

Health Care Provider Performance Review

Presentation for World Bank workshop, September 5, 2014

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HCPP Sept 2014 v3 (30 min - World Bank workshop)(few extra slides).ppt

last updated: Sept 3, 2014

Health Care Provider Performance Review: Systematic review of strategies to improve health care provider performance in low- and middle- income countries

Near-final results



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Background

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- In LMICs, however, HCP performance often inadequate (i.e., adherence to clinical guidelines)

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- In LMICs, however, HCP performance often inadequate (i.e., adherence to clinical guidelines)
- Ex: review by Holloway *et al.** of 900 studies from 1990–2009 found proportion of patients treated according to standard guidelines was:
 - 40% in public facilities
 - <30% in private, for-profit facilities

* *Trop Med Int Health* 2013; 18 (6): 656–664.

Background

- Many strategies exist to improve performance, and summary of evidence would be useful
- Existing reviews have limitations, with key limitation being that they typically focus on one strategy (e.g., job aids, or audit & feedback)
- Decision-makers, however, often ask broader question: What are most effective ways to improve performance?
- To answer this broader question, one needs to compare multiple strategies

HCPP review: Objectives

Conduct systematic review of all strategies to improve HCP performance and related health outcomes in LMICs, and produce:

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Methods: inclusion criteria

- Any study of effectiveness of any strategy to improve HCP performance in LMIC, on any health topic, in any language, published or not
- HCP. Any facility- or community-based health worker, pharmacists, shopkeepers who sell drugs, private sector

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- HCP. Any facility- or community-based health worker, pharmacists, shopkeepers who sell drugs, private sector
- Literature search
 - 15 electronic databases of published studies (e.g., MEDLINE), completed in 2006
 - Document inventories of 30 organizations for unpublished studies, completed in 2008

Methods: eligible study designs

- Pre-post with comparison (+/- randomization)
- Post-only with randomized controls
- Interrupted time series (≥ 3 data points before and after intervention)

Methods: screening and data abstraction

- Titles and abstracts from search screened
- Performed double, independent data abstraction
- Queries often sent to study authors for clarifications and additional details

Methods: analysis of effect sizes

- Effect size in terms of %-point change
- Example formula for outcomes expressed as %:
Effect size = $(FU - BL)_{\text{intervention}} - (FU - BL)_{\text{control}}$
- Calculated effect size such that positive values mean improvement

Defining strategy groups

- Goal = groups neither too specific, nor too broad
- Approach
 - Determined which individual strategy components were used (e.g., training + supervision = 2 components)
 - Created 10 component categories (e.g., training, supervision, incentives, etc.). Not based on effect size
 - Defined strategy groups as unique combinations of 10 component categories, for example:
 - Training only
 - Training + supervision
 - Training + supervision + incentives
 - Etc.

Defining which results can be compared

- Studies used wide variety of outcomes; probably inappropriate to include all in same analysis (e.g., outcomes on mortality and history-taking)
- For more of an “apples–apples” comparison, data were divided into 24 subgroups, based on:
 1. Outcome category (6 general categories)
 2. Outcome scale (dichotomous/% vs. continuous)
 3. HCP type (all HCPs vs. CHW-only studies)
- Only compare results within subgroups
- This presentation: process outcomes (%) (e.g., % of patients correctly treated)

Making comparisons that minimize bias:

Primary analysis

- Only include strategy vs. control comparisons (no head-to-head studies)
- Results from studies with >1 primary outcome summarized by median effect size (MES)

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- Results from studies with >1 primary outcome summarized by median effect size (MES)
- Effect sizes adjusted for differences in effect modifiers (i.e., factors that influence effect size, regardless of strategy): baseline performance & public HF setting
- Compare MES distributions of various strategies: weighted medians, IQRs
- Weight = $1 + \ln(\text{no. of HCPs or service provision sites})$

Making comparisons that minimize bias:

Primary analysis

- For strategies with greatest effectiveness, check for “confounding by limited variability” (i.e., are high effect sizes due to studies from settings unusually well suited for strategy?)
- Broaden strategy definition to include more studies with same basic strategy, and see if results change; large decreases indicate bias

Making comparisons that minimize bias: Secondary analysis

- Meta-analysis
- Meta-regression
- Network meta-analysis, which includes head-to-head studies

Results

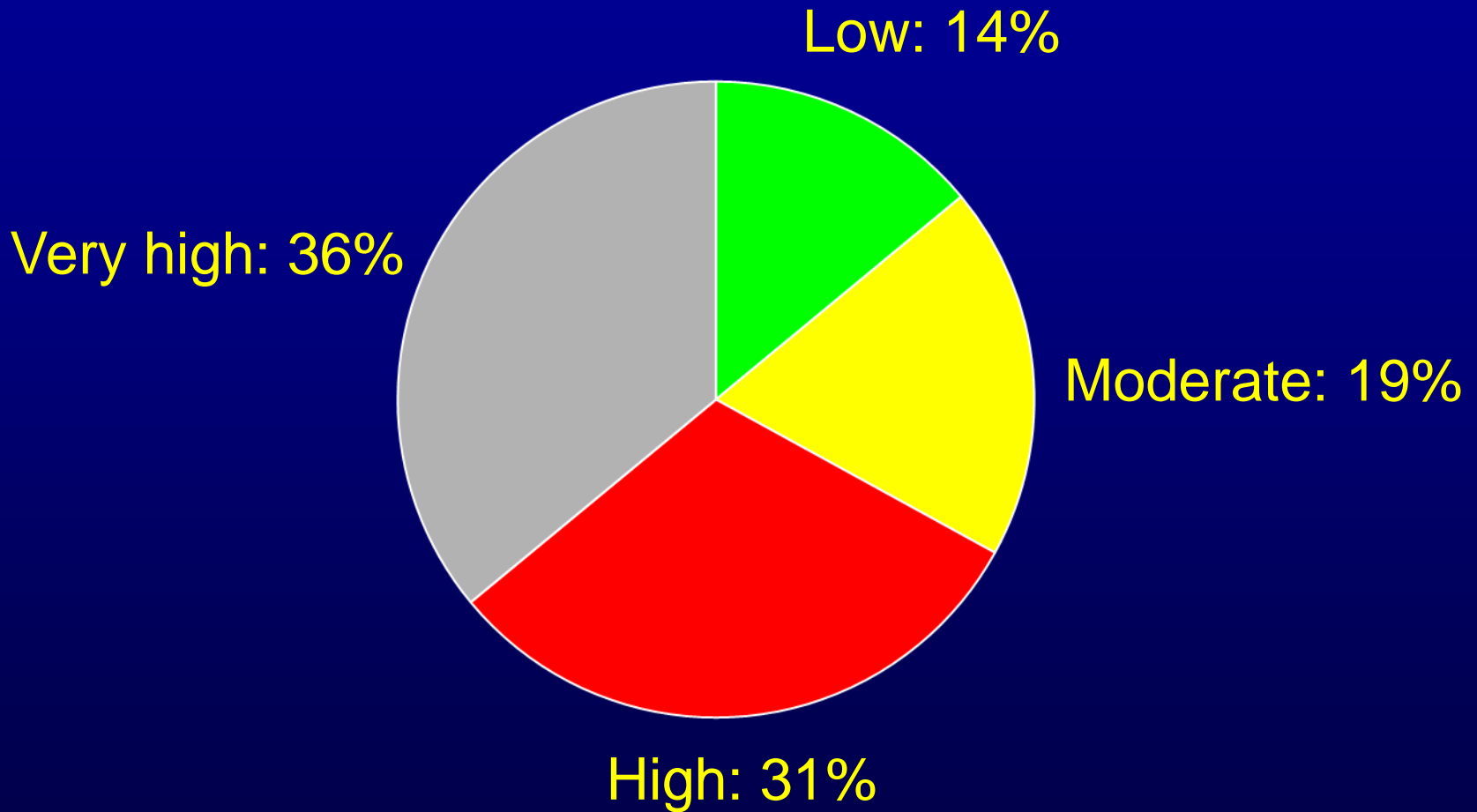
Literature search

- >105,000 citations screened
- 829 reports included in review
- 66% of reports published in scientific journals
- 491 studies included 674 comparisons
 - 448 strategy vs. control group comparisons
 - 226 head-to-head comparisons

General descriptive results

- 79 countries
- 54% from low-income countries
- Wide range of contexts
 - Urban and rural
 - Public and private health facilities, and community settings
 - Numerous health conditions

Overall risk of bias (N = 490 studies)



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Results from the “all HCP” group of studies

(i.e., not CHW-only studies)

Numbers of studies and strategy groups

- 171 comparisons from 141 studies
- 56 unique strategy groups, most tested by only 1 or 2 comparisons each (generalizability uncertain)
- Focus on results of strategies with at least 3 comparisons (studies) each

Effectiveness of strategies with most evidence (3+ comps)

Strategy group (no. of comp)

