform
- Managers MUST be able to use technology
Boost for Technology

Annual business investment in information processing equipment vs. the DJIA; reindexed with 1990=100

Source: Commerce Department
Health Care Lags Other Industries in IT Spending

IT Budget as a % of Revenue

- Health Care
- Government
- Financial
Measuring Value of IT Investment 1990’s in Health Care

- Clinical care has few or no new strategies to take advantage of IT. Supply mgmt, resource utilization, staffing models.

- Difficult to extract value even if improve clinical outcomes using IT. Not all improvements = lower cost. Just better care.

- Dissociation of beneficiary and payer for clinical improvements. This is finally beginning to change!
Eventual IT Value Creation in HealthCare

- **Process Performance Improvement (Mgrs)**
  - Supply/inventory (JIT), tracking for optimizing patient flow and scheduling, load control, process control charts, complete medical records always available

- **Individual Productivity and Decision Quality Improvements (Docs, patients)**
  - Info at the point of care, making right decisions, error reduction, algorithm based advice, practice guidelines

- **Competitive Advantage (CEO, board)**
  - e.g. Fed Ex, not understood in health care, business strategy = competition on price
  - As outcome reporting is mandated, this WILL change
Valuing Healthcare IT in 2004

- Can be hard as all potential uses are not appreciated/yet imagined by those deploying it
- Requires some faith and vision
- Not necessarily a strong point of CFO’s in charge of hospitals with no current margins and few, if any, with government/societal support (different than Japan).
Hospital Margins Nationwide
(Including BBA Effects, Without Non-Operating Gains)

The Result:

#1 -- Johns Hopkins: $10 million operating loss projected for FY99

#3, #8 -- Mass General/Brigham and Women’s: Partners Health System $38.8 million operating loss first six months

#4 -- Cleveland Clinic: $13.8 million operating loss first quarter

#6 -- UCLA: 178 FTE reduction in work force

#10 -- Univ. of Penn: $198 million loss FY99

Others:

UCSF-Stanford: system disbanded after $86 million operating loss

Penn State-Geisinger: system disbanded after $25 million operating loss
It’s usually these leading hospitals that “play around” with unproven technology – the early adopters. Who’s going to take the lead if they have no money, they are not developing the applications to obtain an ROI and there is no current ROI?
The Government?

- Maybe!
- Medicare (care for those over 65) will pay extra in 2005 for reporting specific outcomes – a start!
- Eventually will pay for better outcomes.
- Reporting/management of outcomes will drive IT adoption across U.S.
- Up to now, no $ were allocated for coveted federal grants related to IT.
  - 2004 $50 Million from AHRQ for demonstration projects
  - 2005 $100 Million
Nature of IT Benefits – a business classification

- Direct Benefits
- Option Benefits
- Proprietary Benefits
- Strategic Benefits

Adapted from Information Technology for Managers, Applegate et al., 1999 Harvard Business School Publications
Nature of IT Benefits

- **Direct Benefits** -
  - value-added apps bundled with platform
  - many health care informatic companies should be here, but only go so far as to offer platform or incompletely tailored value added apps
  - Mostly “administrative” type analyses
Nature of IT Benefits

- Direct Benefits -
  - Examples of incomplete perioperative information system applications
    - Drug use/cost programs in anes systems
      - No simple mechanism to enter actual costs of drugs
      - No way to account for waste (no way to link to size of vial)
      - No way to deal with erroneous entries polluting database (require each site to set dose range, not linked to wt)
A Direct Benefit –
Managing Perioperative Drug Costs with Informatics

Successful Application of Principle


Lubarsky DA et. al. Using an anesthesia information management system as a cost containment tool: Description and validation. Anesthesiology 86:1161–1169, 1997
Principle - Comparative data is itself a change agent

- Benchmarking is the use of external data (i.e. from someone other than the unit/person being studied) to measure internal processes (i.e. your performance)
- In other words, comparison with known peers.
- IT allows continuous benchmarking
Individual MD Drug Use: Behavior in Response to Data
High Users Revert to the Mean, and Mean Constantly Decreases.

