

PHSSR Research-In-Progress Webinar
Wednesday, August 27, 2014

***Priorities in Rural Health:
Cost-effectiveness Analysis of Fungal
Meningitis Outbreak
in New River Health District***

Conference Phone: 877-394-0659

Conference Code: 775 483 8037#

Please remember to mute your computer speakers during the presentation.

**PUBLIC
HEALTH** |||

SERVICES & SYSTEMS RESEARCH
PRACTICE-BASED RESEARCH NETWORKS

NATIONAL COORDINATING CENTER

AT THE UNIVERSITY OF KENTUCKY COLLEGE OF PUBLIC HEALTH

**PUBLIC
HEALTH** |||

SERVICES & SYSTEMS RESEARCH
PRACTICE-BASED RESEARCH NETWORKS

Agenda

Welcome: **C. B. Mamaril**, PhD, National Coordinating Center for PHSSR

Presenter: **Kaja Abbas**, PhD, MPH, Assistant Professor, Dept. of Population Health Sciences, Virginia Tech

Commentary:

- **Kerry Redican**, PhD, MPH, research mentor, Professor, Virginia Tech Carilion School of Medicine
- **Molly O'Dell**, MD, MFA, Director, New River Health District, Virginia Department of Health

Questions and Discussion

PHSSR Research in Progress Series

Pre and Post Doctoral Research Awards (2013-4)

- 10 one-year awards with mentor & Center support
- Recordings available:
 - **May 14 -- Local Health Department–Hospital Collaborations in New York State: A Natural Experiment**
Chris Maylahn, MPH, Office of Public Health Practice, New York State Dept. of Health <http://connect.uky.edu/p69fyfw4q3o/>
 - **June 18 -- Health Care Reform: Colorectal Cancer Screening Expansion and Health Disparities**
Michael Preston, MPH, PhD, Cancer Control, University of Arkansas for Medical Sciences <http://connect.uky.edu/p4p2yumgzqp/>
 - **Aug 13 - Quantifying the Value of Public Health Intervention**
Theresa Green, PhD, MBA, MS, Center for Community Health, U. of Rochester Medical Center <http://connect.uky.edu/p806n4ek68a/>

PHSSR Research in Progress Series

Mentored Research Development Awards (2012-4)

- 24-month awards, mentored by researchers & public health practitioners
- Recordings available:
 - **Jan 15 -- Racial Disparities in Access to Public Water and Sewer Service in North Carolina: An Analysis of Public Health Impacts & Policy Solutions**
Jacqueline McDonald Gibson, PhD, UNC Gillings School of Global Public Health
<https://connect.uky.edu/p3eaivn7bcy/>
 - **Jan 22 -- Applied Economic Modeling: Tuberculosis Control**
Thaddeus L. Miller, PhD, School of Public Health, University of North Texas Health Sciences Center <https://connect.uky.edu/p5sffjdzvo9>
 - **Feb 5 -- Collaborative Governance to Support Exchange of Public Health-Relevant Data**
Holly Jarman, PhD, Center for Law, Ethics & Health, U. of Michigan School of Public Health
<https://connect.uky.edu/p68do95av7w/>
 - **Feb 12 -- Building an Evidence-Base for Social Media Use in Public Health Practice**
Jenine K. Harris, PhD, Assistant Professor, George Warren Brown School of Social Work, Washington University in St. Louis <http://connect.uky.edu/p8zzhvee42j/>

Presenter



Kaja Abbas, PhD, MPH,
Assistant Professor
Department of Population
Health Sciences
Virginia Tech

Priorities in Rural Health: Cost-effectiveness Analysis of Fungal Meningitis Outbreak in New River Valley

Kaja Abbas

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Priorities in Rural Health: Cost-effectiveness Analysis of Fungal Meningitis Outbreak in New River Valley

Kaja Abbas, PhD, MPH

Nargesalsadat Dorratohtaj, MS, MPH

Paige Bordwine, MPH

Margarat O'Dell, MD, MFA

Thomas Kerkering, MD

Kerry Redican, PhD, MSPH, MPH



VirginiaTech



New River Valley

New River Health District



Study objective

- To conduct cost-effectiveness analysis of the fungal meningitis outbreak in New River Valley from the local health department perspective.

