Cost-effectiveness of point-of-care viral load monitoring

Insights from mathematical modeling

Implementing HIV and TB Diagnostics in Resource-Limited Settings
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Is viral load monitoring necessary?

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- Switching to second-line ART possible quickly after virological failure
  - Reduced mortality
  - Reduced risk of opportunistic infections
  - Reduced risk of onward transmission
- Detection of poor adherence
- Switching only patients with true virological failure

- Expensive
- Earlier switching to second-line ART reduces further treatment options
- Requires laboratory capacities
  - Difficult to implement in rural and remote areas

Cost-effectiveness

$$\text{Cost-effectiveness ratio} = \frac{\text{Additional costs}}{\text{Additional benefit}}$$

(e.g. lived QALYs or averted DALYs)

Costs of antiretrovirals

Costs of CD4 or viral load tests

Costs of OI management

Costs of secondary cases

<u>Intervention:</u> Replacing CD4 monitoring with routine viral load monitoring

Impact of adherence on quality of life and survival

Improved survival by timely switching

Reduced risk of transmission

Cost-effectiveness of viral load monitoring

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Cost-effectiveness of point-of-care viral load monitoring of antiretroviral therapy in resource-limited settings: mathematical modelling study

Janne Estill[a], Matthias Egger[a], Nello Blaser[a], Luisa Salazar Vizcaya[a], Daniela Garone[b], Robin Wood[c], Jennifer Campbell[d], Timothy B. Hallett[e], Olivia Keiser[a], for IeDEA Southern Africa

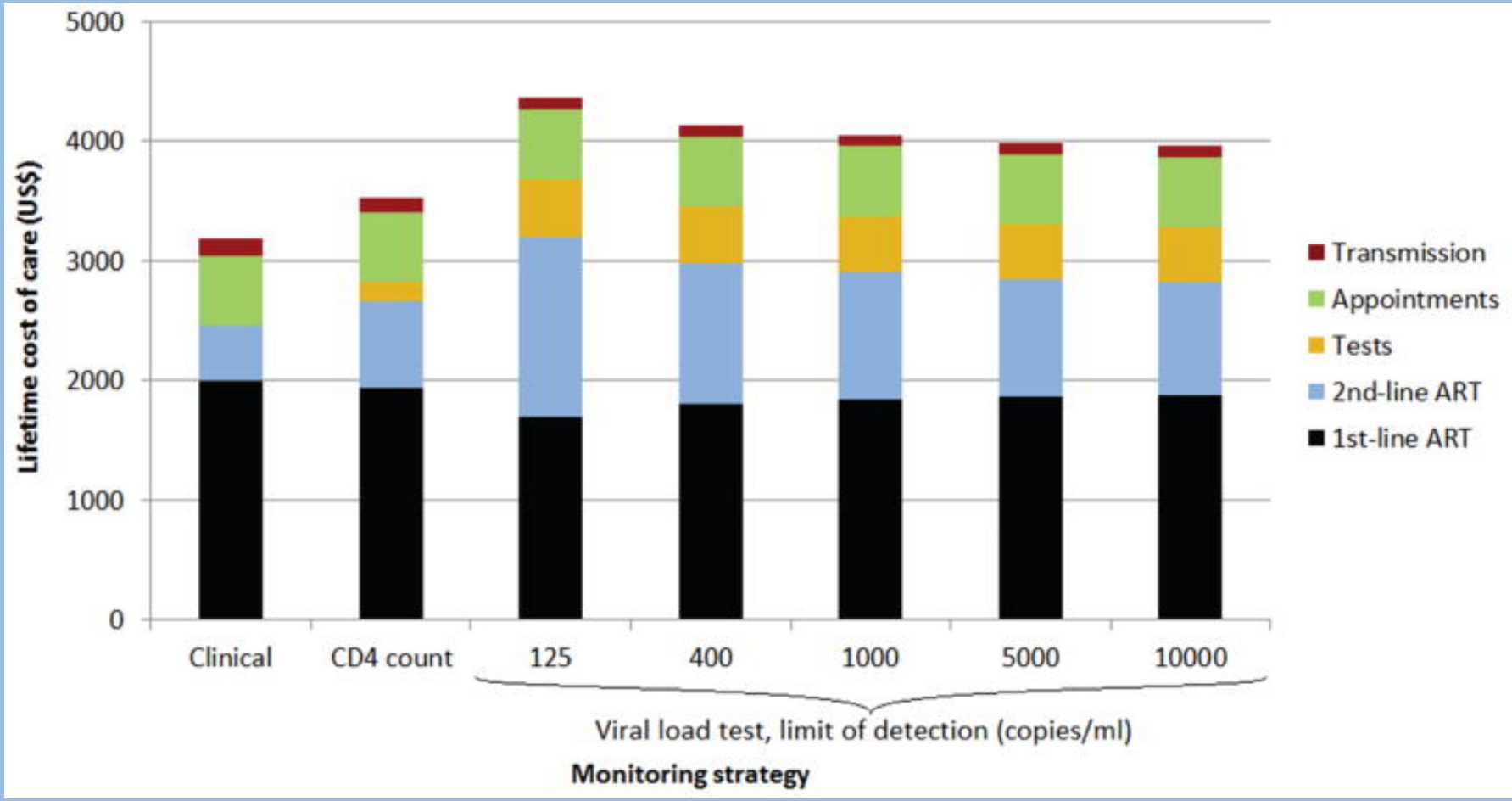
Background: Monitoring of HIV viral load in patients on combination antiretroviral therapy (ART) is not generally available in resource-limited settings. We examined the cost-effectiveness of qualitative point-of-care viral load tests (POC-VL) in sub-Saharan Africa.