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</tr>
<tr>
<td>Anesthesiologist “Z”</td>
<td>HETASTARCH</td>
<td>125.50</td>
</tr>
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Colloid – Constraining Variable Use

(as a percentage of total patients)

- March 1994: 13%
- March 1995: 12%
- June 1995: 4%
- January 1996: 3%
IT allows Benchmarking

- Evaluating personal data against performance of others VERY powerful
- Everyone – especially those of us with a history of medical school competitiveness – wants to do a better than just average job
Etomidate – Encouraging Appropriate Use

% cases used
% cases ASA 3E-5

Mar-94: 5% cases used, 39% cases ASA 3E-5
Mar-95: 5% cases used, 34% cases ASA 3E-5
Jun-95: 2% cases used, 62% cases ASA 3E-5
Jan-96: 3% cases used, 85% cases ASA 3E-5
Success - $1MM/Year Saved
Nature of IT Benefits

- Direct Benefits -
  - Examples of incomplete perioperative information system applications
    - Billing in America – exact time continuous care is provided by anesthesia team, plus discrete billable events like pain blocks or arterial lines.
    - Automated billing – biggest US issue - not possible w/o recovery room module to record when continuous time stops. Now a few have it (but not easy)
  - No program
    - to calculate true billable time (discontinuous)
    - with intelligence to mandate correct documentation (attestation of work performed)
    - or to link notes of a billable event to a charge
    - or coordination with common billing software (IDX)
Nature of IT benefit: IT Investment Viewed Like Options

- Accept initial negative NPV, as IT projects generate options for future growth
- IT platform = “options” to build value-added apps
- Less risk/project with platform costs sunk through useful life
- Options = Uncertainty. That may not be acceptable in declining margin health industry or in state supported systems with limited funds. JMH CLASSIC!
- Like option, IT investment might not pay off, but useful life and opportunity for growth are key to “valuation”

Kester, HBR, 3-4/1984 and Applegate 1999
Nature of IT Benefits - Options

- This describes most of the work being done in audit function (retrospective analysis of collected data to augment administrative functions) with some emerging real time decision support
- Requires someone to do the programming/searching, as companies not pursuing this work and this talent rarely available except at large academic institutions
- A big one – proving your point in malpractice suit
- Whole point of AHRQ initiative in U.S. is to show how option can become direct benefits
Nature of IT Benefits - Options

Current Audit programs
- Clinical practice guideline feedback (hgb project, beta block)
- Supply and Drug costs
- Automated supply, pharmaceutical and professional billing
- JIT inventory management
- Staffing models
- Narcotics control (JCAHO rules, early recognition of abuse)
- Resident experience monitoring

Decision support
- Lots of talk but rare
- Example to follow
The University of Miami’s Latest Options Benefit - Beta Blocker Guideline adherence

Less Than 25% of Cardiac Risk Patients Entering Screening Clinic are Taking Beta Blockers

- ACC/AHA Risk Factors
  - Taking Beta Blockers: 1195
  - NOT taking Beta Blockers: 196

- Mangano Risk Factors
  - Taking Beta Blockers: 618
  - NOT taking Beta Blockers: 195
Even when following guidelines, imperfect performance:

Many Patients are NOT beta-blocked

Adequate Beta Blockade

Inadequate Beta Blockade

Screening Clinic Heart Rate
Following patients intraoperatively, this puts patients at risk:

Majority of patients taking Beta-blockers have inadequate beta-blockade

![Graph showing heart rate at initial pre-op screening vs. average HR (intraoperative)]
Where we are going with this = Decision Support

- To prospectively take lab/history data entered into preop module, link to pager system, automatically alert preop MD that patient should be on beta blocker, generate prescription prior to closing record, link to email, and automatically notify surgeon of action.

- To take identified patients, and automatically set up beta blocker prompts based on HR intraoperatively and postoperatively (may depend on if PACU module deployed or if Cerner in PACU).

- Postoperatively, link to planned Cerner CPOE system to guarantee post op beta blockers ordered.
Nature of IT Benefits

- Proprietary Benefits
  - IT platform provides competitive advantage independent of applications or platform.
    - At Duke University, 870 practicing MD’s. Accumulating data on their practice in a database could not be matched elsewhere, even with same platform and apps. Could sell to consumers of information. Arbeus — path/history
    - Obtaining periop research contracts may depend on combined issue of size of practice and ability to generate detailed data
Nature of IT Benefits

- Strategic Necessity – If IT required to maintain favorable competitive position
  - not an issue in health care today, but soon may be
  - DOCUMENTING PROCESS OR OUTCOMES -
    - govt, credentialing bodies, empowered patient groups, or employers may demand this (currently entirely voluntary but that will change)
  - “all health care is local” vs. “information is global” (can’t ignore your outcomes once other systems are reporting their outcomes)
Post Operative Nausea and Vomiting: An Example of Difficult Decision Support