Wt. median adj. MES & IQR

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-
-
-
-
-

Effect size (%-points) → -10 0 10 20 30 40 50

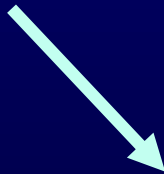
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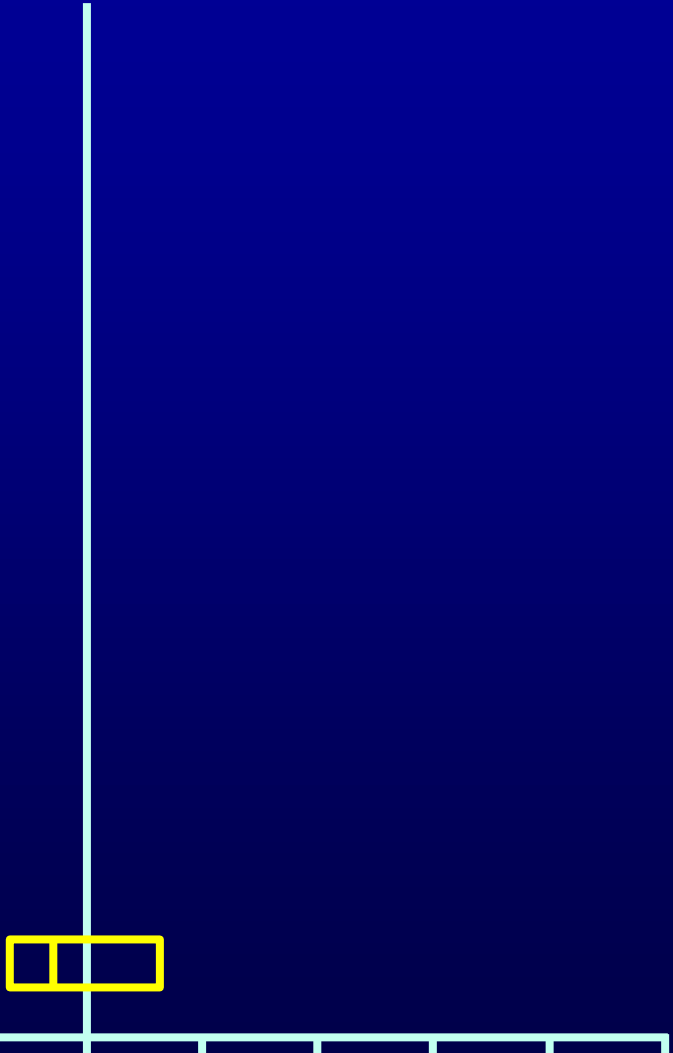
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No. of comparisons that evaluated the strategy



Print/electronic info. for HCPs only (6)

-4



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Weighted median of adjusted MES

-4

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Strategy group (no. of comp)

Wt. median adj. MES & IQR

-
-
-
-
-
-
-
-
-
-

No. of comparisons that evaluated the strategy

Weighted median of adjusted MES

Interquartile range

Print/electronic info. for HCPs only (6)

-4

Effect size (%-points) → -10 0 10 20 30 40 50



Effectiveness of strategies with most evidence (3+ comps)

Strategy group (no. of comp)

Wt. median adj. MES & IQR

-
-
-
-
-
-

Ex: Patient education



Consumer support + supervision + train (5)

7



Training only (46)

7



Supervision only (14)

6



Print/electronic info. for HCPs only (6)

-4



Effect size (%-points) →



Effectiveness of strategies with most evidence (3+ comps)

Strategy group (no. of comp)

Wt. median adj. MES & IQR

-
-
- **Ex: licensing & accreditation**
-

Ex: HCP self-assessment

Institutional approach + other management techniques + supervision + training (3)

Consumer support + training (6)

Consumer support + supervision + train (5)

Training only (46)

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Print/electronic info. for HCPs only (6)

8

7

7

7

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Effect size (%-points) →



Effectiveness of strategies with most evidence (3+ comps)

Strategy group (no. of comp)

Wt. median adj. MES & IQR

Supervision + training (20; BD)

16

Group problem solving + training (8; BD)

15

Group problem solving only (14; BD)

13

Consumer support + other mgmnt tech (3)

11

Institutional approach + other management techniques + supervision + training (3)

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Supervision only (14)

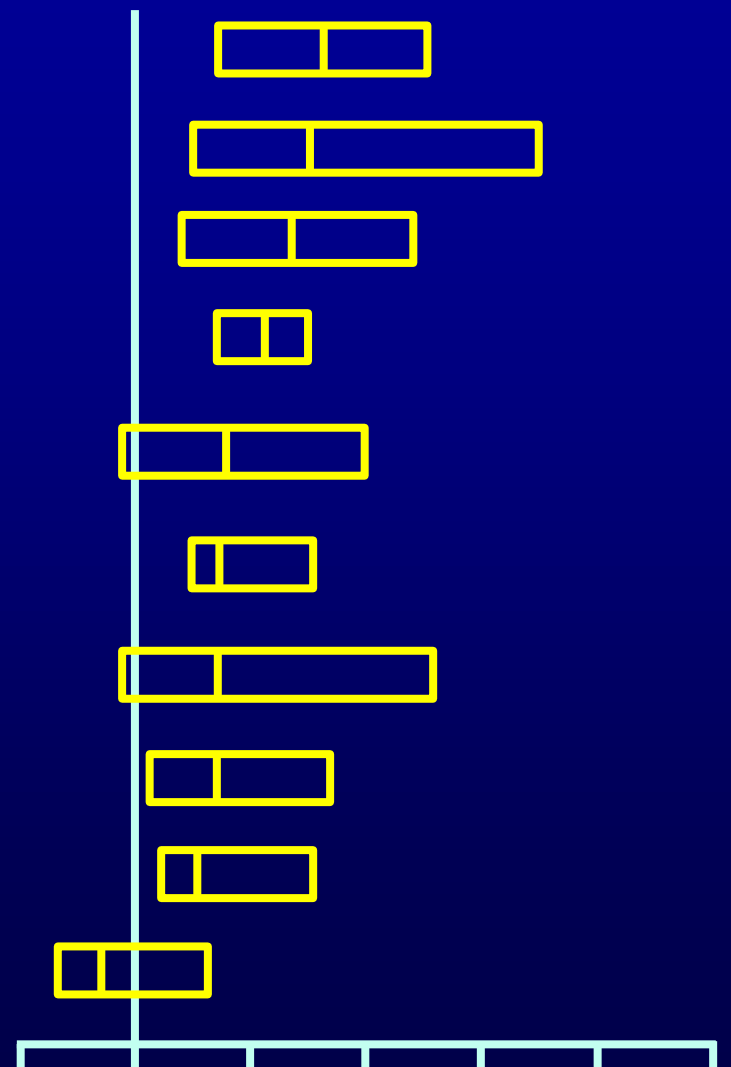
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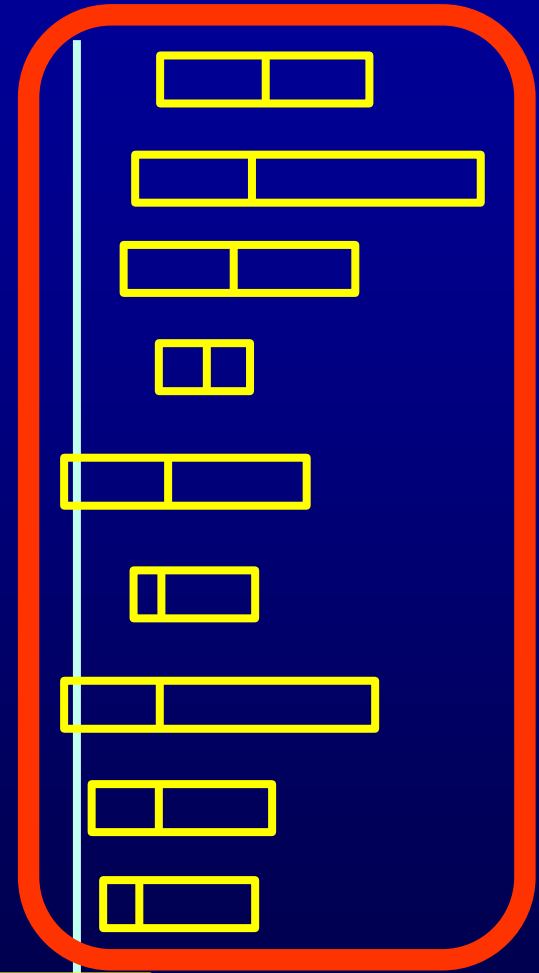
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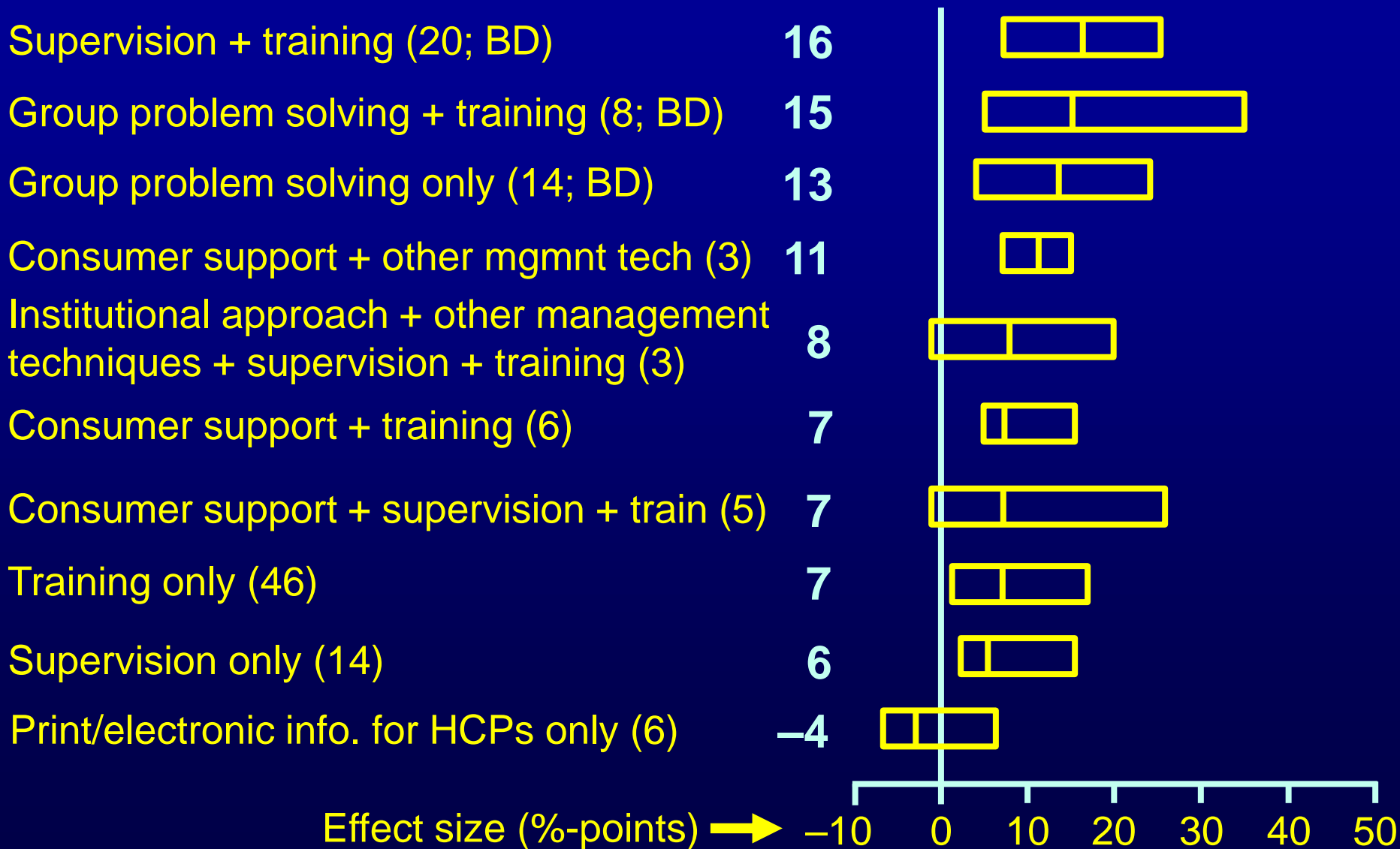
-4