Fungal meningitis

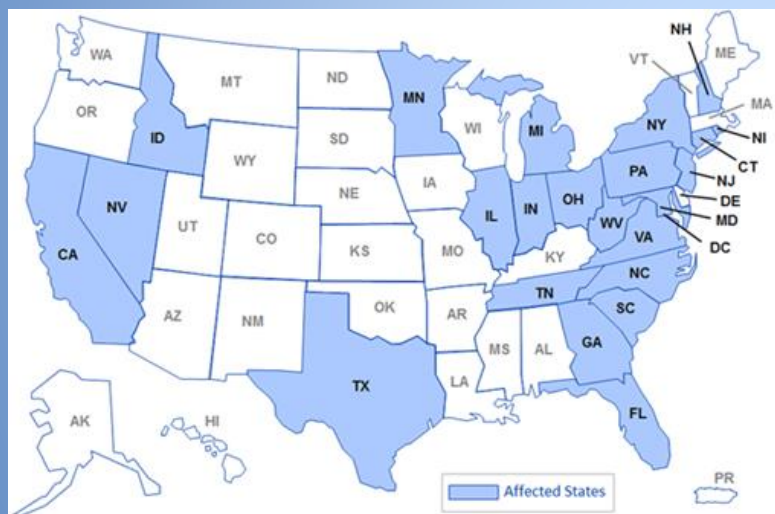
- Fungus
 - *Exserohilum rostratum*
- Symptoms
 - headache
 - stiff neck
 - fatigue
- Non-contagious
- Treatment drug
 - voriconazole
- New England compounding center
 - contaminated lots of methylprednisolone acetate
 - used in epidural spinal injections



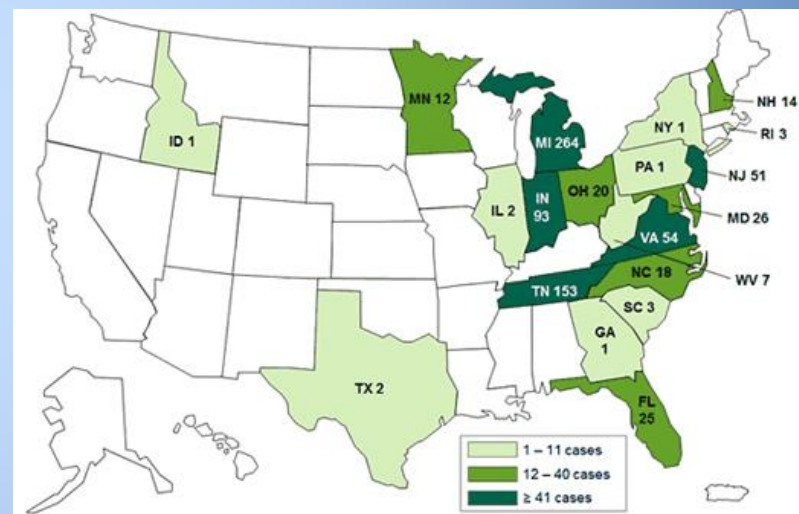
Fungal meningitis outbreak

- Health facilities

- 23 states
 - received contaminated lots



- 20 states
 - 751 cases
 - 64 deaths



CDC (2013)

