Kabisa-like programs: future use in support, training and quality evaluation of clinical care in resource poor countries

Jef Van den Ende
Rik Van Hauwe
Brussels
November 2016

How it started: Evaluation of diagnostic quality in 5 hospitals in Sub Saharan Africa

Prof J. Van den Ende, IMTA

April 2013

Report of evaluation: files

- Files well filled
  - Repetition of same texts
  - No clear system
- Guidelines not followed
  - Not available
  - Overprescription of antibiotics and steroids

Report of clinical reasoning

- Syndromic approach
- Multiple diagnoses for one patient
- Absence of search for excluders (confirmation bias)

Report of clinical reasoning2

- Absence of reconsideration of a diagnosis (anchoring bias)
  - Thick film for malaria negative: no stop of malaria treatment
  - Urinalysis negative: diagnosis of urinary infection not altered.
- Vicious circle of lab tests:
  - Poor quality→ the clinician disregards the result → the lab technician does not invest time any more in his work → clinician disregards even more →
- Absence of analysis or information (tunnel vision)

Analysis of 97 hospitalized patients

Problem	Number
Poor clinical reasoning	33
Poor knowledge	19
Poor management	48
Absence of diagnostic means	3
Absence of therapeutical means	2
Total	97

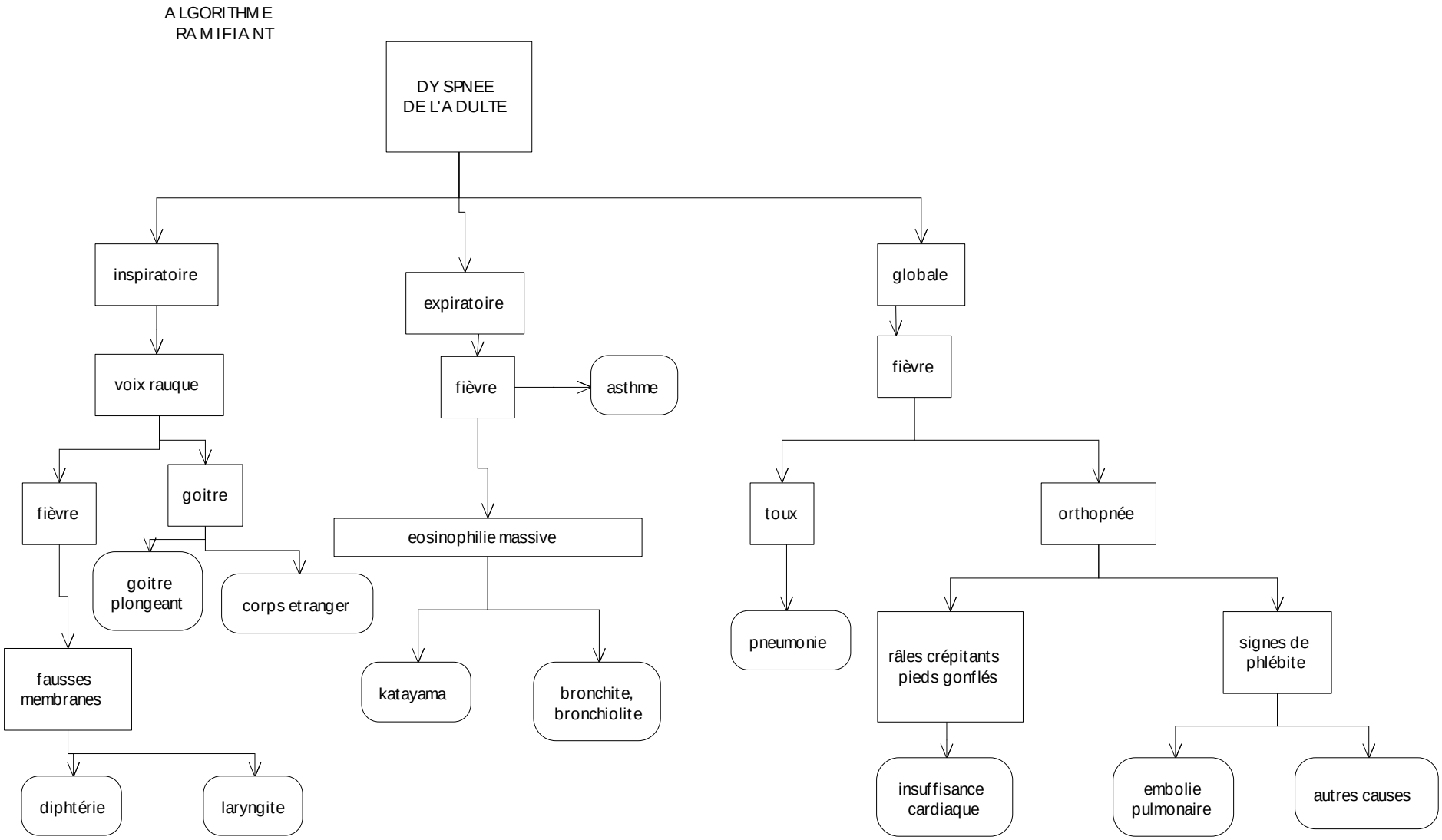
Solutions

- Quality system?
- Algorithms, ordinograms, guidelines?
- Continuous training/evaluation?

Solution1: Quality system (PBF)

Premises	Diagnosis	Treatment
Files retrievable Files completed Lab functional and fast RX and US functional Doctors and nurses present Reference report	Hypothesis generation Hypothesis checking Diagnosis correction	Medication available Surgery available Protocols followed Counter reference report

Solution2: algorithms



Algorithms 2

- Late Bruno Dujardin 1992
- Ward rounds with clinician and public health expert
- Observe a nurse practitioner in action, without interference
  - Nurse rarely follows algorithm
  - Impossible to follow algorithm in most of the clinical cases
  - Reasoning of the nurse close to our own reasoning!

Algorithms 3

- Ask experienced clinicians to draw an algorithm for cough since > 2 weeks
- Take existing database of 100 real patients with proven TB
- Do a "dry run":
  - Inject patient after patient in the algorithm, and look for detection capacity (sensitivity)
  - In most exercises, < 10% !!