Effect size (%-points) →

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Average baseline performance = 40%, so even strategies with highest median effect sizes are typically increasing performance from 40% to only 56% (still large gap)



Secondary analyses

Secondary analyses

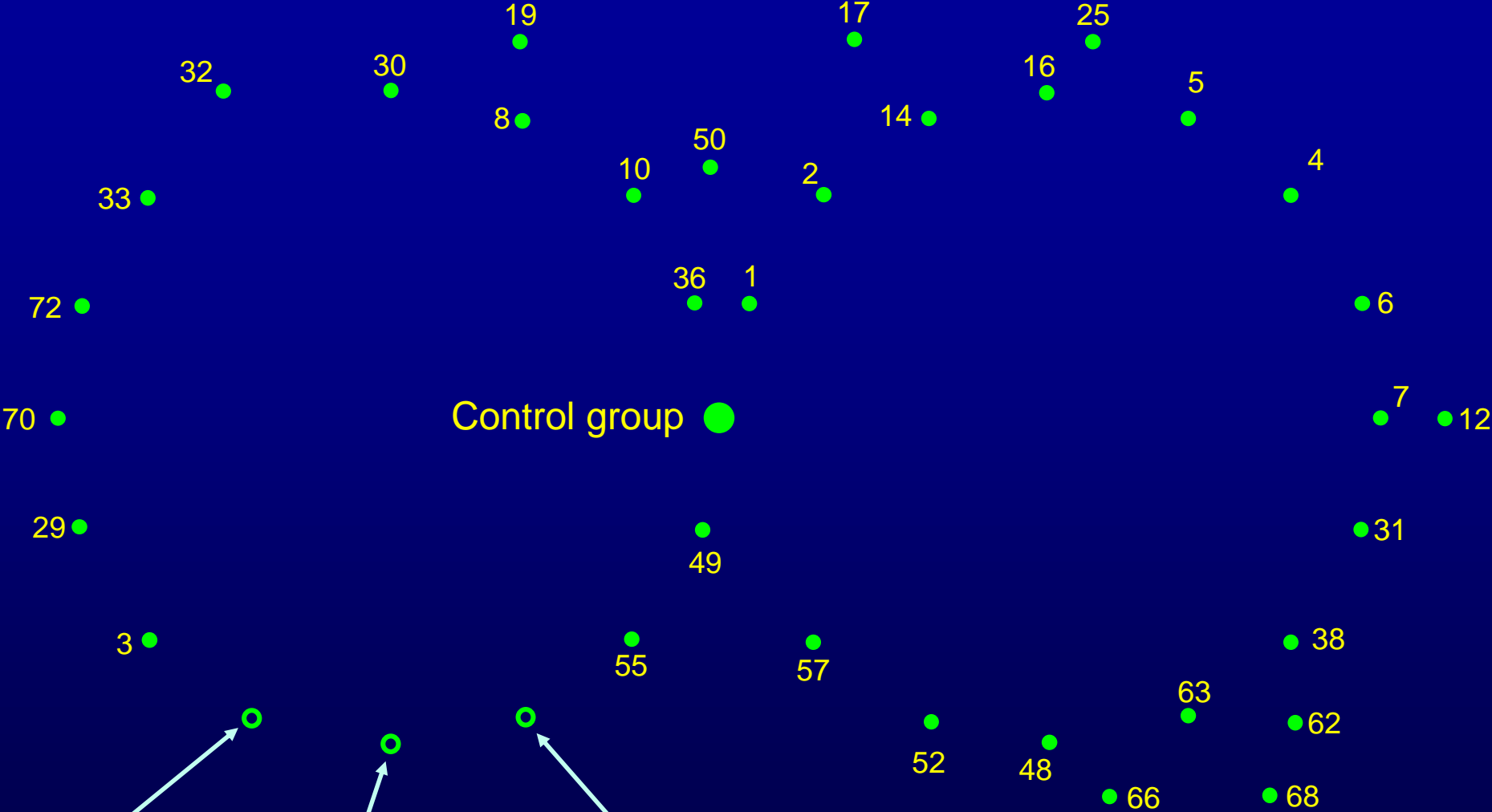
- Methods: meta-analysis, meta-regression, and network meta-analysis
- Results generally support primary analysis, which is reassuring



Network meta-analysis: preliminary results

- Includes head-to-head studies

First, display all unique strategies, plus control group (all “treatments”)