- Virginia
 - 54 cases
 - 5 deaths

Multisectoral public health response to the fungal meningitis outbreak

CDC and FDA

State Health Department

Local Health Department

Clinical: Hospitals and Pharmacies

Immediate Caregivers:
Family and Friends

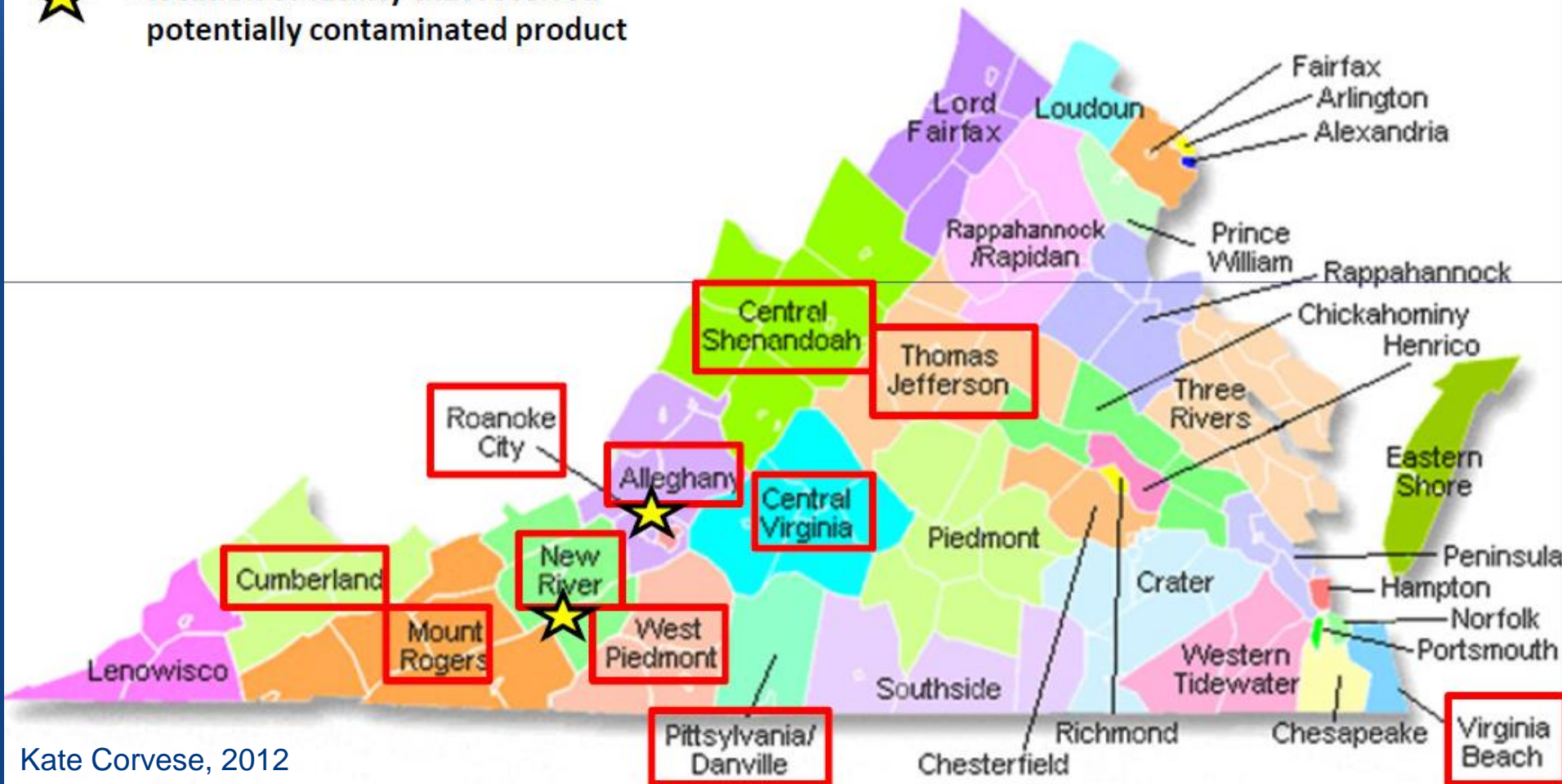
Patients

Fungal meningitis outbreak (2012)