Algorithms 4

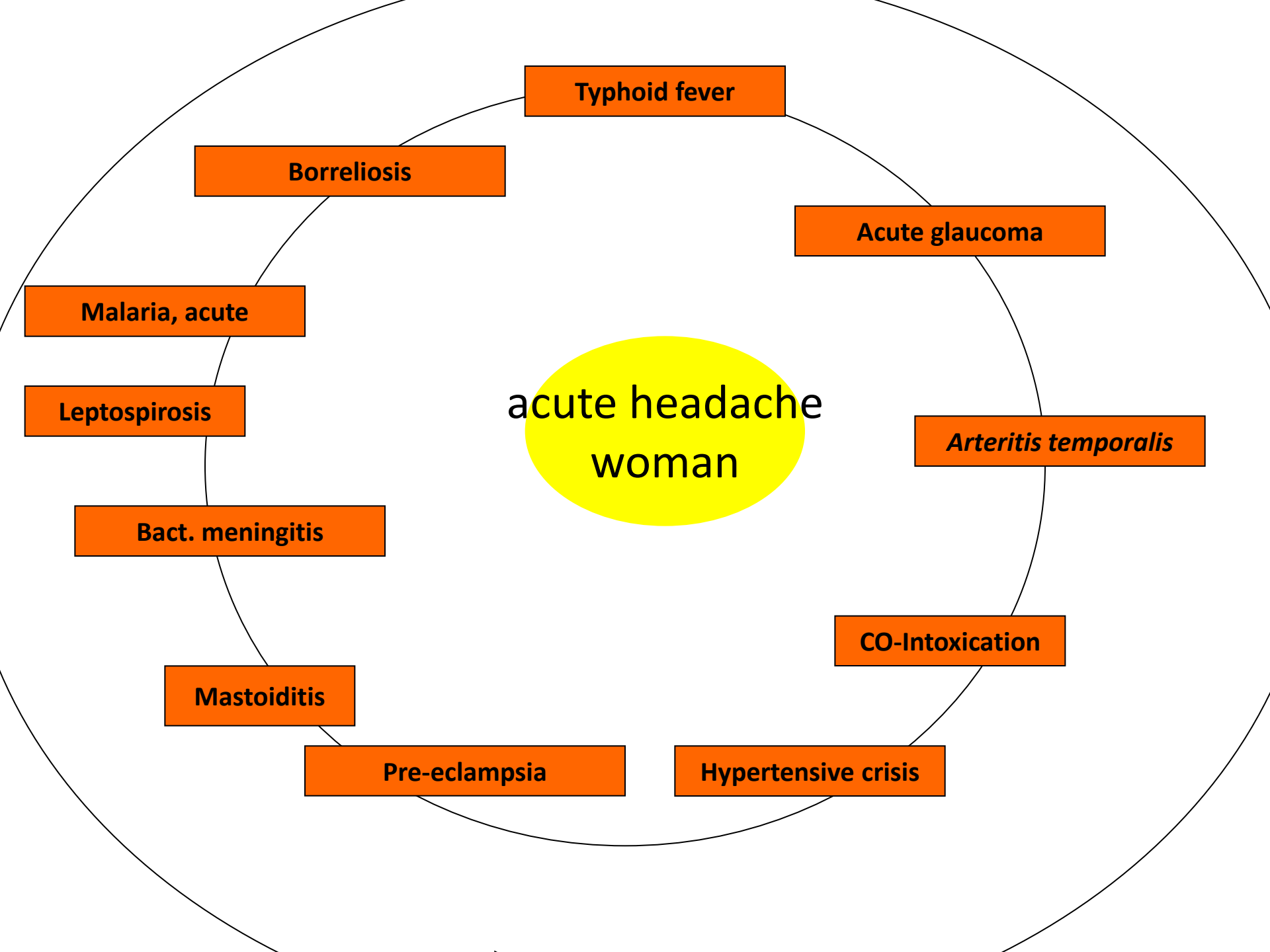
- *Dr Jansen of the Damian Foundation*
  - *“algorithmic thinking is not human”*
- *Answer:*
  - *“propose another logical frame”.*
- *Jansen:*
  - *“this is your problem, not mine”*

