



'Cost Effective' Measures

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Topical Focus

- Cost effectiveness is a critically important topic in 2013 and beyond.
- Current resource levels are stretched, but demands for services are ever-increasing.
- Accountability in many forms abounds as systems attempt to maximize the reach of over taxed resources.





Topical Focus (cont'd)

- Telerehabilitation is seen as a way to improve the quality of services and enhance accessibility.
- Improving service accessibility using TR to avoid putting in place traditional service delivery entities can help to ease the burden on resources.
- A key component of the cost effectiveness discussion is benefit: cost.



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Background

- Telerehabilitation is still in its infancy, but undergoing rapid development.
- But the question such as 'Is telerehabilitation cost-effective?'
- Depends upon its context and the comparator chosen for analysis.
- Number of different costs associated with the development and operation of 'telerehabilitation' services.



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Why do an Economic Evaluation

- Demonstrate Value
 - Going forward this is become increasingly important for new technologies
 - Payers are getting increasingly sophisticated in this regard



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What is Economic Evaluation

Use of applied analytic methods to identify, measure, value, and compare costs and consequences (outcomes) of alternative strategies/deliveries





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Types of Economic Evaluation

Economic Evaluation	Valuation of Costs	Identifying Consequences	Valuation of Consequences
Cost effectiveness	Monetary Units	Single common effect of interest for alternatives	Natural Units (wheelchair falls, averted pressure ulcers, blood pressure reduction)
Cost benefit	Monetary Units	analyzes the positive outcomes (i.e. benefits) as well as the negative outcomes (i.e. costs)	Monetary Units

Bryce Sutton, PhD: An Introduction to Economic Evaluation, March 7, 2013



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Cost Literature

Kairy, D., Lehoux, P., Vincent, C., and Visintin M. A systematic review of clinical outcomes, clinical process, healthcare utilization and costs associated with telerehabilitation. *Disability and Rehabilitation*, 2009. 31(6): p. 427-447.

- Reduced costs or better resource utilization is often cited as one of the main goals of telerehabilitation.
- While the studies indexed included calculations of costs incurred or saved from an organizational or patient perspective, the costs were not related to the other clinical, process or healthcare utilization outcomes.
- Other important notes:
 - Availability of current programs if telerehab is introduced
 - Costs changing over time, sensitivity analyses
 - Whether the goal of the program is in fact direct cost savings

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Cost Literature

Whitten, P., Kingsley, C., & Grigsby, J. (2000). Results of a meta-analysis of cost-benefit research: is this a question worth asking? *Journal of Telemedicine and Telecare*, 6, 4-6.

- Specific Variables equipment costs, line charges, standard ancillary care costs (i.e. laboratory service), standard hospital costs, patient non-emergency transportation fees, consultant fees, and support staff.
- No **uniformity** in cost analyses with each study employing different sets of variables & methods.

Mair, F.S., Haycox, A., & Williams, T. (2000). A review of telemedicine cost-effectiveness studies. *Journal of Telemedicine and Telecare*, 6, 38-40.

- Evaluate the effect of changes in resource use from the perspective of patients as well as providers.
- Need to assess the comparative alternative.
- Majority of analyses have been undertaken in selected patient groups and/or geographical locations.

Cost Literature

Reardon, T. (2005). Research findings and strategies for assessing telemedicine costs. *Telemedicine and e-Health*, 11, 348-370.

- Research has yet to establish a sufficient body of finding for understanding telemedicine cost.
- The essence of the cost evaluation is identifying the alternative that provides the greatest value in relation to the opportunity costs. This may be described in three basic steps:
 1. Identify and aggregate the costs of each health-care alternative.
 2. Identify and aggregate valued outcomes of each alternative.
 3. Compare the aggregated relative, "value for cost," for each alternative



Cost Literature

Telemedicine Business Strategy Literature Review: Prepared for American Telemedicine Association Business and Finance Special Interest Group. December 2012. Contact Dr. Cynthia M LeRouge

- Focused on healthcare domains (Organization Planning, Telemedicine Planning, Services/ Approaches, Cost Analysis-ROI) will be conducting review on terms such as 'finance & cost-effectiveness.'



