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

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

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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 reasoning

• 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

<table>
<thead>
<tr>
<th>Problem</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor clinical reasoning</td>
<td>33</td>
</tr>
<tr>
<td>Poor knowledge</td>
<td>19</td>
</tr>
<tr>
<td>Poor management</td>
<td>48</td>
</tr>
<tr>
<td>Absence of diagnostic means</td>
<td>3</td>
</tr>
<tr>
<td>Absence of therapeutical means</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>97</strong></td>
</tr>
</tbody>
</table>
Solutions

• Quality system?
• Algorithms, ordinograms, guidelines?
• Continuous training/evaluation?
Solution 1: Quality system (PBF)

Premises:
- Files retrievable
- Files completed
- Lab functional and fast
- RX and US functional
- Doctors and nurses present
- Reference report

Diagnosis:
- Hypothesis generation
- Hypothesis checking
- Diagnosis correction

Treatment:
- 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% !!
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
acute headache
woman

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

- Bact. meningitis: Neck stiffness
- Leptospirosis: Exposure, jaundice, Haemorrhages, proteinuria
- Malaria, acute: Local pain, ear infection
- Borreliosis: Thick smear, Splenomegalgy pallor
- Pre-eclampsia
- Hypertensive crisis
- Arteritis temporalis: Unilateral, ESR
- CO-Intoxication: Exposure, red face, heating in house
- Acute glaucoma: Red eye (blue ring), pain, vision disturbance
- Typhoid fever: Exclusion diagnosis, leucopenia, Abdominal symptoms
- Bact. meningitis: Blood pressure
- Mastoiditis: Proteinuria
- Blood pressure
- Hypertensive crisis
- No fever
- Acute glaucoma: Blood pressure
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

![Probability evolution chart](chart.png)
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.

- Adult man
- Adult woman
- Child
- Baby (age random within fourchette)

- Acute
- Subacute
- Chronic
- Recurrent (delay random within fourchette)

- Presenting symptom 1
- Presenting symptom 2
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

- Monthly training with a case
- Evaluation
- Insertion as criterion in PBF

6 months  |  3 months  |  3 months
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.