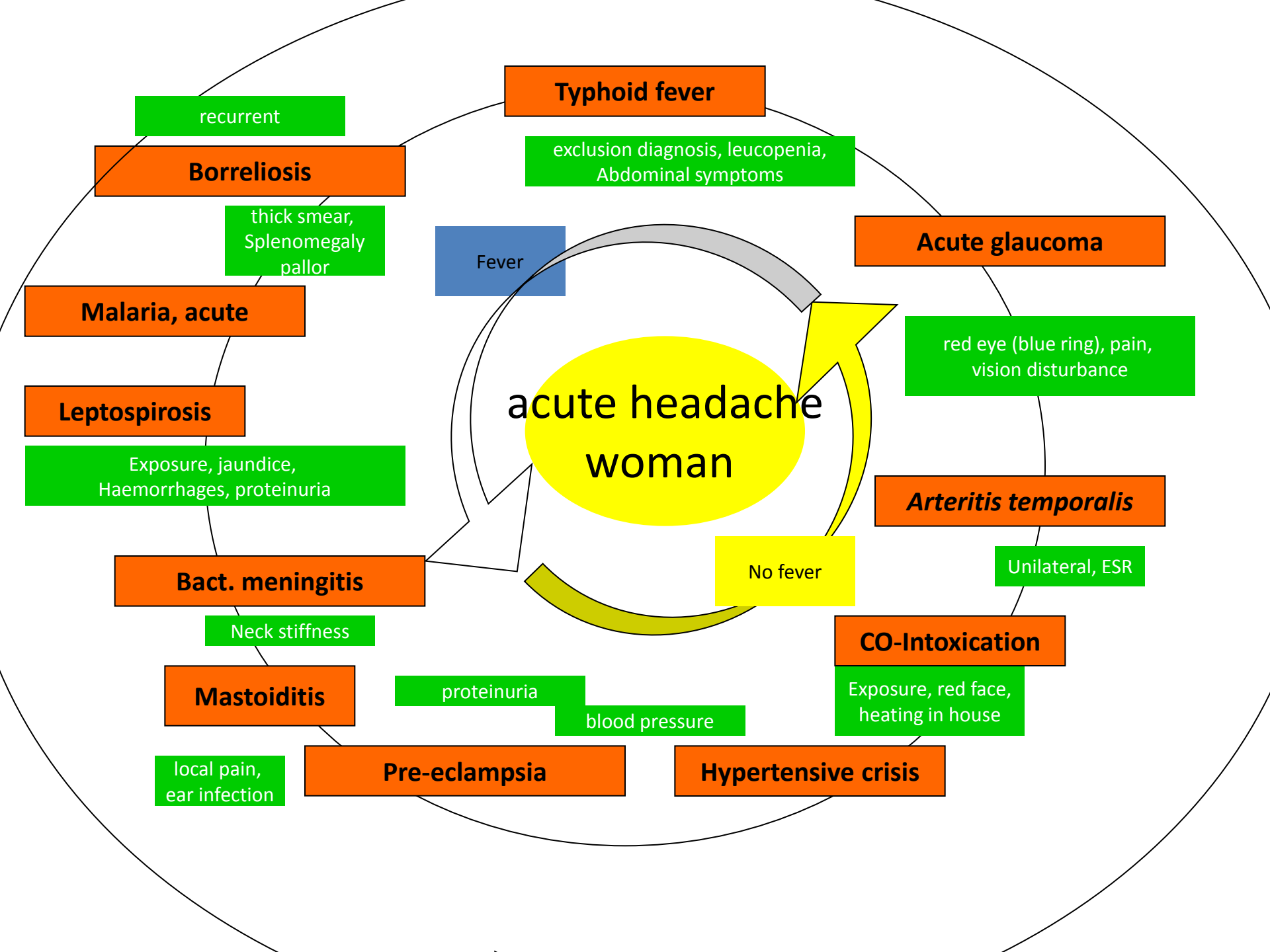
Lumbago in Verona

- *Algorithms*
  - *Serial*
  - *Flip-flop, dichotomous*
- *Human brain*
  - *Parallel*
  - *Fuzzy logic*
- *City of Romeo and Juliet*
- *Tablecloth: the solution*

The idea of the diagnostic landscape or panorama

- Avoid the tunnel trap
  - Go for serious and treatable diseases first
  - Do not stop at the first plausible pattern
- Look for key findings
  - Confirmers
  - Excluders


Typhoid fever
Borreliosis
Acute glaucoma
Malaria, acute
acute headache woman
Leptospirosis
Arteritis temporalis
Bact. meningitis
CO-Intoxication
Mastoiditis
Pre-eclampsia
Hypertensive crisis


acute headache woman
Fever
No fever
Typhoid fever
exclusion diagnosis, leucopenia, Abdominal symptoms
Acute glaucoma
red eye (blue ring), pain, vision disturbance
Arteritis temporalis
Unilateral, ESR
CO-Intoxication
Exposure, red face, heating in house
Hypertensive crisis
proteinuria
blood pressure
Pre-eclampsia
local pain, ear infection
Mastoiditis
Neck stiffness
Bact. meningitis
Exposure, jaundice, Haemorrhages, proteinuria
Leptospirosis
Malaria, acute
thick smear, Splenomegaly pallor
Borreliosis
recurrent

Solution 3: continuous training/evaluation

- Evaluation by peers?
- Evaluation by external experts?
- Necrology sessions?
  - Hindsight error
- Enquêteurs with vignettes?
  - Restricted list of answers
  - Not dynamic
- Electronic tutor based training/evaluation