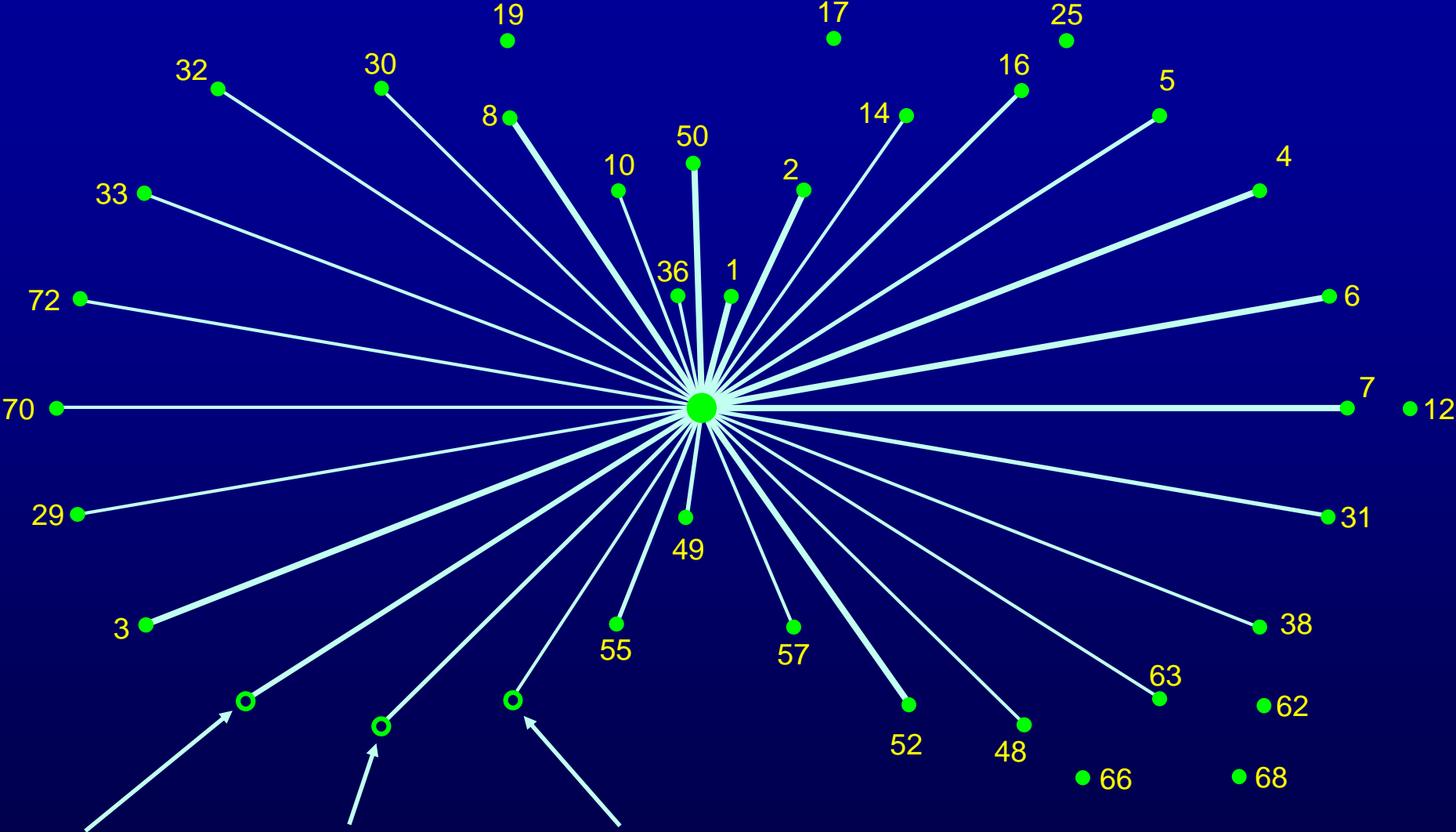


3 comparisons
each: 9, 26, 54

2 comparisons
each: 13, 37, 51

1 comparison each (N = 24 strategies):
11, 15, 18, 20, 21, 22, 23, 24, 27, 28, 41, 44,
45, 47, 53, 56, 58, 59, 61, 67, 73, 75, 76, 78

Strategy vs. controls comparisons only (lines = comparisons)

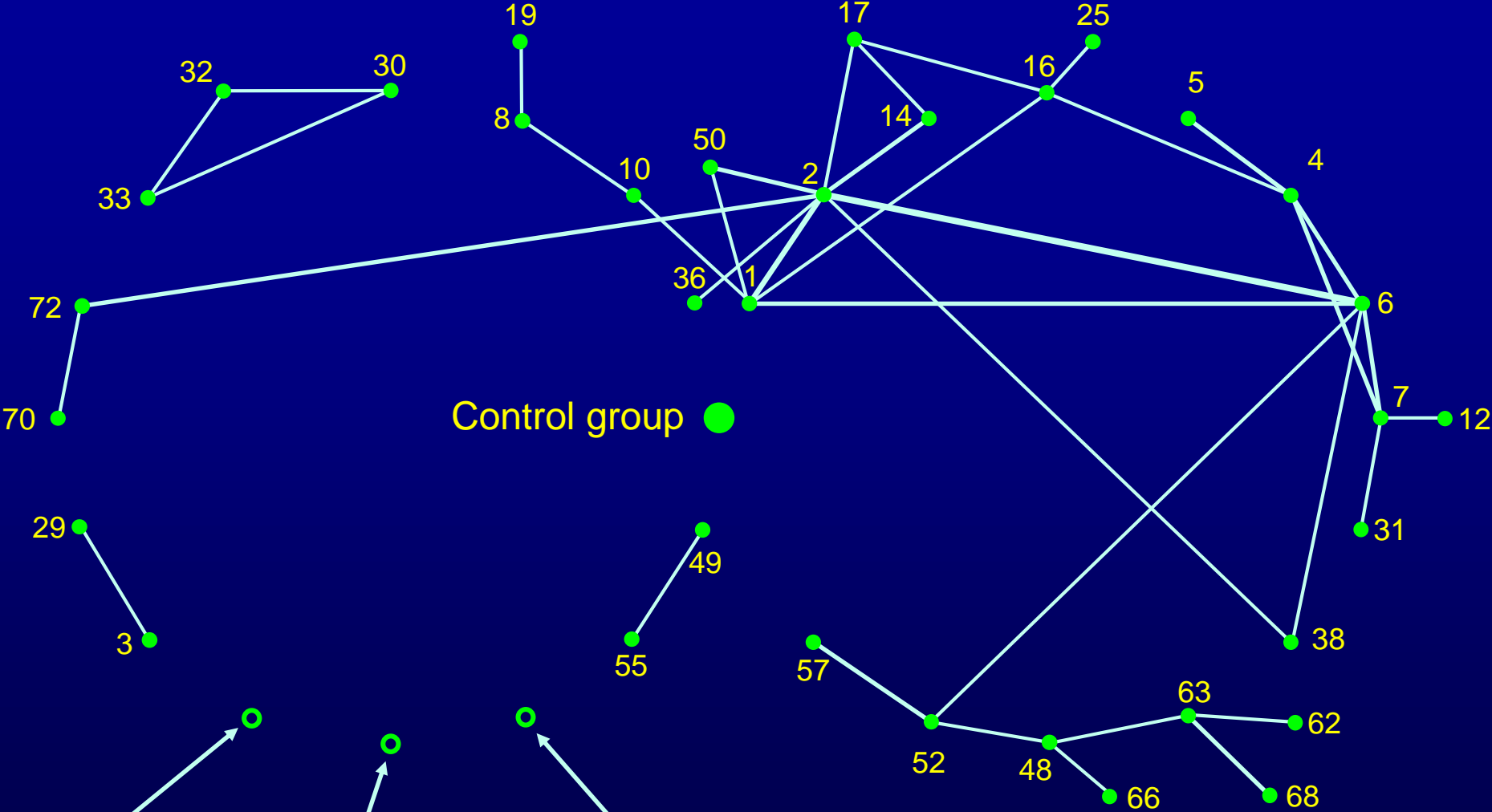


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Head-to-head comparisons only (lines = comparisons)

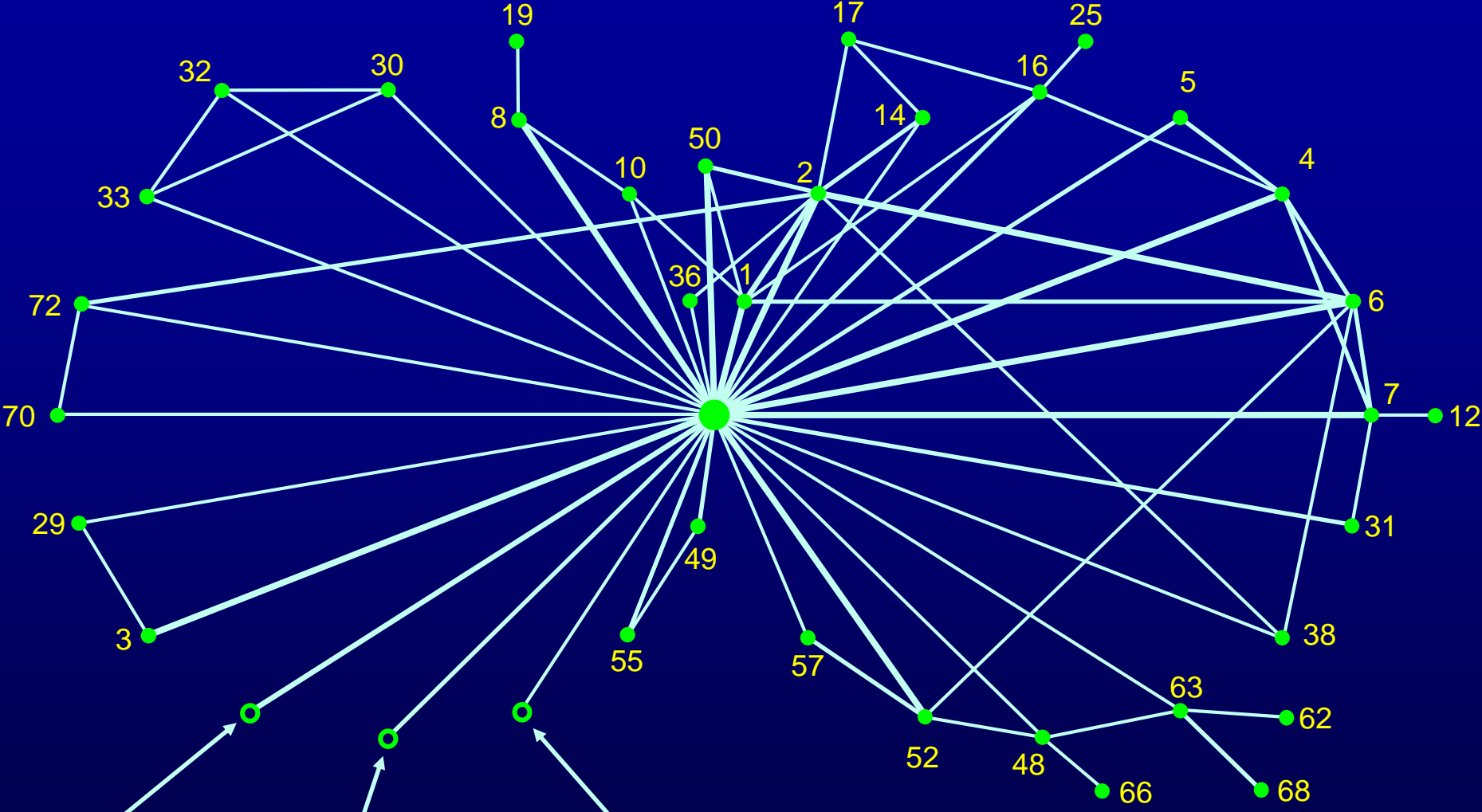


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All comparisons shown, includes 225 comparisons.