Design: Mathematical model based on longitudinal data from the Gugulethu and Khayelitsha township ART programmes in Cape Town, South Africa.

Methods: Cohorts of patients on ART monitored by POC-VL, CD4 cell count or clinically were simulated. Scenario A considered the more accurate detection of treatment failure with POC-VL only, and scenario B also considered the effect on HIV transmission. Scenario C further assumed that the risk of virologic failure is halved with POC-VL due to improved adherence. We estimated the change in costs per quality-adjusted life-year gained (incremental cost-effectiveness ratios, ICERs) of POC-VL compared with CD4 and clinical monitoring.

Estill *et al* (2013), AIDS 27:1483-92

Cost-effectiveness of viral load monitoring



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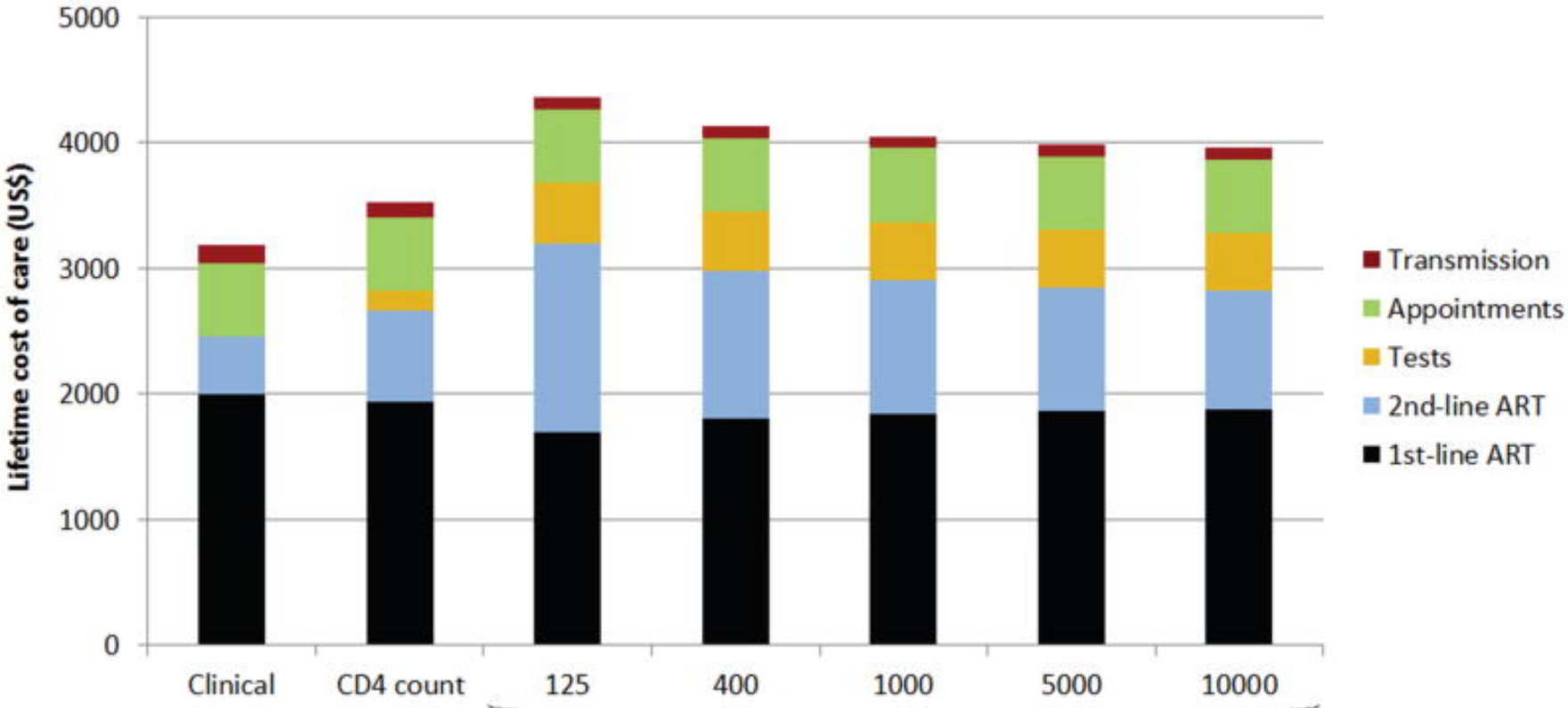
Cost-effectiveness of viral load monitoring