- 20-30% of general anesthetics, one of most important patient considerations
- Linking outcome with perioperative process speeds improvement
- Where does an info system fit in?
Factors → PONV

- Prophylactic Rx administered to patients most likely to benefit?
- Best drug/drug combination used?
- Timing of prophylactic Rx optimal?
- Does everyone accept 1,2,3?
PONV and Informatics

- Preop module - Need to be able to search (NO FREE TEXT!) for relevant information, i.e. patient descriptors (wt, age, sex); operation (breast, gyn); history (motion sickness, allergies)

- Intraop— assess administration of emetogenic medicines, prophylactic medicines AND MEASURES (like OG tube), cross reference to type of operation and personnel type

- PONV—is there an ICD-9 code? (non-specific)

- Is there a recovery room module linked so PONV routinely recorded? Frequency and severity too!

- What about the 50% on the floor and at home – how to link to that recorded occurrence? Lack of collection of these endpoints in consistent fashion.

- Finally, we need to make sure these terms and judgments are all defined and standardized in order to compare inter-group and individual performance
Value of IT aided PONV Rx

- Eliminating all PONV may not affect PACU staffing need (Dexter et al), so ? cost reduction
- Possible to get paid more for better outcome? Current pilot project by Medicare does not include PONV, and, even if it does, is that enough?
- Absent $, misaligned payer/benefit in U.S. system
  - Hospital is the one paying for system and its technical administration and may not value the non-clinical effort of physicians to master/use the system
  - the physician has to spend time for process improvement ? Payback. Does “superior” or administrator value that?
  - Patients benefit (should be enough, but mere process improvements that don’t save lives is not enough to make docs do something given hectic schedules)
Finding Value in IT – Near Future!
But how near?

Only when society and/or patient groups demand outcome reporting and money is at stake.
Collins Avenue at night, Miami Beach, Florida.
More Applications

- A highly paid pediatric cardiac anesthesiologist comes to you saying he cannot take it anymore. Carrying the beeper is killing him every other week/weekend. He wants another person hired or a $50,000 raise because the workload is outsized. What do you do with your information system to analyze?
More Applications

- A highly paid cardiac anesthesiologist comes to you saying he cannot take it anymore. Carrying the beeper is killing him every fourth day. He wants another person hired or a $20,000 raise because the workload is outsized. What do you do with your information system to analyze?
More Applications

- A highly paid cardiac anesthesiologist comes to you saying he is being sued unjustly. He gave 30 units of insulin while on pump, and, somewhere down the line in the ICU the patient had a hypoglycemic episode. When he had a full neurologic exam, there was a little compromise. Now everyone is blaming him for inappropriate insulin dosing. How do you utilize your information system?
More Applications

- A highly paid neuro anesthesiologist comes to you saying he is being sued unjustly after a back surgery case. He had 5 minutes of blood pressure $< 90$ mmHg and the patient woke up paraplegic. How do you utilize your information system?
More Applications

- A highly paid neuro anesthesiologist comes to you saying he is being sued unjustly after a back surgery case. He had a drop of 5 torr on his anesthetic record from one 15 minute interval to another recorded, and the patient woke up paraplegic. The patient is claiming an air embolus caused this problem. How do you use your information system to address this?
More Applications

- A highly paid transplant surgeon comes to you saying this one particular anesthesiologist always is having BP problems. He wants this valuable academic anesthesiologist kicked off of the team. How do you utilize your information system to address this dilemma?
More Applications

- The vice chair for surgery is operating on a lady who was crushed by a garbage truck. The orthopedists are addressing multiple fractures on a hip table. About 8 hours into the surgery for multiple trauma, the 40 y.o. patient arrests and dies. The family refuses an autopsy. The surgeon blames the anesthesia team and accuses the anesthesiologist of missing hypovolemia or a pneumothorax. How do you utilize your information system to address this dilemma?
More Applications

- JCAHO arrives in your institution on a mission to look at a pure surgical complication. They note that the hospital bylaws say that QA information will be used in the recredentialing process. As long as they are looking into the surgery dept, they ask the anesthesia dept for this information. Until that moment, you were unaware of this as a formal requirement. How do you utilize your information system?