Kabisa

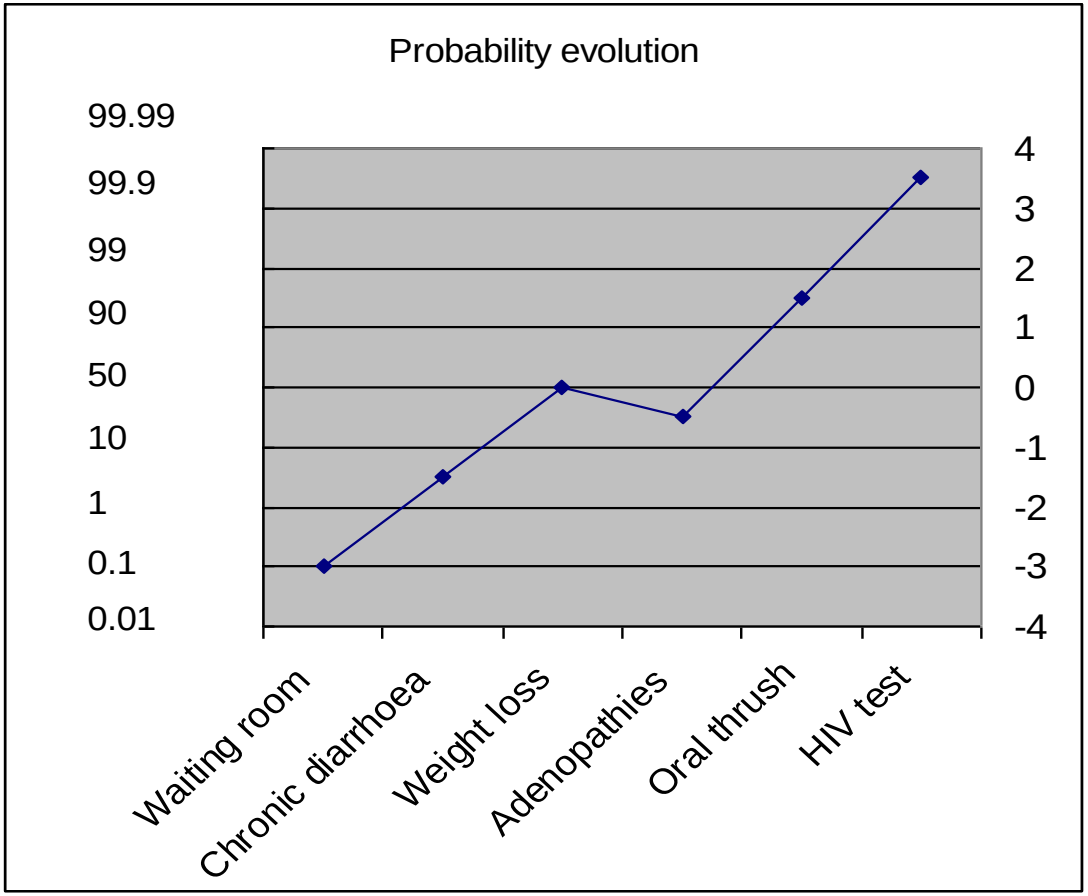
- Card game
- Training
- Non validated expert
  - I Foxpro
  - II C++
  - III-IV VBA
  - V Delphi
  - VI Multiplatform
  - VII Java

Kabisa V

- Program:
  20.000 lines
- Database
- Images database: 100M
- Extensive discussion by tutor

Kabisa logic

- Pattern recognition
- Bayesian computation



Kabisa

- Prevalences
- Sensitivities
- Specificity computed in a dynamic way (waning specificity)
- Sum of prevalences stable

Dynamic specificity

- False positives=
  - Disease X: prevalence * sensitivity= symptom through disease x
  - Sum for all related diseases
  - Add noise factor
- Convert to specificity
- AT EVERY STEP IN DIAGNOSTIC PATHWAY