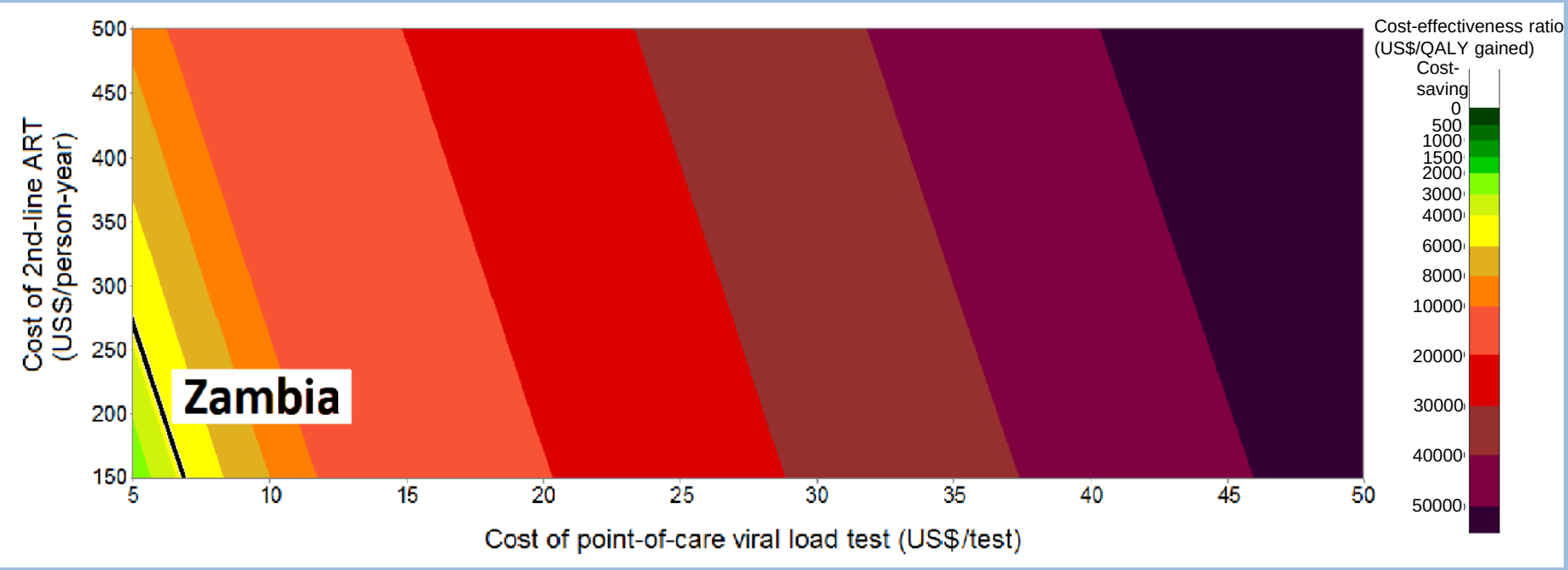
Quality-adjusted life expectancy at ART start:

12.78 12.89 12.93 12.93 12.93 12.93 12.93

Estill *et al* (2015), AIDS 27:1483-92

Cost-effectiveness of viral load monitoring

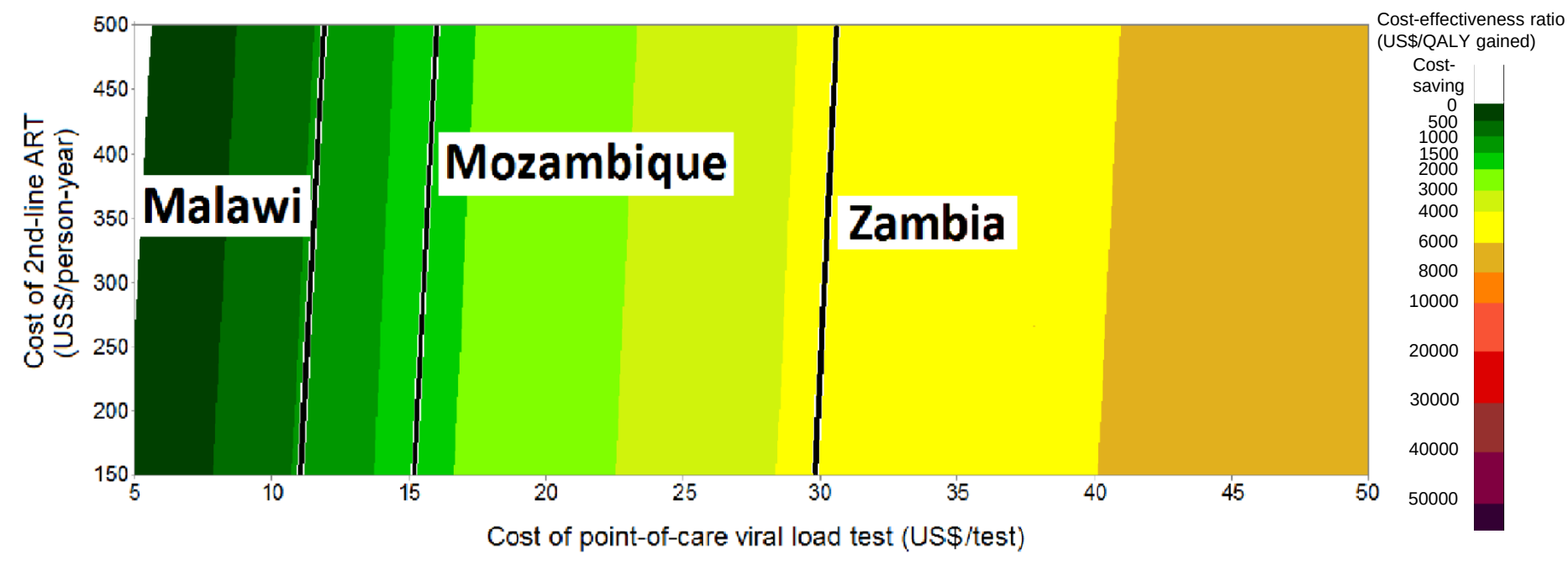
Only «direct» benefit on treated patients included…



Estill *et al* (2013), AIDS 27:1483-92

Cost-effectiveness of viral load monitoring

…or benefit through improved adherence, reduced transmission risk?