- You’ve seen that program made in less than a day
More Applications

- The hospital is bankrupt. They need some supply and pharmaceutical cost savings. How do you utilize your information system.
More Applications

- The hospital receives a JCAHO sentinel event alert about awareness under anesthesia. How do you utilize your information system to prove to JCAHO that you are in compliance with the new rules?
More Applications

- The hospital receives a narcotics citation – that the used/waste numbers and anesthetic records don’t match. How do you use the information system to address this?
More Applications

- The hospital wants to prove they are providing the best possible processes/care in
  - PONV
  - Beta Blocker therapy
  - How do you utilize your information system?
Who Is The Information Consumer?

- Patient
- Clinician
- Practice Administrator
- Hospital/Facility Administrator
- Payer/Risk taker (employer)
- Researcher
- Outside organizations
- Anyone with an interest in the charting or audit capabilities of a system
Who Is The Information Consumer?

Patient

- gets accurate legible record, immediately available for future encounters
- better care if system used right
- Portability across systems and providers easy (theoretically)
- Patient self-scheduling?
- Automate pt. education? Possible with e-mail links of diagnosis to web addresses.
Who Is The Information Consumer?

- **Clinician**
  - gets accurate legible record, immediately available for future encounters
  - able to provide better care
  - smart systems/expert systems
    - better adherence to standards, guidelines, documentation needs, *decrement in errors*
  - able to concentrate on providing rather than documenting care
Who Is The Information Consumer?

- **Practice Administrator**
  - impeachable record for medicolegal defense
  - documented billing and compliance
  - more accurate and more complete billing
  - decreased paper/clerical/transcription costs
  - Labor analysis
  - Automated QA – potential for automated education
Who Is The Information Consumer?

- Hospital/Facility Administrator
  - process re-engineering
  - documented billing and compliance
  - more accurate and more complete billing
  - decreased paper/clerical costs
  - Personnel/procedural scheduling optimization
  - Tie in to JIT inventory, accounting, other enterprise wide systems
The clinician as an information consumer
Value of IT aided Process Change

- The direct benefits of the system that affect resource utilization ARE appreciated though
Managing Perioperative Drug Costs with Informatics

Successful Application of Principle –


Lubarsky DA et. al. Using an anesthesia information management system as a cost containment tool: Description and validation. Anesthesiology 86:1161–1169, 1997
We have an ethical duty as members of society to maximize the benefit of limited resources to achieve the greatest good in society.
Scientific advances and economic realities constrain us to evolve from a spirit of “giving” to a practice of directing resources to where they will do the most good.
Goals of Cost Containment

- Minimize cost, maximize value
- Value = Quality/Cost
- Improve or maintain the current high level of patient care
- Maintain the ability of each physician to provide optimal individualized treatment to each patient
Cost vs Quality

Resources
(Cost)

Best practice

Quality
Changing Resource Utilization

- **Medical field**
  - Consensus
  - Good team - one that includes me (the MD) and puts my preferences on the agenda
  - Motivation - good for MD and health of the patient
  - Change agent’s response to recalcitrant doctor - none, beg, cajole

- **Real Business**
  - Corporate will
  - Good team - one that includes varied skill sets and committed individuals with clear charge
  - Motivation - good for profits and health of the business
  - Change agent’s response to perpetually uncooperative employee - my way or the highway
Changing Resource Utilization

- **Medical Business**
  - Use the resource, don’t care who pays for it as long as it’s not me
  - Change negatively affecting doctors = change negatively affecting customers (doctors can take patients elsewhere or patients choose to go elsewhere)

- **Real Business**
  - Use the resource, pay for the resource
  - Change negatively impacting employee, not a customer
Changing Resource Utilization

85% of all dollars spent are ordered by MD's
Change

A four letter word after

- 4 years college
- 4 years medical school
- > 4 years training avg.
- avg. 100K debt
- surviving a hierarchical system where after 12 years finally get to make your own decisions based on what you’ve learned
Changing Resource Utilization

- Medical field evaluation
  - Objection by exception
  - Impact on customers rarely known
    - patients
    - doctors
    - nurses
    - referring entities
  - Problem identifiers predominate
  - Profits

- Real Business evaluation
  - Statistical performance
  - Impact on customers assessed
    - buyers
    - suppliers
  - Problem solvers predominate
  - Profits
Definition: Practice Guidelines

A recommendation of how to use tests and therapies based upon a combination of clinical practice consensus and evidence from the scientific literature.
What We Can Evaluate in a Statistically Valid Way:

- Cost
- Postoperative nausea and vomiting (PONV)
- Patient satisfaction with postoperative pain control

*Everything else happens too infrequently*
Tenets of Successful Drug Use Practice Guidelines

- Identify a problem that would have significant impact if improved
- Grassroots development of guidelines
- Validity based upon literature, or best clinical evidence available
- Unambiguous language; limited number
- Clinical flexibility, statistical profiles instead of formulary restrictions
Tenets of Successful Practice Guidelines

- Provide point-of-service reminders
- Monitor compliance
- Continue long-term individual feedback
- Create incentives for compliance
- Scheduled review or reviewer mechanism for warranted revision
- Measure success
Annualized Drug Expenses

Largest Drug Expenses

- Muscle Relaxants
- Inhalation Agents
- Propofol
- Midazolam
- Colloids
IT allows Benchmarking

- Benchmarking is the use of external data to measure internal processes (In other words, comparison with known peers)
Pancuronium Use -
(% of cases > 90 min. utilizing NMBs)

Mar-94 | Mar-95 | Jun-95 | Jan-96
---|---|---|---
20% | 35% | 75% | 70%

Education | Information System and feedback
Midazolam Distribution

<table>
<thead>
<tr>
<th>Midazolam</th>
<th>% Wasted</th>
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<tr>
<td>Bolus</td>
<td>44%</td>
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<tr>
<td>Infusion</td>
<td>56%</td>
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80% of waste decreased by change in vial size
distributed to anesthesia team

Comparison of drug administered versus vials used based on Duke custom programming of Arkive® automated anesthesia record keeper
Midazolam Default Protocol

- 2 mg vial unless 5 mg size requested
- Use 10 mg rather than 20 mg to set up each infusion
- Before IS, everyone insisted they needed the “big” size
### Individual Anesthesiologist Drug Use – Reversion to the Mean

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Okay, who's it gonna be? Who's it gonna be?
Colloid – Constraining Variable Use
(as a percentage of total patients)

- Mar-94: 13%
- Mar-95: 12%
- Jun-95: 4%
- Jan-96: 3%
Etomidate – Encouraging Appropriate Use

- % cases used
- % cases ASA 3E-5

<table>
<thead>
<tr>
<th>Month</th>
<th>5%</th>
<th>39%</th>
<th>34%</th>
<th>2%</th>
<th>85%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar-94</td>
<td>5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mar-95</td>
<td>5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jun-95</td>
<td>2%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan-96</td>
<td>3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Generating Group Buy-in

- Consistency: Internal beliefs and external manifestations
- Incentive: Individualized feedback is meaningful to competitive people (like Doctors). Constant threat or constant reward
The Duke Experiment

- Muscle relaxants
- Inhalation agents
- Propofol
- Midazolam
- Colloids
### Individual Cost per Drug

<table>
<thead>
<tr>
<th>Anesthesiologist</th>
<th>Agent</th>
<th>Sum of unit costs/month</th>
</tr>
</thead>
<tbody>
<tr>
<td>“A”</td>
<td>Hetastarch</td>
<td>$1237.50</td>
</tr>
<tr>
<td>“B”</td>
<td>Hetastarch</td>
<td>$1125.00</td>
</tr>
<tr>
<td>“C”</td>
<td>Hetastarch</td>
<td>$400.00</td>
</tr>
<tr>
<td>“D”</td>
<td>Hetastarch</td>
<td>$125.00</td>
</tr>
</tbody>
</table>
VALUE=QUALITY/ COST

- Unplanned post-operative mechanical ventilation, no change 3000 patients
- Organ system dysfunction, no change
- PONV, no difference
- PACU actual discharge times, identical
- PACU ready for discharge times, identical
- 1 pt/day MAC admitted to PACU extra
Incidence of N/V Requiring Treatment

Before PG

After PG

% Requiring Rx

OPGen  IPGen  OPMac  IPMac  OPReg  IPReg
Equipment Guidelines
## Clinical Utilization