Kabisa program

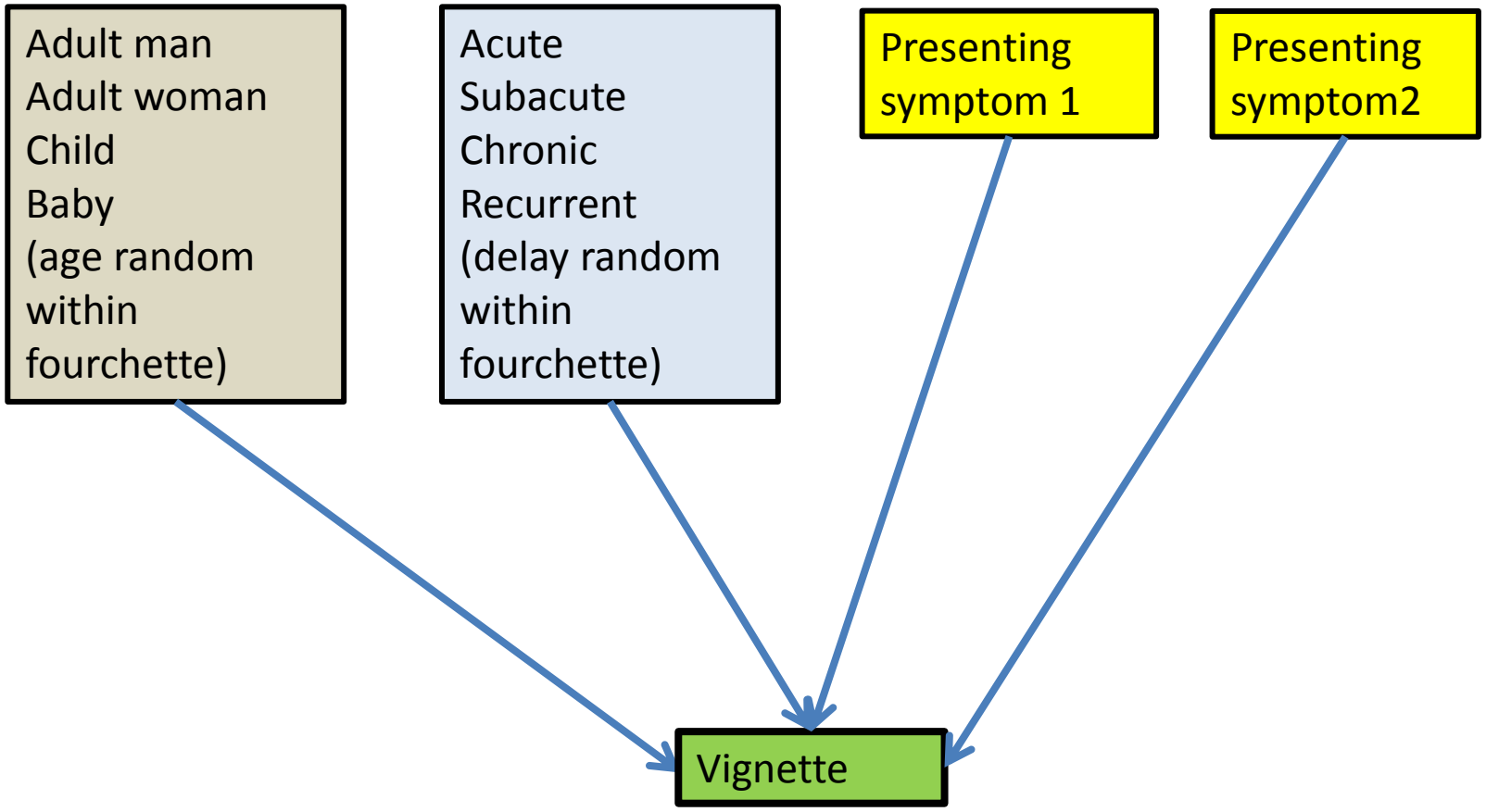
Support for nurses

- Mobile phone bedside support.
  - Android, Iphone: kabisa clusterUN.
  - New version recently developed in Java.

MySQL program

Training/evaluation of nurses

Random generation of vignettes.



Training/evaluation of nurses

Tutor

- Your patient I
- s an adult man, 53 year old, who suffers of high fever and severe headache since two days.
- What should you do?

