Centre for Evidence Based Health Care

Translating results of diagnostic tests into practice: the case of schistosomiasis

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Scenario

- Health policy makers want to introduce a point of care test into practice.

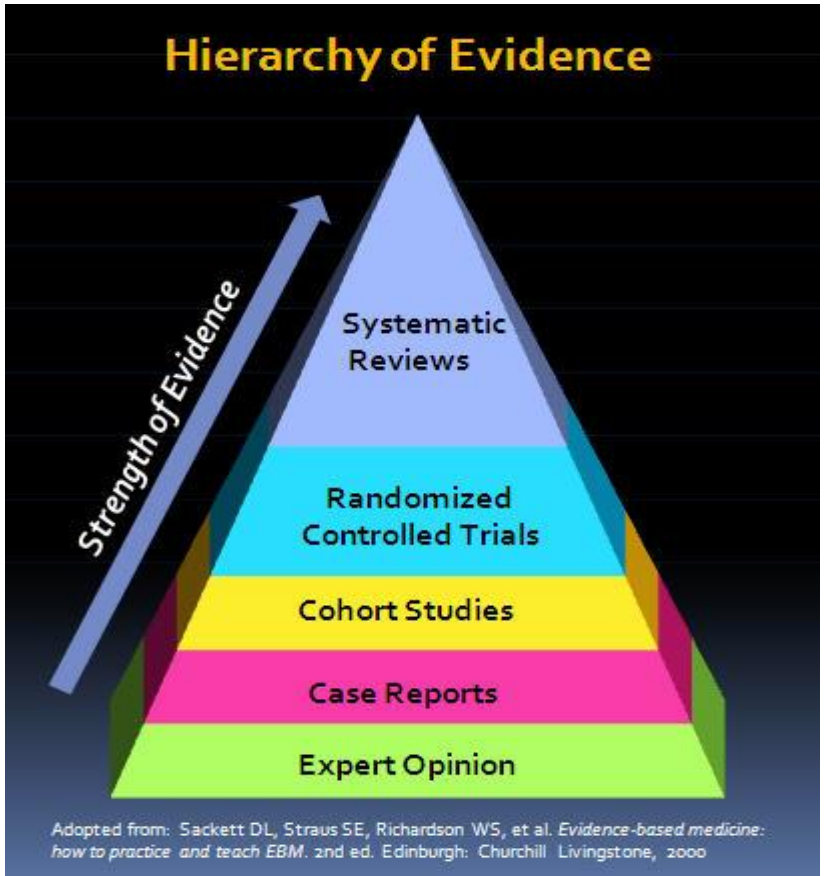
- Many studies have been conducted to establish the accuracy of the POC test albeit with varying results

Accuracy= The ability of a medical test to distinguish the sick from the well

A valid scientific evaluation of the accuracy of tests is therefore required.

Systematic review

A form of study that identifies and summarises data from quality primary studies in an objective and methodological manner



Problem

- Interpreting and reporting results of systematic reviews in a simple way that health care workers and policy makers can understand is a challenge for many authors.

- Challenge is greater for studies and systematic reviews of diagnostic tests

Sensitivity? Specificity? Positive predictive value? Negative predictive value?

- This makes it difficult for diagnostic tests to be implemented in practice.

Objective

- To present a format for presenting results of diagnostic accuracy studies in a simple and straightforward manner by focusing on the consequences of using the tests in practice.

Methods

- We conducted a systematic review and meta-analysis that estimated the diagnostic accuracy of

  i) urine reagent strips and

  ii) circulating cathodic antigen POC tests

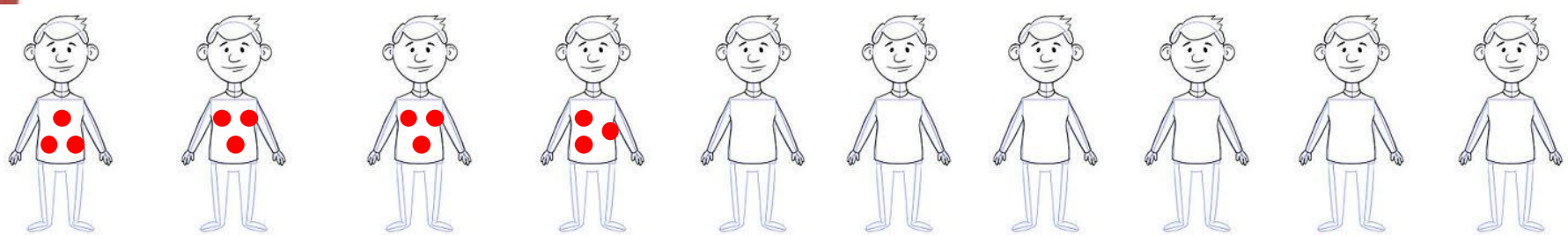
  to detect human schistosomiasis.

