



The transition from efficacy to effectiveness of prevention interventions: reflections for a more rational choice of public health interventions

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Background

the evidence based prevention is becoming increasingly important to guide the policy-makers to choose preventive interventions to be offered to the people

the impact of an intervention in real conditions (effectiveness) may be less than the theoretical efficacy (efficacy) estimated on the results of published studies

the issue was sufficiently studied in clinical and in some prevention activities (i.e. screening, vaccinations)

problem often ignored in the case of interventions designed to change the at-risk lifestyles



An impact simulation framework from the clinical field

THE MEASUREMENT ITERATIVE LOOP: A FRAMEWORK FOR THE CRITICAL APPRAISAL OF NEED, BENEFITS AND COSTS OF HEALTH INTERVENTIONS

PETER TUGWELL, KATHRYN J. BENNETT, DAVID L. SACKETT
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Efficacy and Effectiveness

- **Efficacy**: can it works in experimental conditions (optimal diagnosis, appropriate care, full compliance)?
- **Screening and Diagnostic accuracy**: are the risk factors correctly discriminated?
- **Health provider compliance**: are the appropriate prevention practice complied with by the health providers?
- **Patient compliance**: do the patients comply with the health providers recommendations?
- **Coverage**: to what extent is the prevention practice offered?
- **Community effectiveness**: can it works in real-world conditions?

Tugwell 1985



Effectiveness in clinical practice. Example: antihypertensive drugs

parameter	value
Efficacy	76% (RR 0.24)
Diagnostic accuracy	95%
Provider compliance	66%
Target compliance	65%
Coverage	90%
Effectiveness	28% (RR 0.72)

reduction in all morbid events ass. with h. in pat. with d.b.p. >90mgHg

37% of the impact estimated

$$\text{Effectiveness (0.28)} = 0.76 * 0.95 * 0.66 * 0.65 * 0.90$$



To compare the community effectiveness of two effective smoking cessation interventions in order to illustrate the discrepancy between efficacy and effectiveness of prevention interventions

Interventions delivered by Smoking Cessation Centers vs Physician advice

Treatment combining pharmacotherapy (regardless of type of pharmacotherapy) **and behavioural interventions** for smoking cessation (Stead 2012)

Brief advice defined as verbal instructions with a stop smoking message irrespective of whether or not information was provided about the harmful effects of smoking (Stead 2013)



Interventions delivered by Smoking Cessation Centers vs Physician advice

Partially diffused at national level
Highly specialised, expensive

Intervention offered in **Smoking Cessation Centers** (managed by healthcare facilities)

Intervention offered by **family doctors**

Diffused at national level
FDs generally complain about lack of time



Interventions delivered by Smoking Cessation Centers vs Physician advice

To estimate the expected effectiveness of two different smoking cessation interventions, using available epidemiological data, in order to evaluate the discrepancy between efficacy and effectiveness



Effectiveness in prevention programmes

Example 1: Smoking cessation centers

parameter	value	Source
Efficacy	82% (RR 1.82)	Stead 2012
Provider compliance		
Target compliance		
Coverage		
Effectiveness	?	



Example 1: Smoking cessation centers

parameter	value	Source
Efficacy	82% (RR 1.82)	Stead 2012
Provider compliance	100%	Optimistic assumption!
Target compliance	100%	Optimistic assumption!
Coverage	<1%	PASSI 2015
Effectiveness	?	



Example 1: Smoking cessation centers

parameter	value	Source
Efficacy	82% (RR 1.82)	Stead 2012
Provider compliance	100%	Optimistic assumption!
Target compliance	100%	Optimistic assumption!
Coverage	<1%	PASSI 2015
Effectiveness	0.7% (RR 1.007)	

Assuming that the smoking prevalence is 27% and the spontaneous cessation rate is 8% (Italian estimation), the intervention would increase the cessation rate by 0.06%, corresponding to **9200 cessations**



Example 2: Family physician brief advice

parameter	value	Source
Efficacy	66% (RR 1.66)	Stead 2013
Provider compliance	90%	Guess estimate
Target compliance	100%	Guess estimate
Coverage	36%	PASSI 2015 Fiore 2000
Effectiveness	21% (RR 1.21)	

Assuming that the smoking prevalence is 27% and the spontaneous cessation rate is 8% (Italian estimation), the intervention would increase the cessation rate by 1.7%, corresponding to **275 000 cessations**