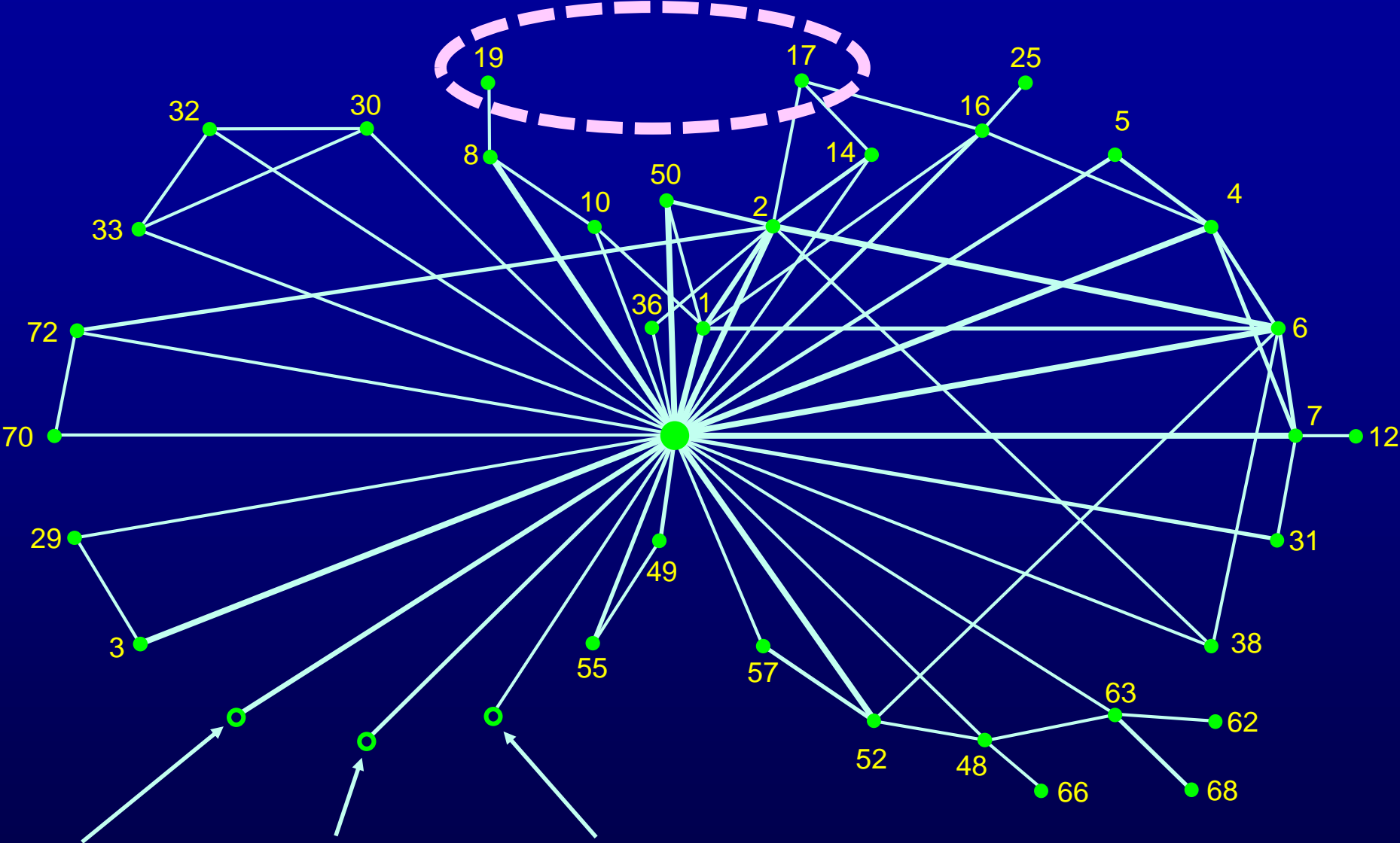


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Network meta-analysis: preliminary results

- Includes head-to-head studies
- Additional strategies now deserve attention. In 1° analysis, we mostly ignored them because <3 comparisons each. By adding head-to-head studies, several “new” strategies have at least 3 comparisons. All have 95% CrI that exclude 0.



Network meta-analysis: preliminary results

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- Additional strategies now deserve attention. In 1° analysis, we mostly ignored them because <3 comparisons each. By adding head-to-head studies, several “new” strategies have at least 3 comparisons. All have 95% CrI that exclude 0.
 1. Consumer support + strengthen infrastructure + institutional approaches + other mgmnt techniques + supervision + low-intensity training (45 %-pts)
 2. Financing/incentives + supervision + high-intensity training (35 %-points)
 3. Consumer support + low-intensity training (29 %-points)
 4. Financing/incentives + institutional approaches + other mgmnt techniques + supervision (25 %-points)
 5. Strengthen infrastructure + supervision + low-intensity training (24 %-pts)
 6. Other mgmnt techniques + low-intensity training (20 %-points)
 7. Other mgmnt techniques + supervision + low-intensity training (21 %-pts)
 8. Financing/incentives + institutional approaches + supervision (20 %-points)
- NB: More work needed to fully understand results

Results from studies
that only included
community health workers

Results

- 7 comparisons from 7 studies
- 6 unique strategy groups, most tested by only 1 or 2 comparisons each
- For training only (N = 3 studies), weighted median of adjusted MES = 10 %-pts
- For strategies that included “consumer supports + training”, weighted median of adjusted MES = 29 %-pts
Caution! Just 2 studies

Factors associated with training effectiveness

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Methods

- Goal: Identify attributes of more effective training strategies

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- Analysis: Unweighted mixed linear regression model with random intercept, which accounts for clustering of effect sizes within studies
- Data sources: “All HCP” studies on strategies with training
- Dependent variable: Process of care effect sizes
- Independent variables:
 - Attributes of training
 - Other strategy components

Effectiveness of training: Main hypotheses

Factor	Hypothesized effect on HCP performance
Increasing training duration	↑
Interactive educational method	↑
Small group size	↑
Professional trainer	↑
Trainer is content expert	↑
On-site training	↑
Some of training was ongoing	↑
Multiple topics	↓

Effectiveness of training: Results

- Analyzed 661 effect sizes from 112 comparisons in 99 studies
- In 5 comparisons, training duration >20 days
 - These were excluded, as they were uncommon and probably represented interventions different from typical in-service training in LMICs
- Substantial numbers of missing values for several factors of interest
 - Validity of multivariable modeling questionable
 - Focus on “univariable” results (still adjusted for strategy components)

Factors associated with training effectiveness

Training attribute	Effect size	P-value
Clinical practice	10 %-points	0.01

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Training duration		

No single effect size because the effect of training duration depended on whether the training was on a single topic or multiple topics

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Some or all training on-site	7 %-points	0.04
Training duration		
Single-topic trainings	0 %-points	NS
Multiple-topic trainings		

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Some or all training on-site	7 %-points	0.04
Training duration		
Single-topic trainings	0 %-points	NS
Multiple-topic trainings	2 %-points per added day	0.008

Evidence-based guidance on improving HCP performance in LMICs

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Guidance on improving processes of care: settings that do not only include CHWs

1. Two strategies might be good choices: “supervision + training” or “group problem solving + training”
2. Provision of printed or electronic materials to HCPs as a sole strategy is unlikely to change HCP performance

Guidance on improving processes of care: settings that do not only include CHWs

3. To increase effectiveness of strategies that include training, the following might be beneficial:
 - a. Using all 4 key training methods (lectures, interactive sessions, role play, and clinical practice)
 - b. If use of all 4 key training methods is not feasible, at least consider including clinical practice
 - c. Increasing training duration for courses on multiple topics
 - d. Conducting at least some training on-site

Guidance on improving processes of care: settings with CHWs only

4. In settings with CHWs only, a good strategy choice might be consumer supports + training

Guidance on monitoring and adaptation

- Wide ranges of effect sizes for most strategies demonstrate difficulty in predicting how effective a strategy will be in a particular setting
- Therefore, it seems prudent to monitor any strategy so program managers can know how well a strategy is working

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- Wide ranges of effect sizes for most strategies demonstrate difficulty in predicting how effective a strategy will be in a particular setting
- Therefore, it seems prudent to monitor any strategy so program managers can know how well a strategy is working
- Monitoring data could be used to better adapt strategies to local conditions, with the aim of increasing effectiveness
- Note that this guidance is partly a hypothesis that should be tested, but is partly supported by relative effectiveness of group problem solving strategies, which often include monitoring and adaptation

Limitations

1. Limitations of studies: lack of detail on strategy and context, lack of standardization, and difficulty in assessing study precision
2. Overview analysis—i.e., intentionally designed to identify broad patterns across all studies. Thus, results do not reflect nuances, e.g., all financial strategies considered equivalent. Future analyses will be more specific.