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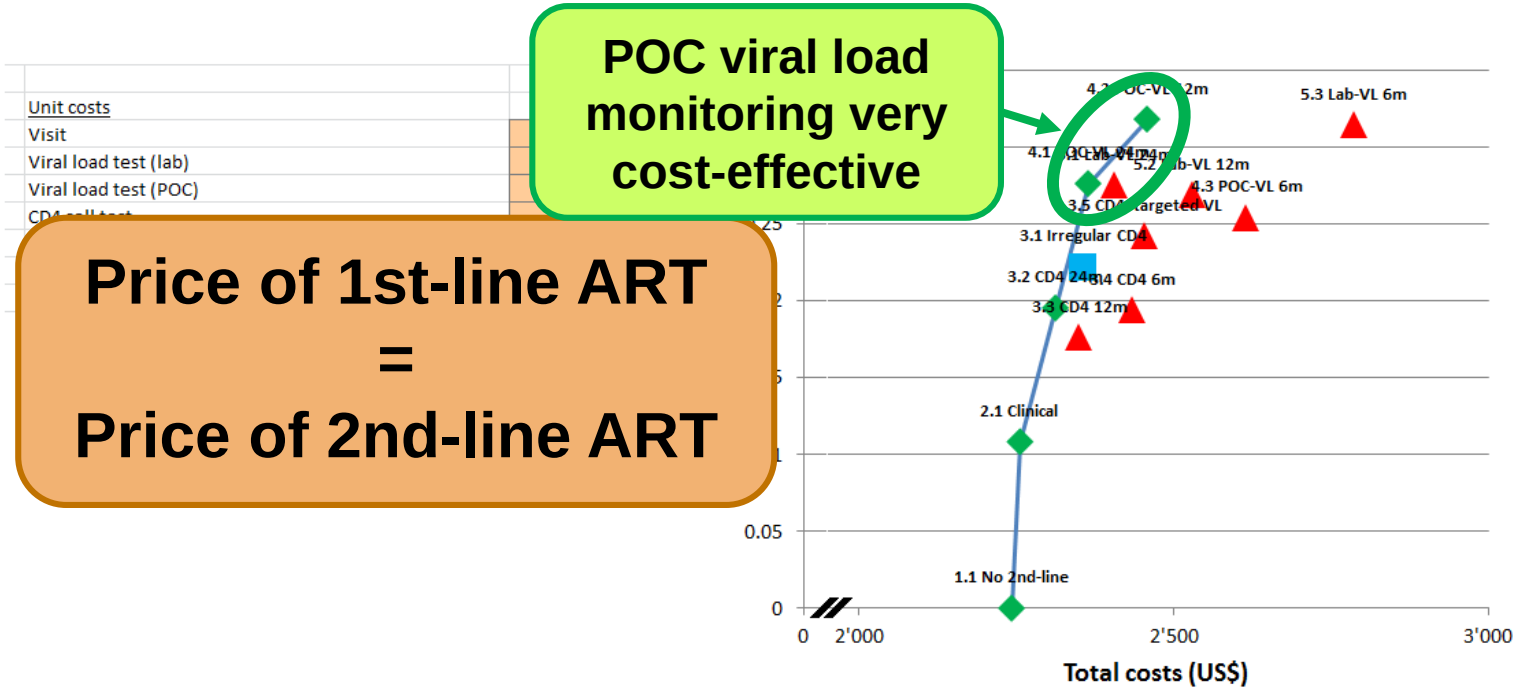
Cost-effectiveness depends also on price of 2nd-line ART



POC viral load monitoring very cost-effective

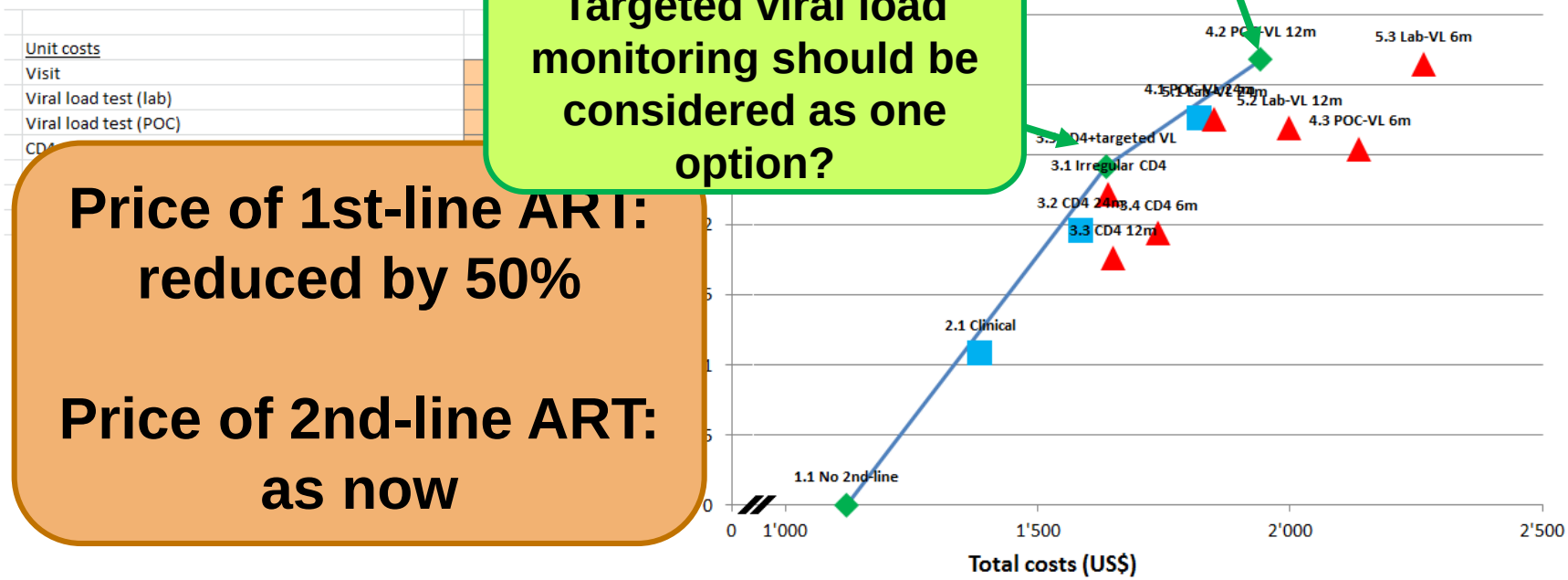
Price of 1st-line ART
=
Price of 2nd-line ART