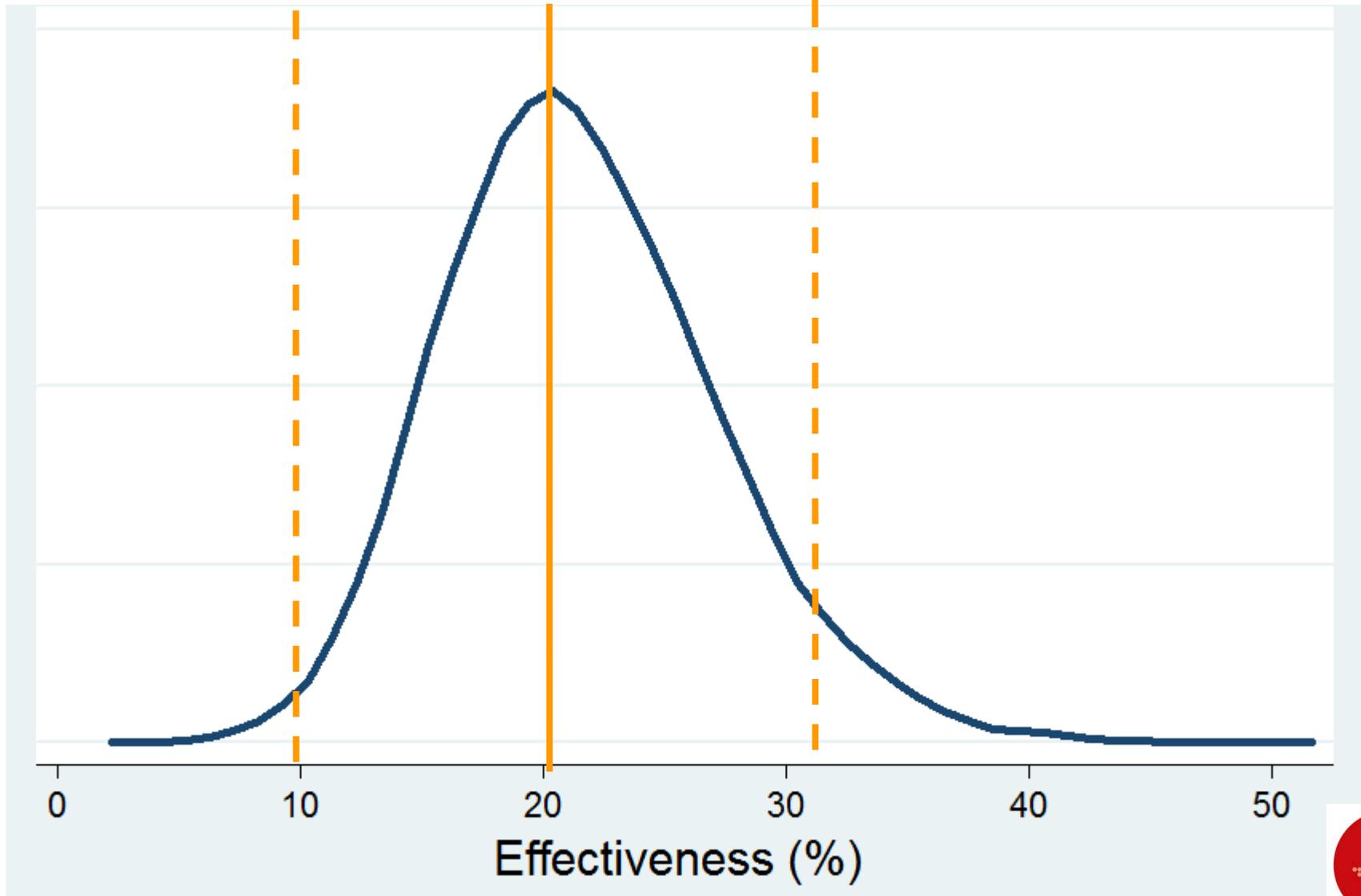


Example 2: Family physician brief advice uncertainty management

parameter	value	Source
Efficacy	66% [42%-94%]	Stead 2013
Provider compliance	90% [80%-100%]	Guess estimate
Target compliance	100%	guess estimate
Coverage	36% [25%-45%]	PASSI 2015 Fiore 2000
Effectiveness	?	