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Main Challenges/ Critiques

- Constantly changing technology (increased expenses);
- Lack of appropriate study designs with mixed results;
- Sustainability of applications;
- Valuation of health outcomes;
- Provider versus patient perspectives; and
- No uniformity of variables to measure 'cost'



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DEA AS A 'COST' MODEL



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Overview of DEA

- Data Envelope Analysis (DEA) is a non-parametric quantitative analysis tool.
- It is based on linear programming (optimization process) and comes from the field of Operations Research.
- It computes productivity, efficiency (benefit: cost) or effectiveness within a group of performance units.



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Overview of DEA (cont'd)

- DEA compares outputs to inputs, productivity, efficiency (benefit: cost) or effectiveness, equating to a lean investment of outputs to inputs or 1.0 (ideal benefit: cost index).
- In using DEA for TR, we are looking at outputs/ inputs or benefits to costs.
- Appropriate theoretical specification is key with DEA to generate meaningful results.



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Overview of DEA (cont'd)

- DEA identifies best performers within a cohort without reference to a theoretical standard.
- DEA handles complex mixes of input and output variables with no need to match different units of measurement across the variables.
- DEA pinpoints degree of improvement needed and specific variables to modify.



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Overview of DEA (cont'd)

- DEA can examine the efficiency or effectiveness (benefit: cost) of a group of rehabilitation service providers before/ after the implementation of TR technology to see the pre/ post difference the delivery mode makes in benefit: cost.
- DEA can be used with cross-sectional and panel data.



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DEA Illustrations



- Generic Non-TR example with data
- Community mental health agency exploration of efficiency or benefits: costs
- Outputs = (units of case management services [hours])(units of day support services [days])(units of emergency services [hours])
- Inputs = (total FTEs)(total clients)(total expenditures)



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DEA Illustrations (cont'd)

	Iota Value (Benefit: Cost Index)	Percentage of Modification/ Improvement Needed	Specific Variable Modifications Suggested
Community MH Agency 1	1.0 (ideal benefit: cost index)	NA	NA
Community MH Agency 2	0.71	29%	Increase outputs: units of emergency services by 3823.13 and day support by 16,107 units AND decrease inputs: FTEs by 3.86.
Community MH Agency 3	0.58	42%	Increase outputs: units of ES by 331.25 and case mgt by 2946 units AND decrease inputs: FTEs by 1.2.

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DEA Illustrations (cont'd)

- UPMC Physician Practice Group TR example with data
- UPMC General Medicine Practice Group that provides traditional and some integrated TR services
- $\text{Outputs} = (\text{UPMC revenue}) / (\text{other revenue})$
- $\text{Inputs} = (\text{physician salary}) / (\text{staff salary}) / (\text{supplies}) / (\text{malpractice expenses}) / (\text{purchased services})$

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DEA Illustrations (cont'd)



	Iota Value (Benefit: Cost Index)	Percentage of Modification/ Improvement Needed	Specific Variable Modifications Suggested
General Medicine Practice Group 1	1.0 (ideal benefit: cost index)	NA	NA
General Medicine Practice Group 2	0.66540	33.46%	Increase outputs: other revenue by \$212.60 AND decrease inputs: supplies by \$957.24, malpractice by \$92, and purchased services expenses by \$6530.
General Medicine Practice Group 3	0.78321	21.679%	Increase outputs: other revenue by \$9177.33 AND decrease inputs: malpractice by \$183.60 and purchased services expenses by \$1675.

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DEA Illustrations (cont'd)

- Theoretical example with CSEP TR project.
- Outputs/Inputs:

$$\frac{(\text{prog completion rate})(\text{mean \% improvement in social fx pre to post})(\text{mean \% improvement in fx ratings pre to post})(\text{satisfaction})}{(\text{scheduling costs})(\text{document storage costs})(\text{admin support costs})(\text{clinician time costs})}$$

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DEA Illustrations (cont'd)

- Theoretical example with ASERT TR project.
- Outputs/Inputs:
 (# of ADOSs completed)(degree of improved accessibility to ADOS) / (ADOS admin costs)(infrastructure costs)(training costs)



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DEA Illustrations (cont'd)

- Theoretical example with Spina Bifida TR project.
- Outputs/Inputs:
 (clinical outcomes)(functional outcomes)(medical outcomes) (satisfaction) / (clinician time)(tech costs)(tech support staff time)(cost of staff training on technology)



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General Open Discussion & Questions and Answers

THANK YOU.....



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