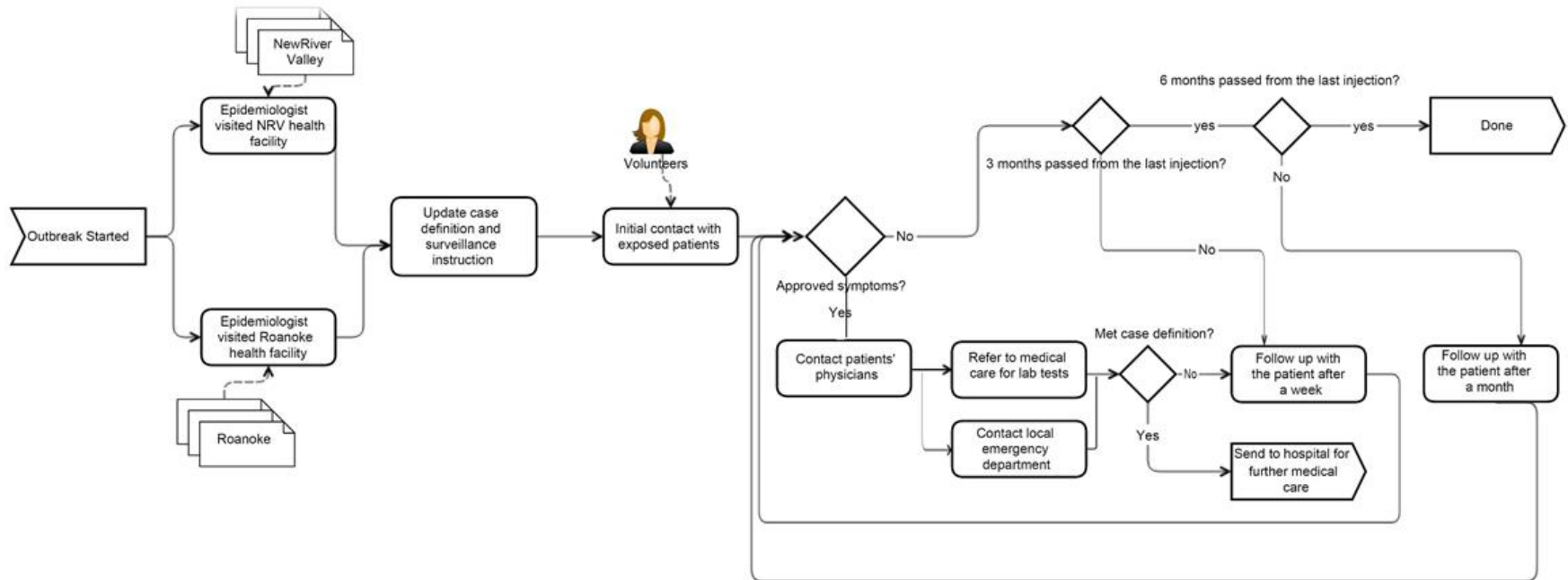
New River Valley

94 exposed residents

★ = location of facility that received potentially contaminated product



Surveillance process



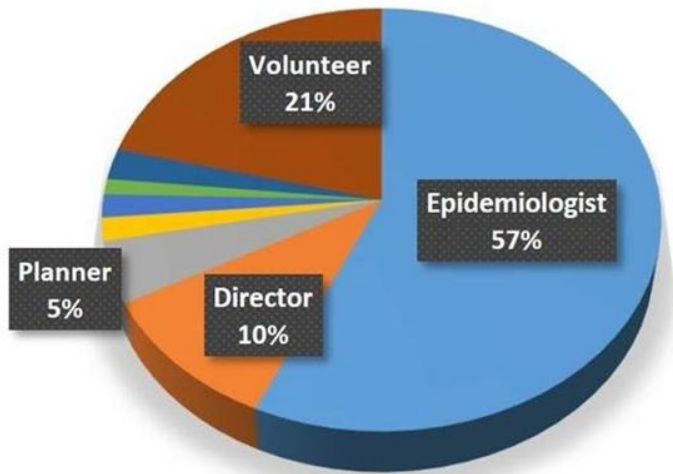
Incremental cost-effectiveness ratio

- Costs
- Effectiveness
- Perspective
 - Local health department
- New intervention
 - outbreak response
- Control
 - no intervention