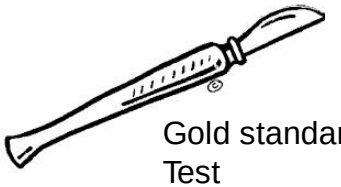
- We focus on the results of CCA-POC test for *S. mansoni* as an example.

Methods

- We translated the results of sensitivity and specificity into natural frequencies
  - Sensitivity: Proportion of those with a positive test result among those with disease
  - Specificity: Proportion of those with a negative test result among those without disease

Example

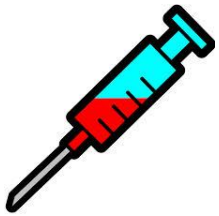




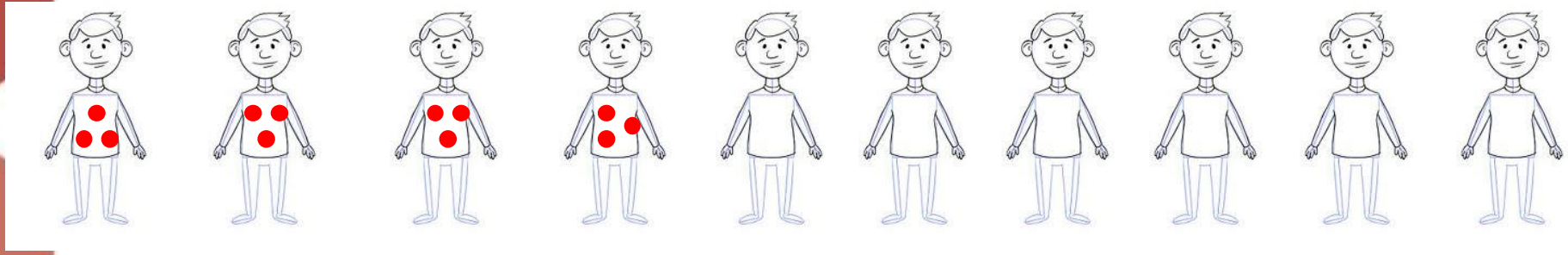
Gold standard
Test

Prevalence Disease X = 4/10*100 = 40%

Example



New Test X



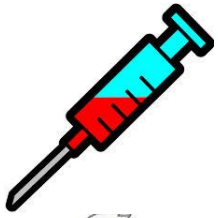
Prevalence Disease X = 4/10*100 = 40%

Sensitivity $_{\text{New Test}}$ = 75%

Specificity $_{\text{New Test}}$ = 66%

Example

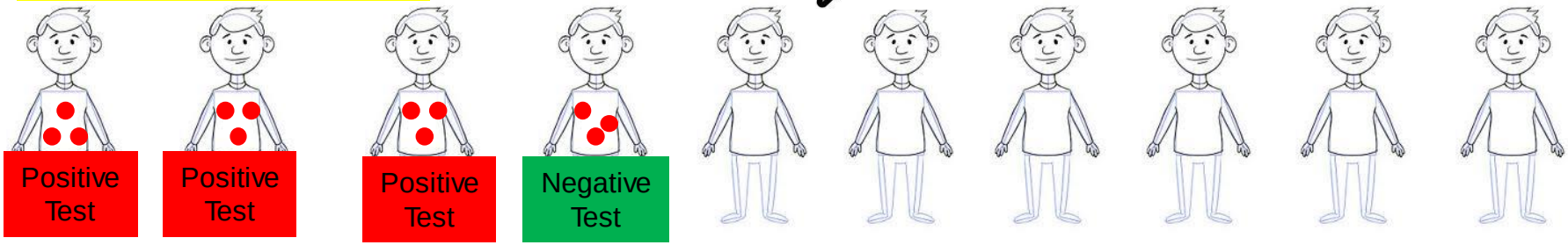
Prevalence Disease X = 4/10*100 = 40%



New Test X

True Positive

False negative

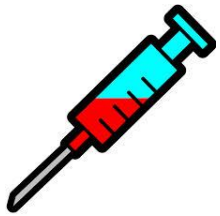


3 of 4 Patients with disease tested positive with New Test = ¾*100 = 75%

Sensitivity $_{\text{New Test}}$ = 75%

Example

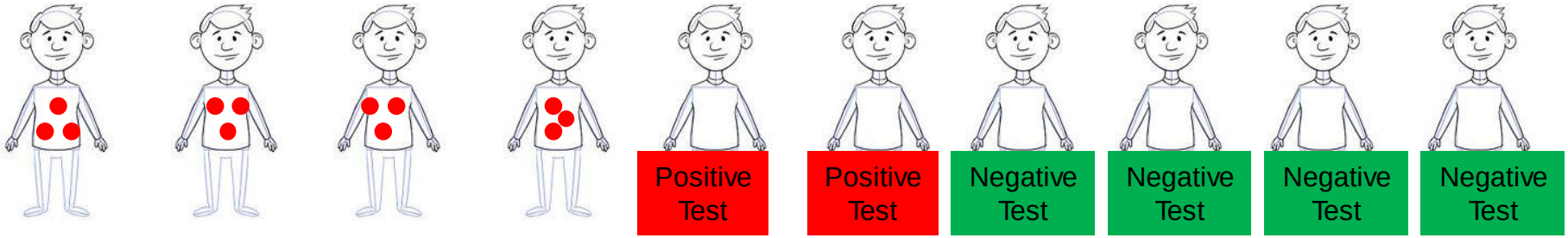
Prevalence Disease X = 4/10*100 = 40%



New Test Y

False Positive

True Negative



4 of 6 Patients withOUT disease tested Negative with New Test = 4/6*100 = 66%

Specificity $_{\text{New Test}}$ = 66%

Methods

- We also considered the true prevalence of infection and calculated the observed prevalence of infection the tests would present should they be applied.

Measuring accuracy

- The results of the index test and reference test are compared using a 2 by 2 table.

		Reference test		
		Disease +	Disease -	
Index test	Test Positive	True Positives (TP)	***False positives (FP)***	TP+FP ***(Observed prevalence)***
	Test Negative	***False negatives (FN)***	True negatives (TN)	FN+TN