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2. Overview analysis—i.e., intentionally designed to identify broad patterns across all studies. Thus, results do not reflect nuances, e.g., all financial strategies considered equivalent. Future analyses will be more specific.
3. With numerous statistical tests, results represent hypothesis screening, not true hypothesis testing
4. Review already out of date

Conclusions

- 1) Large number of studies on many strategies, although most tested by only 1 or 2 studies
- 2) Major challenges: heterogeneity, lack of detail and standardization

Conclusions

- 1) Large number of studies on many strategies, although most tested by only 1 or 2 studies
- 2) Major challenges: heterogeneity, lack of detail and standardization
- 3) Although results should be interpreted with some caution because of review's limitations, data do suggest greater effectiveness for several strategies and attributes of training
- 4) Results also suggest it would be prudent to monitor effectiveness for all strategies

Conclusions

- 5) Health Care Provider Performance Review is largest review of strategies to improve HCP performance in LMICs
 - Programs, donors, and other development partners consider results when making decisions
 - To help disseminate results and encourage more specific, local analyses, the entire database will be made publicly available at end of this year

*Thanks for
your attention!*

Any questions or
comments?



For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333

Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348

E-mail: cdcinfo@cdc.gov Web: <http://www.cdc.gov>

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Extra slides:
10 strategy
components

Ten component categories

- Consumer support: E.g., community health education
- Strengthening infrastructure: E.g., new info. system, provision of drugs
- Financing and incentives: E.g., changing user fees, financial or non-financial incentives
- Institutional approaches: E.g., licensing and accreditation schemes, and resource control given to local government or civil society organizations
- Group problem solving: E.g., continuous quality improvement with or without formal teams
- Supervision: E.g., improving routine supervision, audit with feedback
- Management techniques, but not group problem solving & supervision: E.g., HCP self-assessment, change processes to improve use of services
- High-intensity training: Duration >5 days (or ongoing training) + at least one interactive education method (e.g., role play or interactive sessions)
- Low-intensity training: Any training that is not high-intensity training
- Printed or electronic information or job aids for HCPs that is not integral part of another component

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- Strengthening infrastructure: E.g., new info. system, provision of drugs
- Financing and incentives: E.g., changing user fees, financial or non-financial incentives
- Institutional approaches: E.g., licensing and accreditation schemes, and resource control given to local government or civil society organizations
- Group problem solving: E.g., continuous quality improvement with or without formal teams
- Supervision: E.g., improving routine supervision, audit with feedback
- Management techniques, but not group problem solving & supervision: E.g., HCP self-assessment, change processes to improve use of services

- High-intensity training: Duration >5 days (or ongoing training) + at least one interactive education method (e.g., role play or interactive sessions)
- Low-intensity training: Any training that is not high-intensity training

- Printed or electronic information for HCPs only

Little difference;
results often combined

Extra slides:
Confounding by
limited variability

Effectiveness of strategies with most evidence (3+ comps)

Strategy group (no. of comp) Wt. median adj. MES & IQR

Supervision + training (20; BD) 16

Group problem solving + training (8; BD) 15

Group problem solving only (14; BD) 13

Consumer support + other mgmnt tech (3) 11

Institutional approach + other management techniques + supervision + training (3) 8

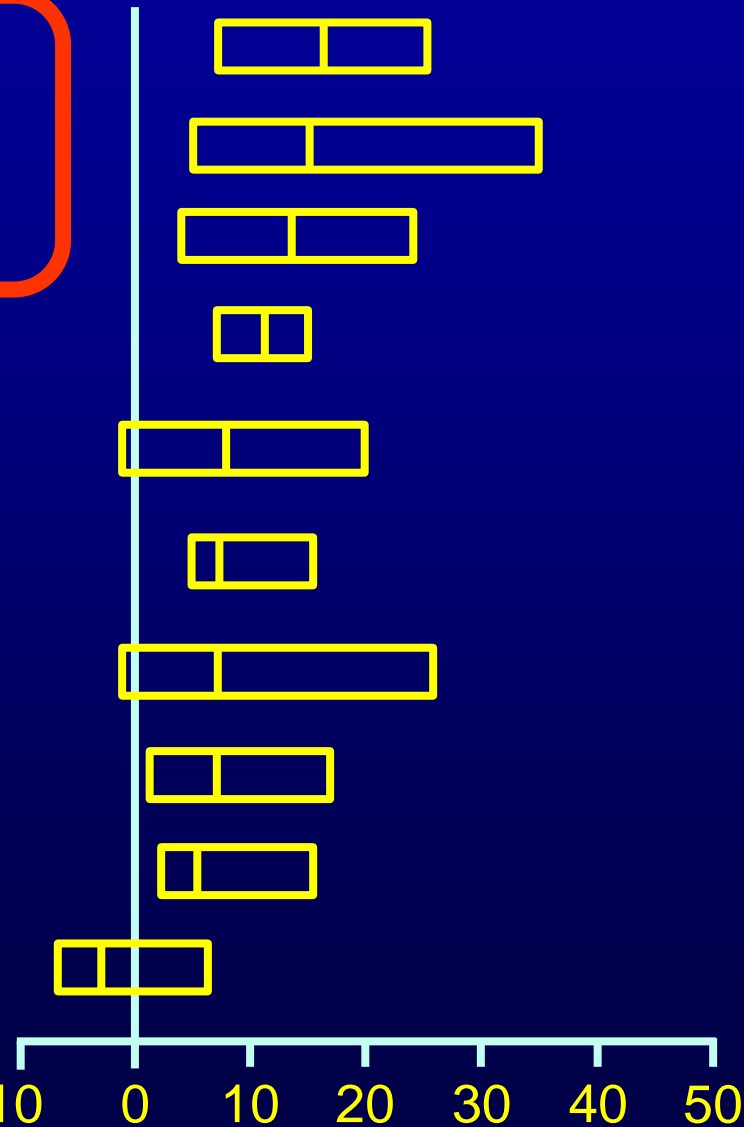
Consumer support + training (6) 7

Consumer support + supervision + train (5) 7

Training only (46) 7

Supervision only (14) 6

Print/electronic info. for HCPs only (6) -4



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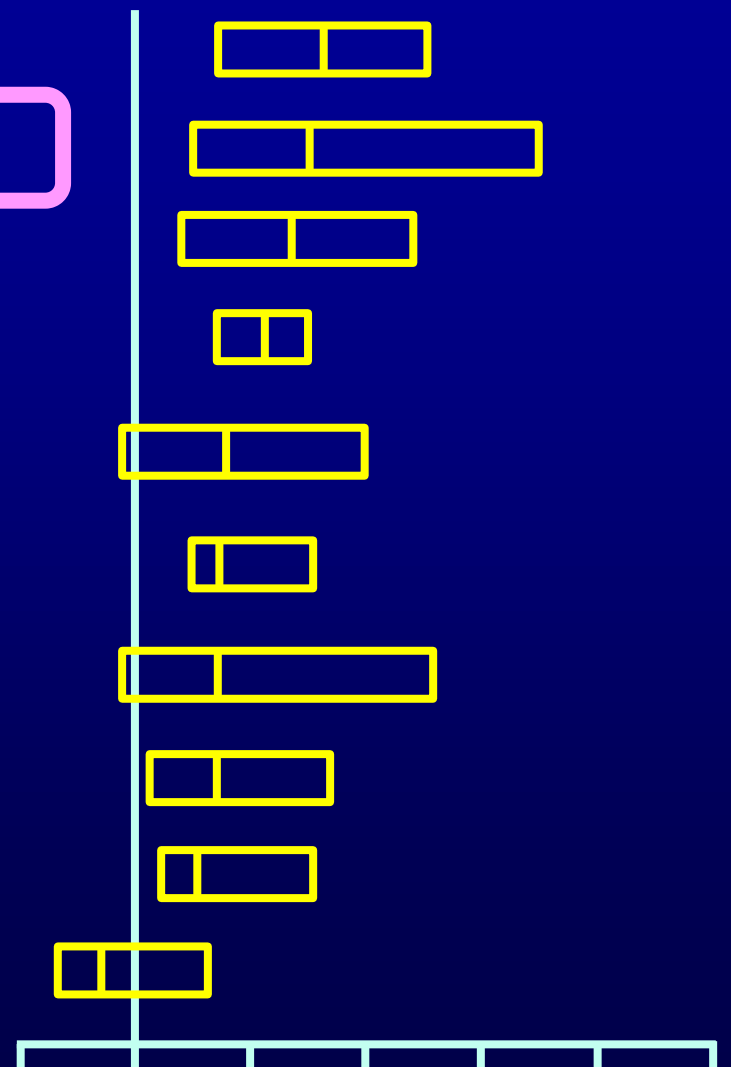
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Effect size (%-points) → -10 0 10 20 30 40 50



Example of “confounding by limited variability”

Strategy group	No. of comps	Wt. median adj. MES (IQR)
<i>Original definition of row 2</i>		
Group problem solving + low-intensity training	3	60 (30, 77)
<i>Broadened definition</i>		

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- Assume “extra” components unlikely to decrease effect size
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Bottom line. Adjusted results from broadened definition are probably best: more generalizable, greater validity, more conservative.