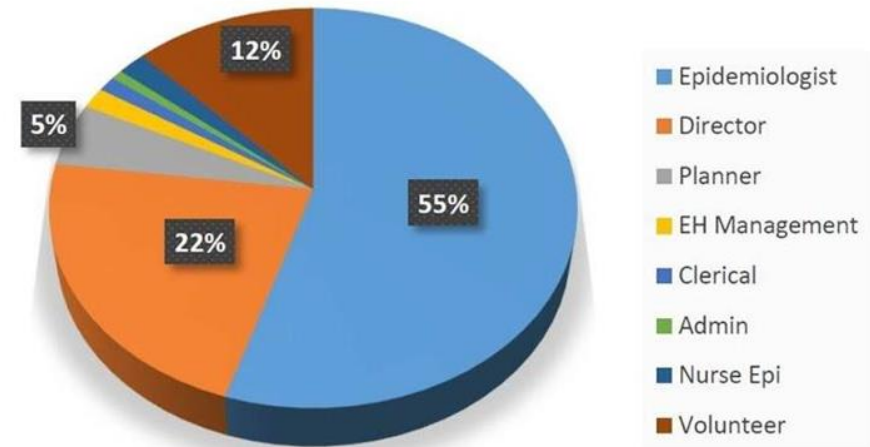
$$ICER = \frac{Cost_{\text{new intervention}} - Cost_{\text{control}}}{Effectiveness_{\text{new intervention}} - Effectiveness_{\text{control}}}$$

Time & cost

Hours



Cost



- Epidemiologist
- Director
- Planner
- EH Management
- Clerical
- Admin
- Nurse Epi
- Volunteer

Cost

NRHD Division	Cost
Epidemiologists	\$16,748.5
Director	\$6,746.9
Planner	\$1,558.7
EH Manager	\$511.0
Clerical	\$372.8
Admin	\$240.0
Nurse Epi	\$575.5
Volunteers	\$3,739.5
Total	\$30,492.9

Effectiveness - *DALY*

$$DALY = YLL + YLD$$

- *DALY*
 - Disability Adjusted Life Year
- *YLL*
 - Years of Life Lost due to premature death
- *YLD* (Years Lived with Disability)
 - Years of Life Lost due to Disability
 - population: (prevalence) * (disability weight)
 - individual: (years with disability) * (disability weight)
- $DALY = YLL + YLD$

One DALY equals one lost year of healthy life.

Effectiveness - *DALY*

$$DALY = YLL + YLD$$

DALY

Disability Adjusted Life Years is a measure of overall disease burden, expressed as the cumulative number of years lost due to ill-health, disability or early death

$$= \text{YLD} + \text{YLL}$$

Years Lived with Disability + Years of Life Lost



- **Disability weight**
 - fungal meningitis - 0.615

Effectiveness - DALY

$$DALY = YLL + YLD$$

Parameter	Estimation
DALY	2.87+97.65=100.52
YLL (outbreak response)	10.15 years
# of potential cases	7
Case Fatality	10%
Average life expectancy in Virginia	79 years
Average age of exposed patients	57 years
YLL (no response)	107.8 years
# of potential cases	7
Case Fatality	70%
Average life expectancy in Virginia	79 years
Average age of exposed patients	57 years
YLL	10.15-107.8= 97.65
YLD (outbreak response)	2.87 years
Disability Weight	0.615, [0.613,0.616]
Average duration of Disease	8 months [3 months- 1yr]
YLD (no response)	0
YLD	2.87