<table>
<thead>
<tr>
<th>Clinical Variable</th>
<th>CVP</th>
<th>PA catheter (VIP)</th>
<th>PA catheter (Oxi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVEF</td>
<td>Normal &gt;50%</td>
<td>&lt;50%</td>
<td>&lt;35</td>
</tr>
<tr>
<td>MI status</td>
<td>&gt;2 weeks</td>
<td>Recent</td>
<td></td>
</tr>
<tr>
<td>Type of Operation</td>
<td>1° CABG</td>
<td>Valvular</td>
<td>? Redo or MVR</td>
</tr>
<tr>
<td>COPD/Pulm HTN</td>
<td>None/Minimal</td>
<td>Present</td>
<td>Severe or Significant</td>
</tr>
<tr>
<td>Age</td>
<td>&lt;70</td>
<td>&gt;70</td>
<td></td>
</tr>
<tr>
<td>CHF/LVEDP</td>
<td>No or compensated/&lt;15</td>
<td>LVEDP &gt;15</td>
<td></td>
</tr>
<tr>
<td>Chest pain status</td>
<td>None current</td>
<td>Current</td>
<td></td>
</tr>
<tr>
<td>IABP</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

* Treatment may be modified at discretion of physician
Conclusion on Resource Utilization Changes and IT

- Make it *logistically* and *psychologically* easier for physicians to change their behavior than to continue in old habits.
- TRACK VALUE, not just costs.
- Be able to tap the system for accurate ongoing data that YOU CONTROL.
- Then IT aided practice guidelines may be successful.
Implementing IS Projects In a Consensus-Driven Environment
The users have to like it – all else is secondary
Planning an IS Install

- Understand vision of CEO, CIO, MCIS
- Understand current legacy systems and key connectivity required
- Determine critical performance milestones
Planning an IS Install

- Committee of key decision makers: CIO (vision), COO (money), Division director or departmental chair and system feed/connectivity technophile.
- Develop RFP with 3 points from previous slide
- Actual demonstration on site for direct feedback with RFP finalists
Planning an IS Install

- Pick system and develop contract with:
  - time course for installation
  - performance milestones
  - support (software & hardware)
  - upgrades (software & hardware)
  - computer code access/ownership in event of insolvency
Planning an IS Install

- Understand expected value creation of IT and who’s responsible for getting value out.
Costs of an IS

- Hospital infrastructure
  - Space for server & b/u
  - Wiring
  - Mounting
  - Desktop (bedspace)
Costs of an IS #2

- Software and replacement schedule
- Hardware and replacement schedule
- Training costs:
  - initial
  - ongoing for upgrades and new personnel
Costs of an IS #3

- **Support costs**
  - onsite critical function
  - offsite customization

- **Management Time**
  - analysis and use of data
  - feedback and change management
2003 Into The Future - We Will Find Value in Information Technology!

- Move from retrospective analysis of patterns to...
- Smart systems suggesting optimal approach in real time at point of care
- Automating education for those not conforming
- Error prevention, QA
- Better resource utilization
- More efficient, better patient care
FREE anesthesia e-magazine, 16000 subscribers

National editorial board, hosted by Univ of Miami and Duke University

Literature reviews and breaking live convention news

“Ask the experts” feature, not a chat room

Sponsored by educational grants Sign on TODAY!

www.anesthesiaweb.com
Kaiser Permanente makes $2B plans for a more-wired future

August 26, 2000
Kaiser Permanente is like a rich nationalized health system
“It’s a Huge Financial Bet”

- Will begin implementing electronic medical records system in California, home to 6 million of their 8 million members
- Allows them to go virtually paperless in 35 hospital, 423 outpatient clinics and with 11,345 doctors
Will it give Kaiser an edge?

- Eliminates need for huge medical records department
- Reduces prescription errors
- Monitors appropriate treatment
- Kaiser’s team-based approach: give providers simultaneous and immediate access to patient records
What is Kaiser’s take on “who is the information consumer and where is the value?”

EVERYONE & EVERYWHERE!
Capability: Information Framework

- Data elements
- Linkage
- Standardization
- Automation
- Data Quality
- Security
- Data-sharing capability

- From, JAMA 1999
Data Elements

- Data elements (sometimes called “fields”) are descriptive characteristics or properties of people, places, objects, and events.
- An information framework should enable systems to efficiently deliver a prescribed level of detail.
Linkage

- Linkage is the capacity to access, move, and integrate data values for a given enrollee among databases within a health plan.
Standardization

- Standardization is the implementation - by all users within and across health plans - of common definitions such as:
  - structure and content of medical records
  - codes for encounters, procedures, etc.
  - definitions for all entries
  - identifiers for enrollees, clinicians, plans
  - formats for data transfer
Automation

- Automation is the collection, storage, and transfer of data in electronic form
Capability: Data Automation