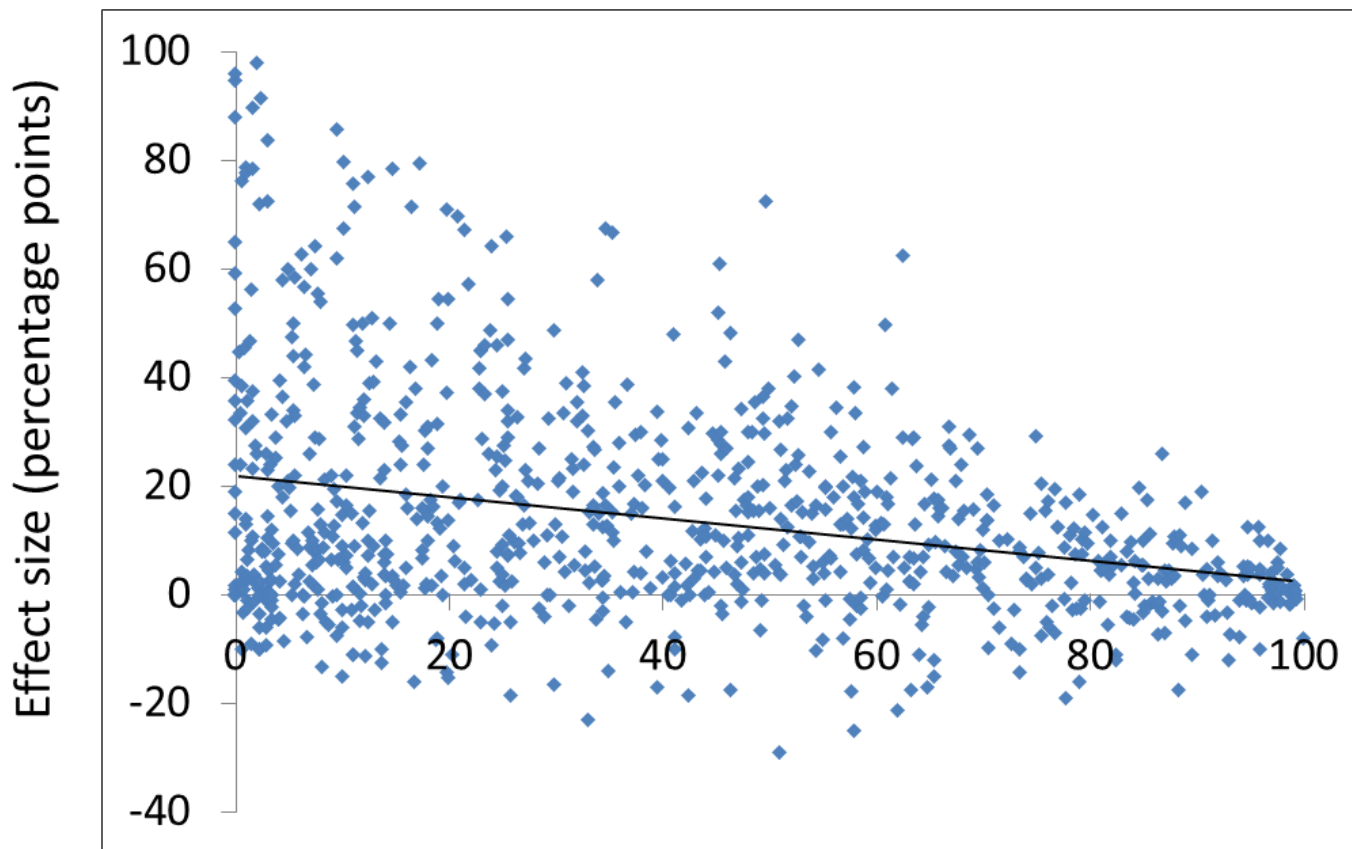
Extra slides:
Adjustment for
effect modifiers

Making comparisons that minimize bias

- Adjusted effect sizes
 - Baseline performance. For every 10 %-point increase in baseline, effect size decreased by 2 %-points, on average (less room to improve...a “disadvantage”, regardless of strategy).

Baseline measure versus effect size

N = 866 effect sizes



Baseline outcome measure used to
calculate effect size (%)

Baseline = average of baseline values of intervention and control groups

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Example adjustment: Mean baseline = 40%.
If baseline for effect size is 50% (i.e., 10 %-points above mean), then adjustment increases effect size by 2 %-points (removes “disadvantage”).

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 - Public HF setting. Mean effect size is 8 %-points higher than other settings, regardless of strategy
 - Goal: adjust results to partly “standard” context (what would results be if all had same baseline?)

Extra slides:

24 outcome groups

Which results can be compared: 24 subgroups

General outcome category				
1. Facilitators (e.g., availability of supplies)				
2. Processes of care (e.g., correct treatment)				
3. Health impact (e.g., mortality)				
4. Utilization/care-seeking				
5. Other patient behaviors (e.g., adherence)				
6. Cost				

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6. Cost				

Which results can be compared: 24 subgroups

No. of studies in each subgroup

General outcome category	Outcome expressed as a percentage		Continuous outcome, not % (e.g., mortality rate)	
	All HCPs	CHW only	All HCPs	CHW only
1. Facilitators (e.g., availability of supplies)	52	7	12	4
2. Processes of care (e.g., correct treatment)	178	14	79	4
3. Health impact (e.g., mortality)	55	15	64	3
4. Utilization/care-seeking	94	38	33	13
5. Other patient behaviors (e.g., adherence)	53	19	56	23
6. Cost	9	1	38	2

Extra slides:
Risk of bias,
results on cost &
cost-effectiveness

Results on cost and cost-effectiveness (N = 491 studies)

- Wide variety of cost and cost-effectiveness data reported; thus, no quantitative synthesis

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- Wide variety of cost and cost-effectiveness data reported; thus, no quantitative synthesis
- Descriptive results
 - 172 (35%) reported any information on strategy costs or other economic evaluations
 - 110 (22%) reported cost on at least 1 strategy component
 - 146 (30%) compared strategy costs of 2 or more study groups
 - 111 (23%) compared strategy costs of 2 or more study groups in terms of cost ratio (e.g., cost per service provided)

Extra slides:
Guidance vs.
recommendations

General considerations

- Decisions about which strategy to use in a given setting depend on many factors, such as effectiveness, cost, feasibility, and cultural acceptability
- This review only has information on effectiveness, and limitations of evidence base require that generalizations must be made with caution

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- This review only has information on effectiveness, and limitations of evidence base require that generalizations must be made with caution
- When evidence base has considerable limitations but a public health problem is important, the decision about whether or not to make recommendation must consider cost of making erroneous recommendation vs. cost of no recommendation and letting the status quo persist
- A middle way is to make statements on “guidance” rather than “recommendations” (which suggest a higher level of certainty)

Extra slides:
Future research

Future research

HCPP review: Objectives

Conduct systematic review of all strategies to improve HCP performance and related health outcomes in LMICs, and produce:

1. Database of studies on improving HCP performance for decision-makers, donors, researchers, and others
2. Estimates of effectiveness of a wide variety of strategies to improve HCP performance, and comparisons to identify the most and least effective strategies
3. Analyses of training and supervision to identify factors associated with greater effectiveness
4. The real goal: Evidence-based guidance on how to improve HCP performance in LMICs
5. Research agenda to fill critical knowledge gaps on how to improve HCP performance

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 - Ex 1: Getting physicians in a prosperous hospital to adhere to hand-washing recommendations
 - Ex 2: Getting CHWs to follow case-management guidelines for multiple illnesses in a poor district with few external resources
3. Develop processes that help program managers select optimal strategies for a given performance problem, setting, and budget

Theme: Coordinate and standardize

- Why emphasize coordination?
 - Numerous studies in past 50 years, but relatively few evidence-based recommendations. **Why?**
 - Many factors, but one key reason is most studies don't fit together or build on each other (some exceptions)
 - No “vaccine” for improving HCP performance. Success will probably be incremental and based on future reviews and meta-analyses
 - Thus, studies need to fit together better
 - Coordination could channel researchers' efforts and donor's funds to achieve research goals more quickly

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 - Thus, studies need to fit together better
 - Coordination could channel researchers' efforts and donor's funds to achieve research goals more quickly
- Why emphasize standardization?
 - Major challenges with synthesizing the evidence are a lack of standardization in study methods and how context, methods, and results are reported

Recommendation 1

- Coordinate research so studies of agreed-upon, high-priority topics can be completed more quickly
- Create an evidence-based research agenda
 - Input by range of stakeholders (e.g., Ministries of Health, multilateral and non-governmental organizations, researchers, and donors)
 - Donors should link funding to agenda
 - Researchers should refer to agenda
 - Results should be linked to agenda

Recommendation 2

- Work towards standardization of:
 - Strategy definition and description
 - Outcome definition
 - Measurement and analysis methods
 - Description of setting
 - Which contextual elements?
 - How should they be reported?
- Improve reporting of details
 - E.g., Standards for Quality Reporting Excellence (SQUIRE)*
 - Other guidance

* Davidoff F et al. *Ann Intern Med.* 2008;149:670-676.

Recommendation 2, cont.