		TP+FN ***(True Prevalence)***	FP+TN	TP+ FP+ FN+TN

Sensitivity=TP/ TP+FN **Specificity=TN/ FP+TN**

Methods

- True Prevalence of *S. mansoni: 36%*
- CCA-POC test fo*r S. mansoni;*
  - sensitivity (89%) and
  - specificity (55%)
- Reference standard: Microscopy

Results

CCA-POC compared to Microscopy as the reference standard in a population of 1000)

		Microscopy		
		Disease +	Disease -	
CCA-POC	Test +	320 (TP)	**288 (FP)**	**608**
	Test -	**40 (FN)**	352 (TN)	392
		360	640	1000

False positives: 288
False negatives: 40
Observed prevalence using CCA-POC: 608 (61%)

Results (Plain Language)

- If we apply the results of the test to detect *S. mansoni* to an imaginary group of 1,000 people where only 360 have intestinal schistosomiasis according to microscopy:
  - this test would misclassify 288 uninfected people as infected. These people may get unnecessary treatment.
  - The test will also wrongly classify 40 infected people as uninfected. These people may miss treatment and can develop complications of the disease.

Results (Plain Language)

- If we apply the results of the test to detect *S. mansoni* to an imaginary group of 1,000 people where only 360 have intestinal schistosomiasis according to microscopy:
  - When mapping infection, the prevalence of *S. mansoni* would seem to be 61%, far from the true prevalence of 36%.
  - In case of mass-treatment, the ultimate consequences of these numbers would depend on the minimal prevalence needed to start mass-treatment.

Conclusion

- We recommend that authors translate test accuracy results into natural frequencies and stress on the consequences of applying the results to a hypothetical cohort of people in the discussion section of a paper.

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