COST EFFECTIVENESS IN THE INTENSIVE CARE UNIT

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Outline
- Health Care Costs
  - Overall
  - ICU
- The study of cost analysis
- The topics regarding ICU cost of care
  - Rationing
  - Regionalizing
  - Organization
  - Prevention

Health Care Costs in the US
- Total over $2 Trillion per year
- Over 15% of our Gross Domestic Product
- 190% increase in ICU costs from 1985 to 2000
- Disproportionate share attributed to elderly shortly before death

Disproportionate Cost of Care
- 6% of Medicare recipients >65 years who died, accounted for about 30% of all costs
- 77% of Medicare decedents’ expenditures occurred in last year of life
- 40% occurred in the last month of life
- Inpatient costs accounted for 70% of total decedents’ costs
We spend twice as much per capita on health care but are ranked 38th percentile in life expectancy.

Why Examine ICU Costs?
- 20-30% of all hospital costs
- Greater than 1% of the GDP
- A growing percentage of hospitalized patients receive critical care
- A day in the ICU costs $2500-$4000
- Considerable variation exists in the use of the ICU at the end of life implying potential areas of overuse
  - There is a three-fold regional variation of ICU use in the last 6 months to year of life in the US

Andrew Schorr CEA-Current Opinion in Critical Care 2002
- ICUs account for 10% of all inpatient beds
- ICU's account for 1 out of every 3 dollars spent
- $1 billion was spent on sedation alone at the end of the 1990's
- Increases are in part due to an aging population: Sepsis is predicted to rise by 30%
- Changes in cost are targeted towards disease-specific management, organization and prevention

Neil Halpern, Current Opinion 2009
- Russell Equation: ICU cost per day and relies on American Hospital Association's 'adjusted cost per inpatient day' as its financial underpinning
- National ICU costs are then a product of the Russell equation and the total bed occupancy in ICUs across the country
  - Flaws: "ICU costs" may actually be a reflection of what happened to the patient before going to the ICU and the savings may not be able to be quantified until after they leave
Cost Analysis: Definitions

- Cost Effectiveness Analysis
  - Effectiveness of an Intervention
    - Ability to do more good than harm
  - Resources required to deliver an intervention
  - Usually measured in cost of an intervention per unit gained (such as a year of life gained)
  - Quality-adjusted life year (QALY)
    - Weighted average of health-related quality during a year of increased survival
    - Optimal health=1 Death=0

Cost-effectiveness analysis

- Compares options with one common measure of effectiveness usually expressed as years of life saved
- Allows comparison of many diverse programs: Prehospital injury prevention versus immunization, for example

Cost-Minimization

- Used when two alternatives are considered with very similar outcomes
- Cost-benefit analysis: Outcomes are multiple and may differ and the common denominator can then become dollars
  - Can be expressed as net savings or as a ratio of costs to benefits
Cost utility analysis

- Primary outcome for the impact of interventions becomes based on the quality of that endpoint (QALY)
- For example, in the SUPPORT study, the analysis demonstrated that the cost never fell below $50K per QALY for mechanical ventilation
- Average QALY in >65yo=$46K whereas for younger patients it was $32K; not that different. Prognosis was a much more robust predictor of QALY
- Consider cost vs charge

Rationing

- Triage
- Refusal of admissions
- Discussions of end of life care
- Withdrawal
- Early discharges—All days do not cost the same—early is more expensive than late.
  - May not reduce cost much by discharging a little early

Is the ICU a place to look to reduce Cost?

- Should we reduce the need for elderly and others who appear to have terminal illness
- Terminally ill are often hospitalized and often candidates for Intensive Care
- The ICU is resource intensive

ICU Cost Effectiveness Analysis

- Talmor et al, CCM 2006
- Tabulated and analyzed 48 cost effectiveness ratios from 19 CEA studies
- Wide ranges of cost effectiveness for the same treatment among different groups of patients stratified by risk
  - Mechanical ventilation: QALY ranged from $26K per QALY to $174 per QALY depending on high or low risk of death in the next two months
19 separate studies between 1993-2003
- Defining whether a therapy is cost effective requires judgment of society’s willingness to pay for a QALY or year of life saved
- No consensus but general trend shows that interventions with a ratio of $50-100,000 per year of life gained are acceptable in the US today
  - Lower in many European countries
  - Many interventions then in the US are acceptable
  - HOWEVER, stratifying for risk MAY change the acceptability

SUPPORT Study
- Study to Understand Prognosis and Preferences for Outcomes and Risks of Treatment
- Large cohort study following ICU patients with a 6-month predicted survival probability of 52%
- Findings: Despite interventions to improve end of life care:
  - Many who died spent at least 10 days comatose on mechanical ventilation
  - Many died in pain with DNR orders written 2 days before death

The Important Question
Should we and could we limit health care costs and pain and suffering by limiting ICU care at the end of life?