- Encourage studies that:
 1. Use standard methods and reporting of results
 2. Are larger than a few health facilities (although small pilot studies are important before large-scale trials)
 3. Have follow-up periods of at least 12 months
 4. Use pre- versus post-intervention RCT designs that include time series data to better characterize trends
 5. Include process of care outcomes
 - Useful programmatically
 - Help explain causal link to other outcomes (e.g., utilization of services or health outcomes)
 6. Include cost estimates & cost-effectiveness analyses
 7. Actively search for unintended negative consequences

Recommendation 3

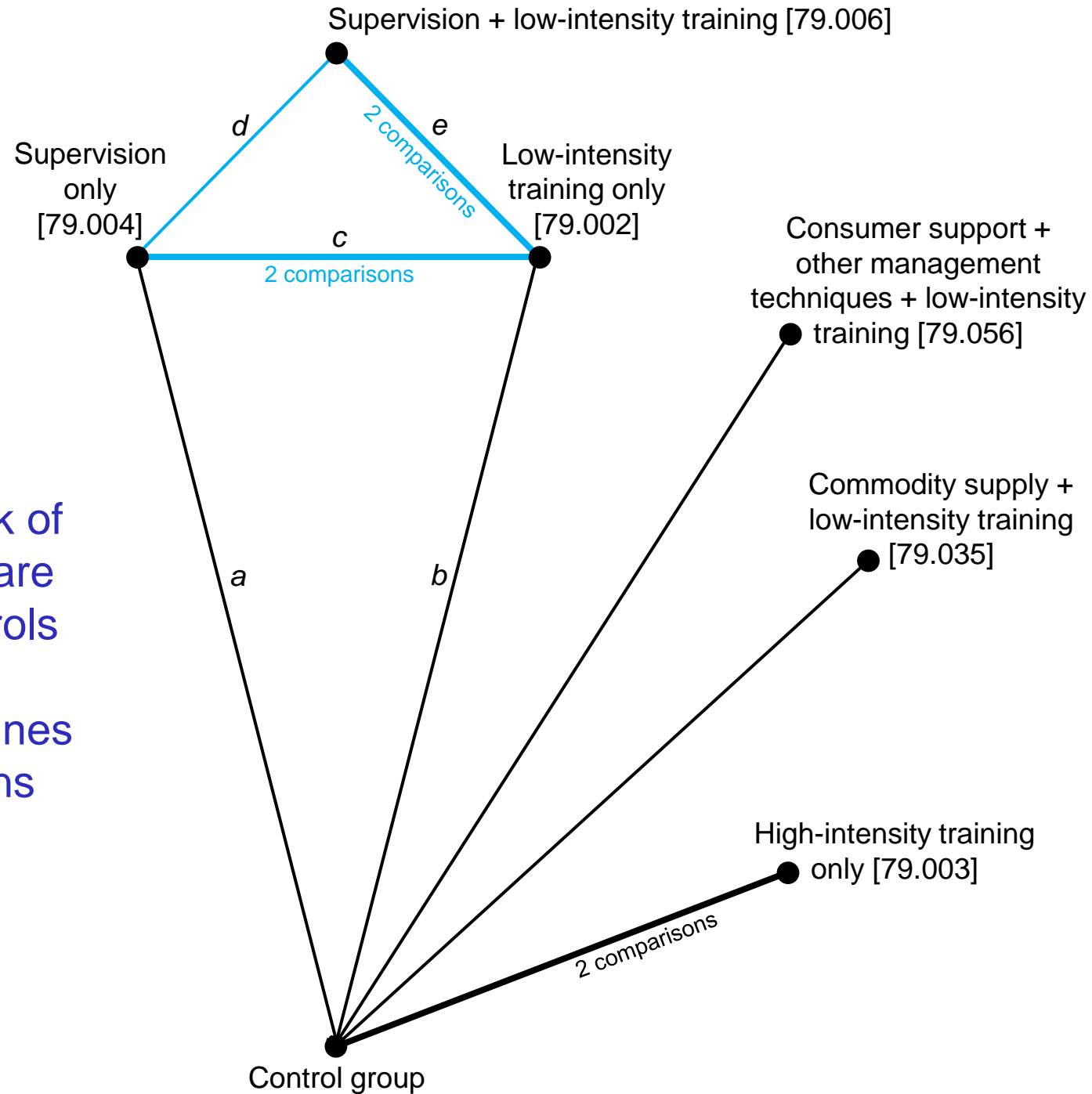
- Proposed research priorities
 1. Large-scale RCTs of improvement collaboratives
 - Studies have compelling results but important limitations
 2. RCTs that compare different training and supervision models for community health workers
 3. Additional trials of strategies with large effect sizes, according to network meta-analysis
 - Ex 1: Consumer support + strengthen infrastructure + institutional approaches + other management techniques + supervision + training (45 %-points)
 - Ex 2: Financing/incentives + supervision + training (35 %-points)

Recommendation 4

- There should be support for ongoing efforts to synthesize research findings via systematic reviews and meta-analysis:
 1. Guide programs, donors, and development partners
 2. Inform future research
- HCPP Review is a step towards the goal this recommendation aims to achieve

Extra slides:
network meta-
analysis

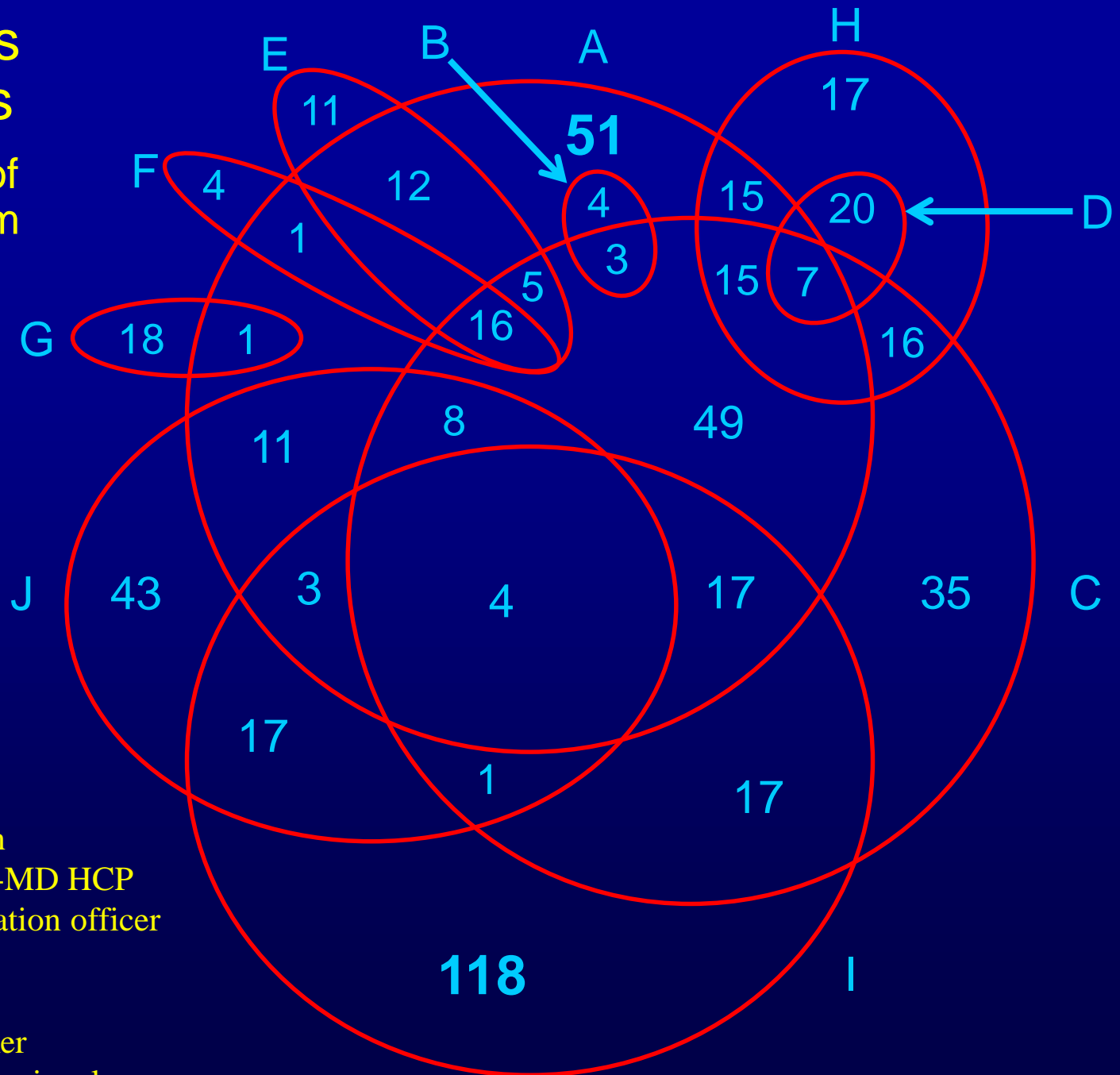
A simple network of studies: circles are strategies (controls considered a “strategy”), and lines are comparisons



Extra slides:
Descriptive
results

Combinations of HCP types

(80% [539/672] of comparisons from all 491 studies)



- A Physician
- B Clinical officer
- C Nurse/Midwife
- D Pharmacist/laboratorian
- E Paramedic/unspec. non-MD HCP
- F Health educator/information officer
- G Student
- H Aide
- I Community health worker
- J Unspecified health professional