Estill *et al* (2014), 20th International AIDS Conference, Melbourne, Australia (poster WEPE046)

Cost-effectiveness depends also on price of 2nd-line ART

POC viral load monitoring less cost-effective

Targeted viral load monitoring should be considered as one option?



Price of 1st-line ART: reduced by 50%

Price of 2nd-line ART: as now

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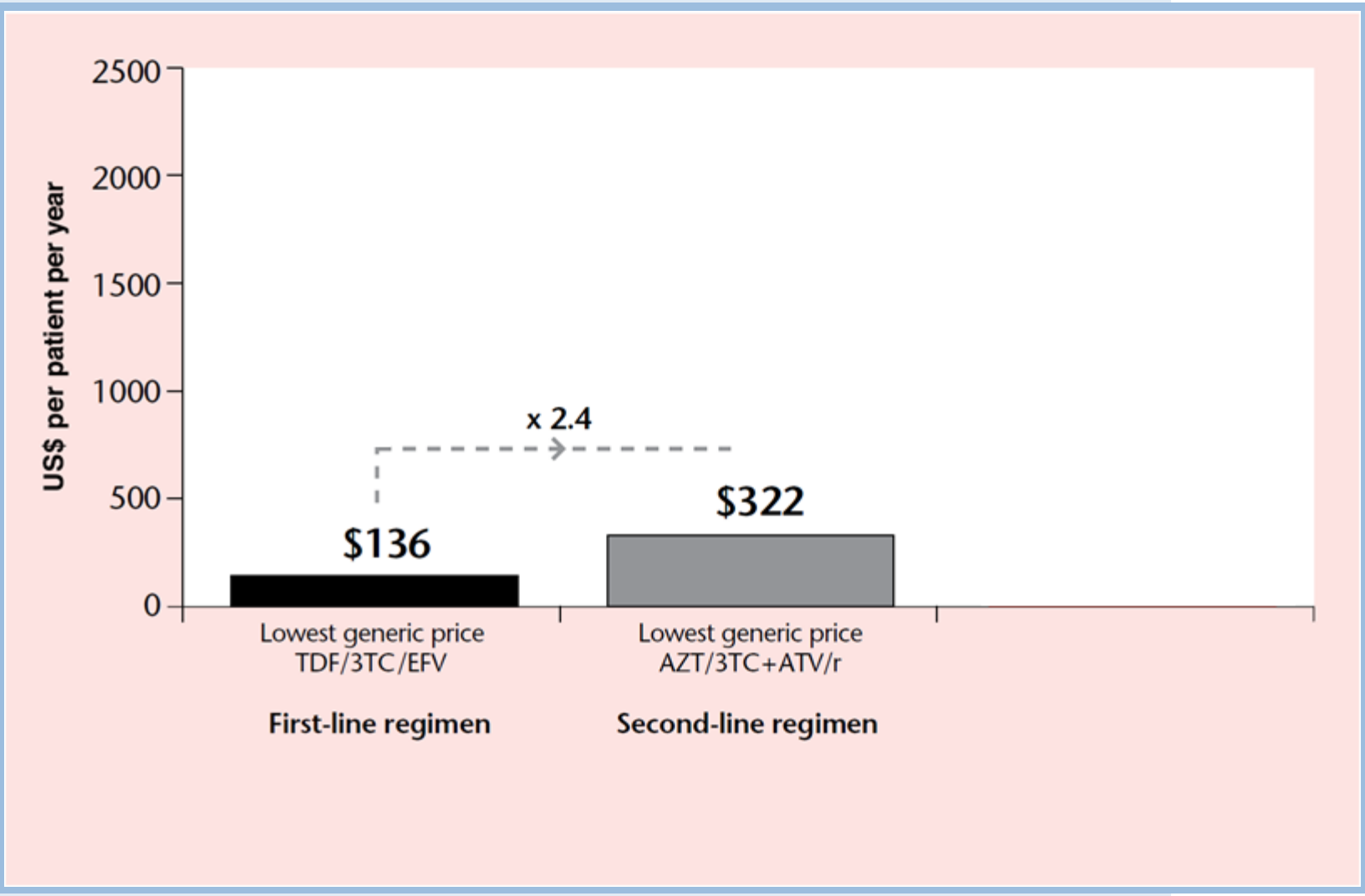