Nurse practitioner

- I would do a rapid test for malaria

Training/evaluation of nurses

Tutor

- It is negative.
- What do you do next ?

Nurse practitioner

- Then I think this is typhoid fever.

Training/evaluation of nurses

Tutor

- I think this is too early to make a diagnosis. I propose to look further. What would you do next?

Nurse practitioner

- Ok, then I would look for abdominal pain

Training/evaluation of nurses

Tutor

- Very good. It is negative. What is your next step?

Nurse practitioner

- I still think this is a malaria case.

Training/evaluation of nurses

Tutor

- Indeed, you reached the threshold for malaria, but we think there are more findings to look for.
- What would be your next step?

Nurse practitioner

- I would look for neck stiffness

Training/evaluation of nurses

Tutor

- Very good. You need some more questions?

Nurse practitioner

- I would look for dehydration.

Training/evaluation of nurses

Tutor

- I do not see what you are thinking of. Can you tell me which disease you look for?

Nurse practitioner

- Severe malaria.

Training/evaluation of nurses

Tutor

- These findings are explained by severe malaria:
  - High fever
  - Vomiting
  - Stiff neck
- These are not explained:
  - dehydration
- These are absent, and should be present
  - RDT

Nurse practitioner

- Ok, then I go for meningitis

Training/evaluation of nurses

Tutor

- Congratulations, you are correct.

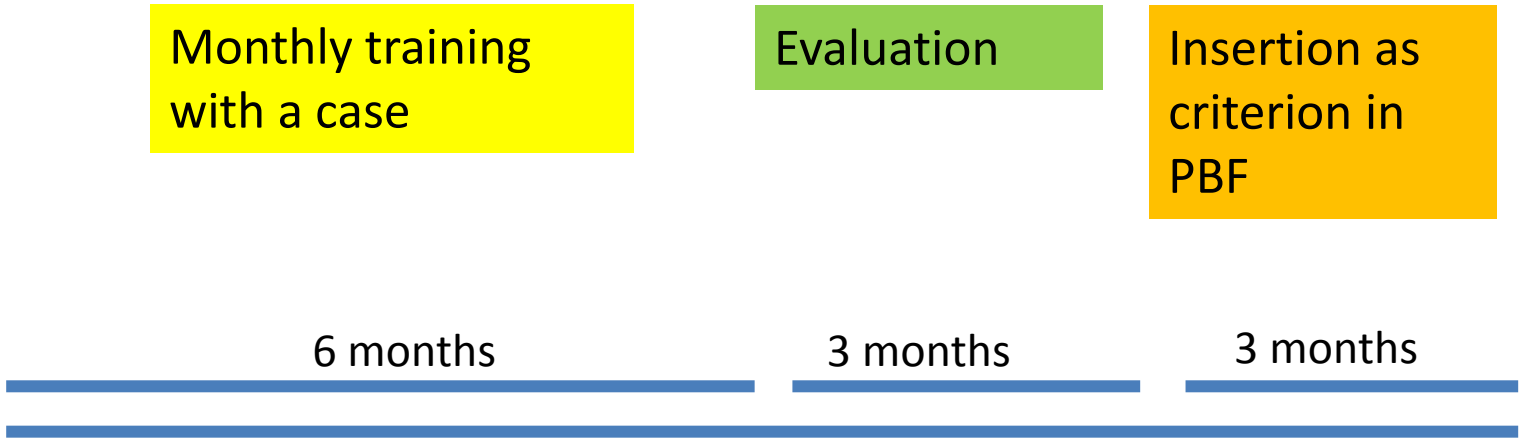
Nurse practitioner

- Thanks

Evaluation

- How many hypotheses outside a reasonable range?
- How many non pertinent questions?
- How many findings in general to reach the diagnosis?
- How many diagnoses found?

Training/evaluation of nurses Timeline



Doctors

- Link with open clinic
- Clinician inserts presenting symptoms.
- Give panorama, if clinician asks for it.
- Evaluate if key findings were asked for, based on presenting symptoms.

Limitations

- This is a dream, we are working on.
- If we succeed, it might be a big leap forward.