2010-2015: uptake and impact of Xpert MTB/RIF

Wayne van Gemert
WHO Global TB Programme, Geneva

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Xpert MTB/RIF roll-out: global progress

Dec 2010

99 GeneXperts (524 modules) in the public sector in 23 countries

Q1 2011

3,763 GeneXperts (17,883 modules) in the public sector in 116 countries

Q4 2014

Data: FIND/Cepheid
Capacity for Xpert MTB/RIF testing today

Numbers of GeneXpert modules procured under concessional pricing, as of Q4 2014

Top procurers of modules (GeneXperts):
- 4,260 (357) South Africa
- 3,876 (969) China
- 780 (204) India
- 720 (180) Brazil
- 624 (156) Nigeria
- 492 (120) Philippines
- 412 (108) Uganda
- 388 (98) Ethiopia
- 388 (88) Zimbabwe
- 376 (71) Bangladesh
- 374 (91) Kenya
- 336 (83) Pakistan

Data: FIND/Cepheid
Xpert MTB/RIF cartridges procured under concessional prices

Data sources: FIND/Cepheid
Xpert MTB/RIF cartridges procured under concessional prices: Procurers/donors

South Africa (MoH, Global Fund, USAID, PEPFAR, others)

Data sources: FIND/Cepheid (data by country and overall); WHO (data by donor)
56% of all cartridges have been procured by South Africa (MoH, Global Fund, USAID, PEPFAR, others)
Xpert MTB/RIF cartridges procured under concessional prices: Procurers/donors

- DFATD Canada (TB REACH/EXPAND-TB)
- South Africa (MoH, Global Fund, USAID, PEPFAR, others)

Data sources: FIND/Cepheid (data by country and overall); WHO (data by donor)
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- UNITAID (TBXpert/EXPAND-TB)
- DFATD Canada (TB REACH/EXPAND-TB)
- Brazil (MoH)
- China (Global Fund)
- South Africa (MoH, Global Fund, USAID, PEPFAR, others)

Data sources: FIND/Cepheid (data by country and overall); WHO (data by donor)
Xpert MTB/RIF cartridges procured under concessional prices: Procurers/donors

Data sources: FIND/Cepheid (data by country and overall); WHO (data by donor)
GeneXpert modules procured under concessional prices

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GeneXpert modules procured under concessional prices

24% of all modules have been procured by South Africa

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GeneXperts being underutilized...
TBXpert Project

• $25.9 million UNITAID-funded project for procurement and use of 237 GeneXperts and 1.4 million Xpert MTB/RIF cartridges in 21 countries (2013-2015)
• Managed by the **WHO Global TB Programme** with the **Stop TB Partnership**
• Implementation funding for selected sites by TB REACH
• Innovative social business models designed by IRD in Bangladesh, Indonesia and Pakistan
• Technical assistance provision coordinated by African Society for Laboratory Medicine (ASLM) in 5 African countries
TBXpert Project: Interim progress

**Xpert MTB/RIF tests procured and performed**

- **2013-2014 cumulative:**
  - 607,240 tests procured (1.4 million target by 2015)
  - 394,240 Xpert MTB/RIF tests performed

**Rifampicin-resistant TB cases detected**

- **2013-2014 cumulative:**
  - 17,017 rifampicin-resistant TB cases detected
  - Significant numbers of incident TB and HIV-associated TB also detected
Uptake of WHO policy recommendations: national policies on Xpert MTB/RIF

<table>
<thead>
<tr>
<th>Country Type</th>
<th>Initial diagnostic for people at risk of DR-TB (2013)*</th>
<th>Initial diagnostic for PLHIV (2013)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 high TB burden countries</td>
<td>86%</td>
<td>82%</td>
</tr>
<tr>
<td>27 high MDR-TB burden countries</td>
<td>89%</td>
<td>89%</td>
</tr>
<tr>
<td>All countries</td>
<td>61%</td>
<td>56%</td>
</tr>
</tbody>
</table>

- Countries using Xpert as the initial diagnostic test for all people suspected of having TB: South Africa, Swaziland, Brazil, Moldova
- Moving beyond risk groups (though not for all people suspected of having TB):
  - Testing of all smear-negative with chest X-ray abnormalities (e.g., Philippines)
  - Testing of all people suspected of having TB, at sites with a GeneXpert; specimens from risk groups referred from sites without GeneXpert (e.g., Tanzania)

* WHO Global Tuberculosis Report 2014
Impact of Xpert MTB/RIF

Impact measures under assessment:

1. Increase in TB cases detected
2. Increase in rifampicin-resistant TB cases detected
3. Reduction in diagnostic delay and time to treatment initiation
4. Reduction in morbidity and mortality
5. Cost-effectiveness and patient costs
Impact of Xpert MTB/RIF

Impact measures under assessment:

1. Increase in TB cases detected
2. Increase in rifampicin-resistant cases detected
3. Reduction in diagnostic delay and time to treatment initiation
4. Reduction in morbidity and mortality
5. Cost-effectiveness and patient costs
Impact measures under assessment:

1. **Increase in TB cases detected**
   - Given higher sensitivity of Xpert MTB/RIF compared to microscopy, increases in numbers of **bacteriologically positive cases** have been widely reported.
   - However, several studies from southern African countries\(^1\)-\(^2\), Brazil\(^3\) and Nepal\(^4\) have not found a significant increase in **overall case notifications**.
     - In these settings, patients are often started on treatment empirically, even when Xpert does not detect TB.
   - An increase in bacteriologically positive cases may indicate that the frequency of misdiagnosis and unnecessary treatment has been reduced.

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Impact of Xpert MTB/RIF

Impact measures under assessment:

1. Increase in TB cases detected
2. Increase in rifampicin-resistant cases detected

- Countries are now able to detect rifampicin-resistant cases at decentralized levels (e.g., 15 times more in India TBXpert Project sites)

- Quantification at global-level is challenging: countries report numbers of rifampicin-resistant cases to WHO, but cases that are detected with isoniazid resistance are classified as MDR-TB

  - Scale-up of other DST technologies (LPA, MGIT) has been in parallel

![Bar chart showing rifampicin-resistant and multidrug-resistant TB cases detected globally, 2009-2013](chart.png)
Impact measures under assessment:

1. Increase in TB cases detected
2. Increase in rifampicin-resistant cases detected
3. **Reduction in diagnostic delay and time to treatment initiation**
   - Reduced time to TB treatment initiation in Brazil (11.4 to 8.1 days)\(^1\), remote Canada (7.7 to 1.8 days)\(^2\), and in several southern African settings\(^3\)\(^-\)\(^5\) with high HIV burden (2 to 1 day; 8 to 4 days; 11.5 to 1 day)
   - South Africa EXIT-RIF study\(^6\) focusing on RR-TB: increase in enrolment and reduced time to MDR treatment initiation (43 to 11 days)
   - Health system conditions often prevent rapid turnaround time, return of results and start to treatment (e.g., no TBXpert Project sites are able to test, return results and initiate treatment on the same day)

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Impact measures under assessment:
1. Increase in TB cases detected
2. Increase in rifampicin-resistant cases detected
3. Reduction in diagnostic delay and time to treatment initiation
4. Reduction in morbidity and mortality
   - Studies in southern African settings\textsuperscript{1,2} have not found a significant reduction in mortality or morbidity among drug-sensitive cases
   - EXIT-RIF study\textsuperscript{3} in South Africa found a significant reduction (10-fold) in mortality among rifampicin-resistant patients who were HIV-negative; no significant difference among HIV-positive patients

\textsuperscript{1} Theron G et al. Lancet. 2014 Feb 1; \textsuperscript{2} XTEND study; \textsuperscript{3} Van Rie A et al. Union conference 2014 abstract
Impact measures under assessment:

1. Increase in TB cases detected
2. Increase in rifampicin-resistant cases detected
3. Reduction in diagnostic delay and time to treatment initiation
4. Reduction in morbidity and mortality
5. Cost-effectiveness and patient costs
   - Modeling studies\(^1-^5\) have shown Xpert as a replacement or in addition to microscopy is cost-effective for TB and DR-TB in high burden settings
   - One study\(^6\) in Brazil: Xpert can reduce patient costs by approximately 30% vs microscopy

Impact assessment: what more is needed

- Given impact is setting-specific, what is the impact of Xpert (on TB/RR-TB case detection, mortality, time to treatment initiation, etc.) in other settings with differing epidemiologies and health systems?
- What is the impact of Xpert on detection of paediatric TB and extrapulmonary TB, and subsequent treatment outcomes?
- What is the impact of Xpert on reducing false-positive TB diagnosis, and related adverse effects and costs?
- What is the impact of Xpert on reducing transmission of TB and drug-resistant TB, and reduction of population-level TB burden?
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Thank you

Wayne van Gemert
vangemertw@who.int