Costs of Aggressive Care
- Charges were found to be less in patients with a higher likelihood for survival at admission (Detsky et al)
  - Care of non-survivors had increased lengths of stay
  - Increased resource use and mortality is reliable enough that it is used as a prognostic tool to predict outcome (Therapeutic Intervention Severity Score) Cullen et al
Cost Effectiveness in End-Stage Cancer Care

- Less than one fourth of cancer patients requiring MV for respiratory failure survived the ICU or spent more than three months at home before dying (Schapira et al)
- Cost per year of life gained:
  - $95,000 for solid tumors
  - $450,000 for hematologic malignancies

Potentially Ineffective Care

- Esserman et al looked at people who died in ICU or within 3 months of ICU care, and the upper 25% of resource utilization
- If identified prospectively and given only 5 days of ICU care, costs could decrease $1.8-5 million per year
- “Potentially ineffective care” was found to occur less in the Medicare and HMO population in California than in the fee-for-service group (Cher et al)

Terminal Care

- Issuing palliative care orders are associated with reduced costs
- Delivering comfort care in a hospice setting is far less expensive than in the ICU, or IS it?

Inpatient Costs

- Efforts to shift acute care hospitalization to surgery centers and short stay facilities has NOT reduced health care cost, likely due to fixed costs
- Moving dying patients to facilities other than the ICU created cost shifting instead of cost reduction
  - The first ICU days are very expensive but subsequent days may not be as expensive
Patients with Indeterminate Outcomes
- Most expensive ICU patients are not just those with longest lengths of stay but also those with outcomes different than predicted
- SUPPORT and APACHE models are not robust enough to make end-of-life decisions at point of care
- Estimates of cost saving of patients who die in the ICU assumes a perfect ability to predict

Scoring systems and Predictive models
- Not ready for prime time

Rationing as a cost reduction policy would mean:
- Reducing the overall number of beds
- Refusing admission for those who are deemed not to benefit from advanced care
- To date however, this only produces cost shifting
- To date, the Advanced Directive process has not yet be demonstrated to reduce costs
  - Only a fraction of people have them and those that do, they are not always followed

The Rule of Rescue
- Saving health care costs by potentially withholding care at end of life may be MUCH more difficult than looking elsewhere for cost reduction…
- May not be tenable in the US and is facing growing dissatisfaction in Canada
Cost effectiveness in the ICU is a study in contradictions:

- Patients express wishes >90% that they would want to die at home
- Even when patients have advance directives, physicians follow it only half the time
- Patients also expect that everything will be done
- Most would rather be dead than remain on prolonged mechanical support
- Inability or unwillingness of physicians to predict survivability: 1/3 of patients with metastatic cancer die in the hospital receive ICU care

Other Opportunities to Reduce Cost in the ICU

Organizational Components:

- Closed ICUs and protocols are assumed to be cost effective because it is referred to as dominant: more effective and reduced cost
- Critical pathways and protocols are associated with less resource consumption
- Protocolizing care for Traumatic Brain Injury patients is held as a great example of this
- Sedation protocols have demonstrated reduced ventilator time and the complications associated with that (VAP, prolonged immobilization)

Study of Modernization in ICUs in England:

- 96 ICUs studied and underwent modernization and increased capacity in 2000
  - 35% increased ICU capacity!
  - Modernization included VAP prevention bundles, sepsis and central line bundles
- Annual costs and QALYs were calculated
- ICU mortality fell 11% and hospital mortality fell 13%
- Changes were relatively cost effective
Modernization Study

Other Outcomes
- Significant reduction in length of stay
- Therefore mean incremental costs were reduced
- QALY was increased (adjusted for patient mix)
- Hospital mortality was reduced 2% per year whereas hospital mortality did not decrease at all in the two years prior to the change

Caring for ICU patients outside of the ICU
- Perioperative clinical pathways in order to fast track and use enhanced postanesthesia care units
- Development of ward models in sub-intensive, step down and intermediate care units
  - Less expensive with less staff ratios and reduced fixed costs
  - Non-invasive ventilation and telemetry can be provided in these wards at less overall cost

Trauma ICUs
- Specific trauma ICUs reduced LOS and overall costs significantly
- Run by dedicated trauma intensivists and nurses

Care by Intensivists
- Managed care affects end-of-life care by having dedicated intensivists care for ICU patients (Pronovost)
- Medical ICU patients cared for by Non-intensivists were shown to have a higher ICU LOS and hospital mortality (Kollef et al., CCM 2009)
- Physicians working in the ICU may be able to reduce costs by utilizing advanced directives and having patient and family discussions regarding palliative care when appropriate
Prevention Efforts

- Typically very cost effective
- VAP precautions
- DVT prophylaxis
- GI prophylaxis in a selected group
- Podis boots
- Continuous subglotic succioning proved to save $5000 per VAP averted
- QALY does not distinguish between good death and bad death

What about other expensive diagnostics and interventions

- MRI for equivocal neurologic findings
- Waste in the operating room
- Reducing fixed costs
- Reduction of medical/surgical errors
- Preventive care particularly for the uninsured

Regionalizing Critical Care

- Achieves economic benefit by reducing duplication of regional services
- May lead to less variability in care and improved outcomes
- Downside is that it may produce personal and economic strain on families, amongst other issues
- Still, studying military and disaster relief units may be helpful

Stay Tuned- CEA unknown

- CRRT
- Modern sepsis treatment
- 24 hour intensivist care?!?!?
  - Who won??
Summary of Potential Savings of Lives and $$ $$

- Rationalizing is not ready for prime time
  - Examine our Advance Directive process in the US
  - There is not a perfect predictive model
  - Deep communication with patients and families is critical
- Prevention efforts save lives and $$
- Regionalizing certain aspects may make sense
- Organizational protocols and staff
  Intensivists may save lives AND $$ $$