- The Health Plan Employer Data Information Set (HEDIS) utilization is limited mostly by a lack of clinical data automation

- CPT
- ICD-9
- ADT, to SIS, to Saturn
Data Quality

- Data quality is the extent to which data are valid, reliable, complete and timely.
- Systems can verify data by cross-checking, verifying out-of-range or missing data, and asking users to confirm data values.
- Smart or expert systems.
Security

- Security is the means to prevent unauthorized access
- Access to patient-identification data must be limited to those who have a compelling need
Data Sharing Capability

- Data-sharing capability means that data can be retrieved and exchanged between appropriate entities—such as health plans, clinicians, and public health agencies—when necessary.

- Could save repeated collection of the same data.
Anesthesia Performance

- We concentrate on what we can measure
- We can measure
  a) cost
  b) PONV
  c) satisfaction with post-op pain control
- Everything else happens too infrequently
Cost Per Hour

- Mar-94: $24.52
- Mar-95: $20.07
- Jun-95: $12.63
- Jan-96: $11.46
OUTCOMES ANALYSIS

It’s not cost, it’s value.

Value = Quality/Cost

Value = F(pt) + F(hospital) + F(provider) + F(society)
Unplanned Postoperative Mechanical Ventilation

For patients receiving general anesthesia. 95% confidence intervals of 0.2–1.7% Before and 0.1–1.1% After
Incidence of N/V Requiring Treatment

% Requiring Rx

Before PG

After PG

OPGen  IPGen  OPMac  IPMac  OPReg  IPReg

0  2  4  6  8  10  12  14
OR to PACU Times

Before PG (±7) vs. After PG (±8) Minutes

p < .0001
Events Delaying PACU Discharge

% of Cases

Before PG
After PG

Pain
Wait
Temp
Sat/Vent
CVS
Renal
Admit
A/Comp
S/Comp
Allergy
Ready for Discharge Times

Minutes

99

97

Before PG (±66)

After PG (±75)

p = NS
Actual Discharge Times

- Before PG (±80) minutes: 127
- After PG (±84) minutes: 126

p = NS
Conclusions On Practice Guideline Implementation

- Make it *logistically* and *psychologically* easier for physicians to change their behavior than to continue in old habits
- Measure value (quality/cost), not just cost
- Continuing feedback and good QA/QI require continuous data collection, i.e. IS
Resource Utilization Control Using Information systems

David Lubarsky, MD, MBA
Professor and Chair
Department of Anesthesiology
University of Miami/Jackson Memorial Hospital

and

Adjunct Professor
Fuqua School of Business, Duke University
Basic Truths

- What gets measured gets attention
- What gets rewarded gets done
Resources to Be Controlled/Optimized

- Variable Costs
- Semi-Fixed Costs (Fixed over a Relevant Range)
- Fixed Costs
Resources to Be Controlled/Optimized

- Variable Costs
  - Disposable Equipment
  - Supplies
  - Especially Drugs
  - Alternatives? Incremental analysis
Pharmacy Drug Expense History
(Morris, Central and PCA Pharmacy Areas)
Fiscal Year 1995 Through Current

<table>
<thead>
<tr>
<th>Year</th>
<th>Dollars (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>26,021,900</td>
</tr>
<tr>
<td>1996</td>
<td>26,876,608</td>
</tr>
<tr>
<td>1997</td>
<td>31,927,509</td>
</tr>
<tr>
<td>1998</td>
<td>39,961,122</td>
</tr>
<tr>
<td>1999</td>
<td>44,383,126</td>
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</table>
### FY99 The Top 10 Drugs = 33% of Total Drug Expenses at DUKE