ICER

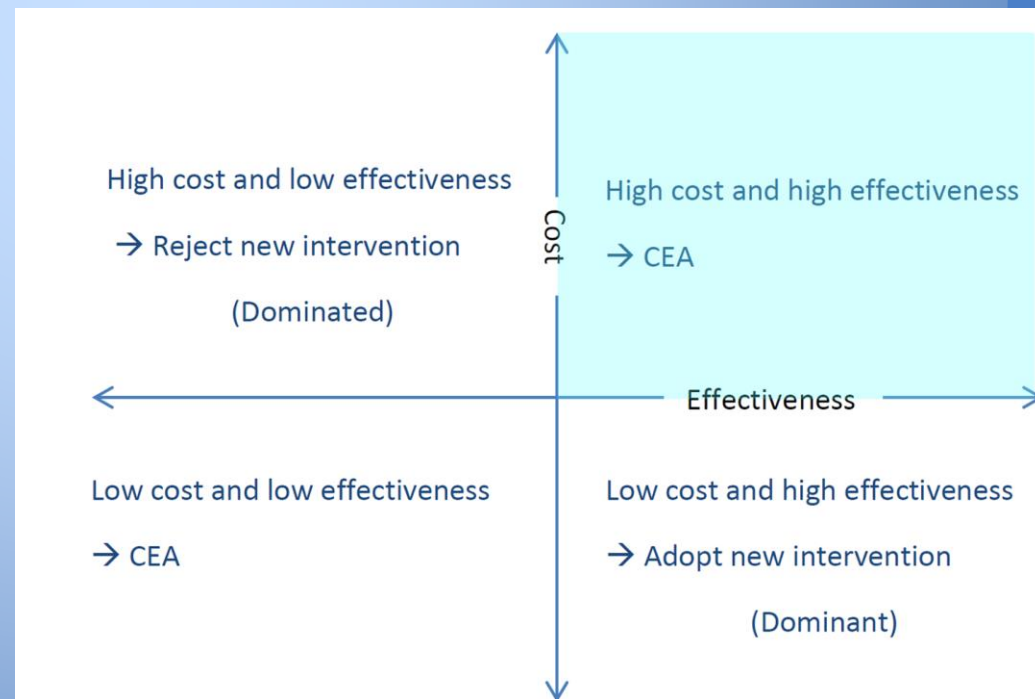
$$ICER = \frac{\text{Cost}_{\text{new intervention}} - \text{Cost}_{\text{control}}}{\text{Effectiveness}_{\text{new intervention}} - \text{Effectiveness}_{\text{control}}}$$

Incremental Cost-Effectiveness Ratio

DALY = 100.52 *DALYs averted*

Cost of Intervention = \$30,493

ICER = \$303 / DALY averted



Limitations

- Local health department perspective
 - partial estimation of total outbreak response costs
- No confirmed case of fungal meningitis
- Disability weight estimation of fungal meningitis

Public health significance & limitations

- Significance

- Fungal meningitis epidemiological impact in Virginia
 - 54 cases
 - 5 deaths
- New River Valley
 - 94 exposed residents

- Implications

- Assist decision makers at local health department to estimate costs and effectiveness of outbreak response
- Prioritization of limited resources