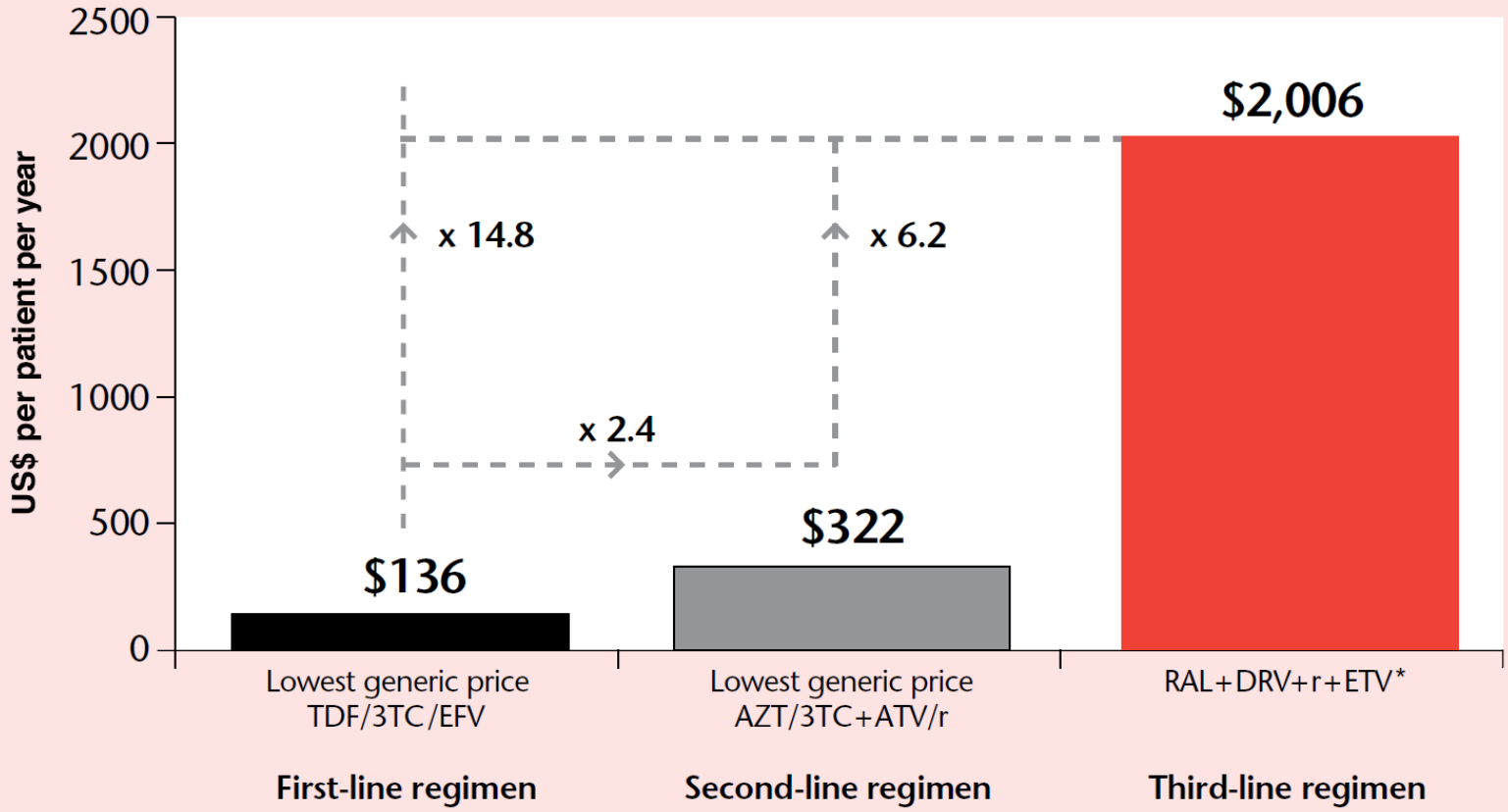
2nd- and 3rd-line ART still expensive



MSF (2014): Untangling the web of antiretroviral price reductions. 17th Edition.

2nd- and 3rd-line ART still expensive



*Note: The price of the third-line ARV regimen of US$2,006 was calculated by adding the three individual prices of the originator product.