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Manufacturer</th>
<th>Extended Cost</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neupogen</td>
<td>Amgen</td>
<td>$2,301,203</td>
<td></td>
</tr>
<tr>
<td>Taxol</td>
<td>Bristol Labs</td>
<td>$2,041,198</td>
<td>(+Taxotere $373,985)</td>
</tr>
<tr>
<td>Reopro</td>
<td>Lilly, Eli Co.</td>
<td>$2,026,350</td>
<td></td>
</tr>
<tr>
<td>Zofran</td>
<td>Glaxo Inc</td>
<td>$1,665,671</td>
<td>($428,000 2ml vials)</td>
</tr>
<tr>
<td>Ivig</td>
<td>Multiple</td>
<td>$1,528,123</td>
<td>(+Sandimmune $272,837)</td>
</tr>
<tr>
<td>Paraplatin</td>
<td>Bristol Labs</td>
<td>$1,379,117</td>
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<tr>
<td>Epogen</td>
<td>Amgen</td>
<td>$1,059,049</td>
<td>(+Procrit $476,280)</td>
</tr>
<tr>
<td>Diprivan</td>
<td>Zeneva Inc.</td>
<td>$882,960</td>
<td>($458,640 100ml)</td>
</tr>
<tr>
<td>Versed</td>
<td>Roche Labs</td>
<td>$788,999</td>
<td></td>
</tr>
<tr>
<td>Primacor I.V.</td>
<td>Miles Biological</td>
<td>$770,001</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$14,442,671</strong></td>
<td></td>
</tr>
</tbody>
</table>
Resources to Be Controlled/Optimized

- Fixed Costs
  - OR #’s
  - Exam Rooms
  - Bed spaces
  - Equipment to fill these
  - usually sunk
Resources to Be Controlled/Optimized

- Semi-Fixed Costs
  - Labor
    - doctors
    - nurses
    - ancillary
Resources to Be Controlled/Optimized

- Semi-Fixed Costs
  - Very difficult to assess incremental impact of minor process improvements if
    - time/work unit large
    - service time variation is large or unpredictable
    - work day is inconsistent (start time variation common in Duke clinics e.g.)
Resources to Be Controlled/Optimized

- Semi-Fixed Costs
  - Flip side to positively impacting incremental cost analysis is changing productivity
  - LOS is primary measure in hospital, patient visits in outpatient arena
  - Only works if demand (i.e. patients) available to fill up empty time
  - Large unit work-times affect capability to increase productivity (e.g., complex surgery)
Resources to Be Controlled/Optimized

- Semi-Fixed Costs
  - Changes often linked to process re-engineering
  - e.g., Duke’s West-Hudson project
  - patient care is job shop for inpatients, characteristics of assembly line possible for outpatients
    - bottlenecks upstream/downstream in complex work-flow environments
Cost vs Quality

Resources
(Cost)

Quality

Best practice
Terminology

- **Practice Guidelines**: voluntary, consensus definition of optimal use
- **Clinical Care Pathways**: similar concept governing flow of patient care
- **Practice Standards**: strong medical reasons needed to disobey
- **Default Protocols**: deal with efficient distribution of drugs and equipment
Creating a Climate for Change: Benchmarking

- Benchmarking is the use of external data to measure internal processes (In other words, it is comparison with known peers)
- Both parts of the data - the outside and inside - must be reliable
- Helps convince people that they are not yet at the “ideal.”
Generating Group Buy-in with Data

- Consistency: Internal beliefs and external manifestations
- Incentive: Individualized feedback is meaningful to competitive people (like Doctors). Constant threat or constant reward
- Money helps
Motivation to attempt to behave in a certain way is greatest when...

- The individual believes that the behavior will lead to outcomes
- The individual believes that these outcomes have positive value for him or her
- The individual believes that he or she is able to perform at the desired level

Incentive Systems

- **Intangible Rewards:**
  - Taking charge of your practice;
  - Filling leadership roles

- **Monetary Rewards:**
  - To individuals for improvement and compliance
  - To the group as a whole
Incentive Systems

- Carrot
- Stick
- Target (all or none)
- Incremental (varies with success)
Ideal Incentive: Target and Incremental

Start Target

Return
Legal Problems with Direct Incentives

- Recent OIG Rulings
- Incentives to practitioners to limit care in return for direct gain (i.e. receiving a cut of the cost savings) are illegal
- Group gain, or pay/hour OK
Backsliding

- Education efforts alone will fail. They don’t address the need to be consistent.
- Individualized feedback works; it is a constant threat or a constant reward to the naturally competitive among us.
Tenets of Successful Practice Guidelines

- Identify a problem that would have significant impact if improved
- Grassroots development of guidelines
- Validity based upon literature, or best clinical evidence available
- Unambiguous language; limited number
- Clinical flexibility, statistical profiles instead of formulary restrictions
Tenets of Successful Practice
Guidelines

- Provide point-of-service reminders
- Monitor compliance
- Continue long-term individual feedback
- Create incentives for compliance
- Scheduled review or review mechanism for warranted revision
- Measure success
Process Improvement

- Patients of a common type
- Single Process
- Outcome
- Continuous Quality Improvement