Cost-effectiveness thresholds

Table 15.4 International thresholds for cost-effectiveness

Organization/group	Cost-effectiveness thresholds	Reference
Australia*	Costs per LYG < AU \$ 42,000 – 76,000 (costs per LYG < AU \$ 42,000: reimbursement likely, costs per LYG > AU \$ 76,000 reimbursement unlikely)	George et al. (2001)
The Netherlands	Costs < € 20.000 per QALY or LYG: cost-effective* Costs < € 80.000 per QALY: cost-effective**	Welte et al. (2004c); Raad voor de Volksgezondheid & Zorg (2007)
UK National Institute of Clinical Evidence (NICE)*	Costs per QALY < £ 20,000–30,000: cost-effective Costs per QALY < £ 45,000: cost-effective	Devlin and Parkin (2004); Appleby and Devlin, Parkin (2007)
US Institute of Medicine (IOM)**	Saves money and QALYs: most favorable Costs per QALY < US \$ 10,000: more favorable Costs per QALY > US \$ 10,000 and < 100.000: favorable Costs per QALY > US \$ 100,000: less favorable	Institute of Medicine (2000)
World Health Organization (WHO)**	Costs per DALY < GDP per capita: highly cost-effective Costs per DALY = 1x – 3x GDP per capita: cost-effective Costs per DALY > 3x GDP per capita: not cost-effective	WHO (2008)
International and especially US decision analysts**	Costs per QALY or LYG < US \$ 50.000: cost-effective	Grosse (2008)
US and British health economists**	Costs per LYG < US \$ 60.000: cost-effective	Newhouse (1998)

* Thresholds derived from past decisions

** Officially stated thresholds

LYG = Life year gained

QALY = Quality-adjusted life year

GDP = Gross domestic product

Related upcoming presentations

- 2014 APHA annual meeting, New Orleans
 - Nargesalsadat Dorratohtaj
 - Economic Evaluation of 2012 Fungal Meningitis Outbreak in New River Valley
 - Session 3040.0: Health administration round table: Innovations in health administration
 - Monday, November 17, 2014: 08:30 AM - 10:00 AM
 - Abstract ID: 307051
 - Kaja Abbas
 - Economic Evaluation of Outbreak Responses of Pertussis, Tuberculosis and Fungal Meningitis in New River Valley, Virginia
 - Session 5052.0: Model practices in program evaluation
 - Wednesday, November 19, 2014: 8:30 AM-10:00 AM
 - Abstract ID: 308705

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 - Organizers
 - Ann Kelly
 - Cezar Mamaril
 - Participants

Thank you!!

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Commentary

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Director, New River Health District,
Virginia Department of Health



Questions and Discussion

Future PHSSR Research in Progress Webinars

All webinars from 12-1 pm, ET

Sept 10 – Improving HIV/STD Partner Services Performance in New York State: A Performance Management Approach

Britney Johnson, MPH, AIDS Institute/Office of Public Health Practice, New York State Department of Health

*Commentary: Sylvia Pirani, MPH, Office of Local Health Services, NYS Dept. of Health
James Tesoriero, PhD, HIV Prevention Director, NYS Dept. of Health*

Sept 24 - State Health Department Foodborne Disease Outbreak Reporting

Fanta Purayidathil, PhD, Health Economics and Outcomes Research, Boehringer Ingleheim

Commentary: Jennifer Ibrahim, PhD, MPH, Dept. of Public Health, Temple University

Oct 8 – Variations in the costs of delivering public health services: An analysis of local health departments in Florida

Simone Singh, PhD, University of Michigan School of Public Health

Commentary: Patrick Bernet, PhD, Florida Atlantic University

Future PHSSR Research in Progress Webinars

All webinars from 12-1 pm, ET

Oct 22 – Relationship Between Public Health Workforce Competency, Provision of Services, and Health Outcomes in Tennessee

Robin Pendley, DrPH, *formerly* Health Services Management and Policy, College of Public Health, East Tennessee State University

Nov 12 – Trends and Characteristics of the State and Local Public Health Workforce

Angela J. Beck, PhD, MPH, Associate Director, Center of Excellence in Public Health Workforce Studies, University of Michigan

Dec 10 – Integrating Public Health and Healthcare: Lessons from One Urban County

Erik L. Carlton, DrPH, Health Systems Management and Policy, School of Public Health, University of Memphis

Commentary: Paul Erwin, MD, DrPH, Dept. of Public Health, University of Tennessee

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