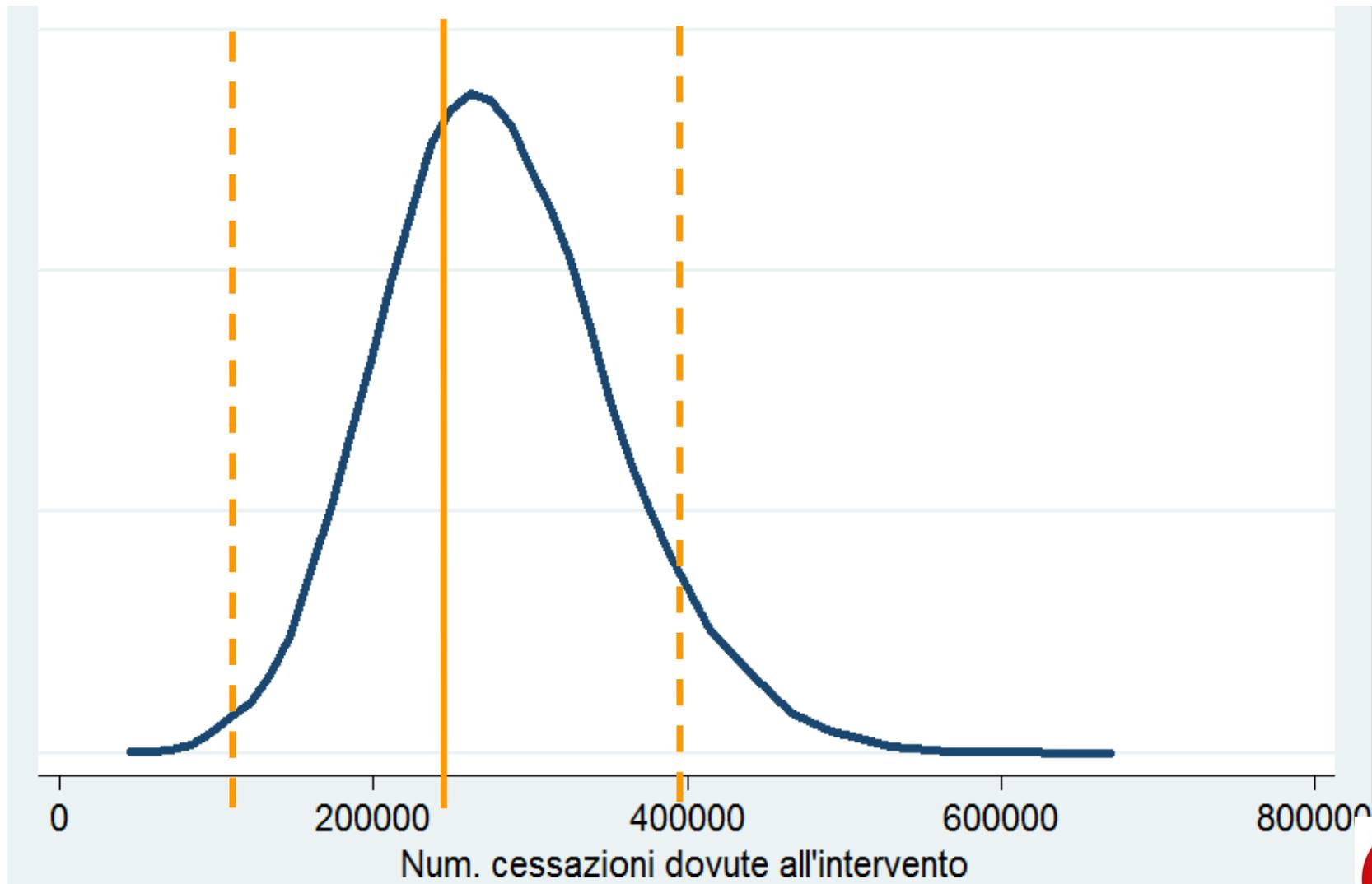


Monte Carlo simulation Effectiveness distribution



Monte Carlo simulation

N of cessations due to the intervention



Even assuming that Smoking Cessation Centers always offer the best available intervention, they do not seem to be able to have a major effect on smoking cessation in the population compared to physicians' brief advice

Evidence of efficacy is not sufficient to ensure that the intervention will have a significant impact on health



Example 3: Tobacco taxation

In Germany from 2001 to 2005 the price rose by about 1 euro (33%)

parameter	value	Source
Efficacy	58%	Hanewinkel 2007
Provider compliance	NA (100%)	Not applicable
Target compliance	NA (100%)	Not applicable
Coverage	NA (100%)	Not applicable
Effectiveness	58%	

Assuming that the smoking prevalence is 27% and the spontaneous cessation rate is 8% (Italian estimation), the intervention would increase rate by 4.6%, corresponding to **760 000 cessations**.



MAIN LIMITATIONS

«Diagnostic accuracy» was not considered even if this is an important element when considering self-evaluation questionnaires

Lack of informations on «compliance»

Conclusions

evaluate both efficacy and community effectiveness of the prevention interventions in order to design different scenarios for policy-makers

search the best **organizational models** to deliver effective interventions

post-implementation monitoring to estimate the real impact of the intervention



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Prevention Lab: <http://www.cpo.it/it/chi-siamo/progetti/show/90488/>

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