MSF (2014): Untangling the web of antiretroviral price reductions. 17th Edition.

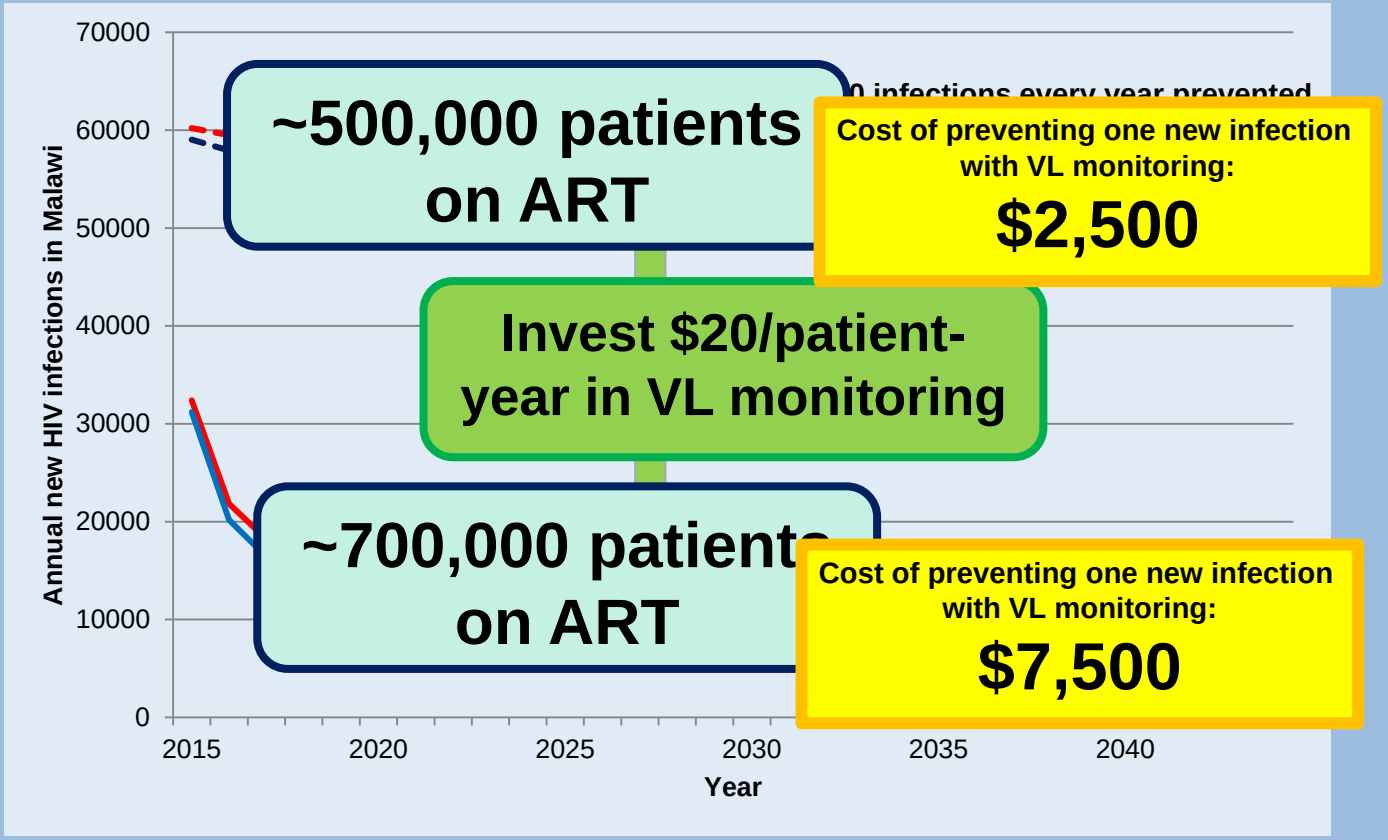
Timely switching to second-line prevents transmission

ART coverage remains stable

- CD4 monitoring
- VL monitoring

Test&Treat

- CD4 monitoring
- VL monitoring



Estill *et al* (2014), 20th International AIDS Conference, Melbourne, Australia (poster TUPE163)

Conclusions

- Routine viral load monitoring can be very cost-effective—but this is mainly due to «indicrect» benefits such as preventing transmission
- Viral load tests are becoming cheaper, but monitoring alone is not enough: resources are also needed to switch patients to second-line
- Special attention should be paid to costs and accessibility for second-line ART and further treatment options

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