

# Navigating the Neglected Crystal Ball: A Systematic Review of Prognostic Models in Visceral Leishmaniasis

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## Objective

- Visceral leishmaniasis (VL) is a neglected tropical disease responsible for thousands of avoidable deaths per year
- We aim to identify, summarise and appraise all prognostic models for clinical outcomes in patients diagnosed with VL
- This review provides an important resource for VL stakeholders, including healthcare workers, policymakers and researchers

## Results

- 2,661 records underwent title and abstract screening, and 61 full-text screening
- 8 published studies were identified describing 12 prognostic model developments (including one updating) and 19 model validations (Table 1)
- All model developments and validations were assessed as having high risk of bias
- All models predicted mortality, with the most common predictors being jaundice, bleeding, extremes of age and oedema (Figure 1)

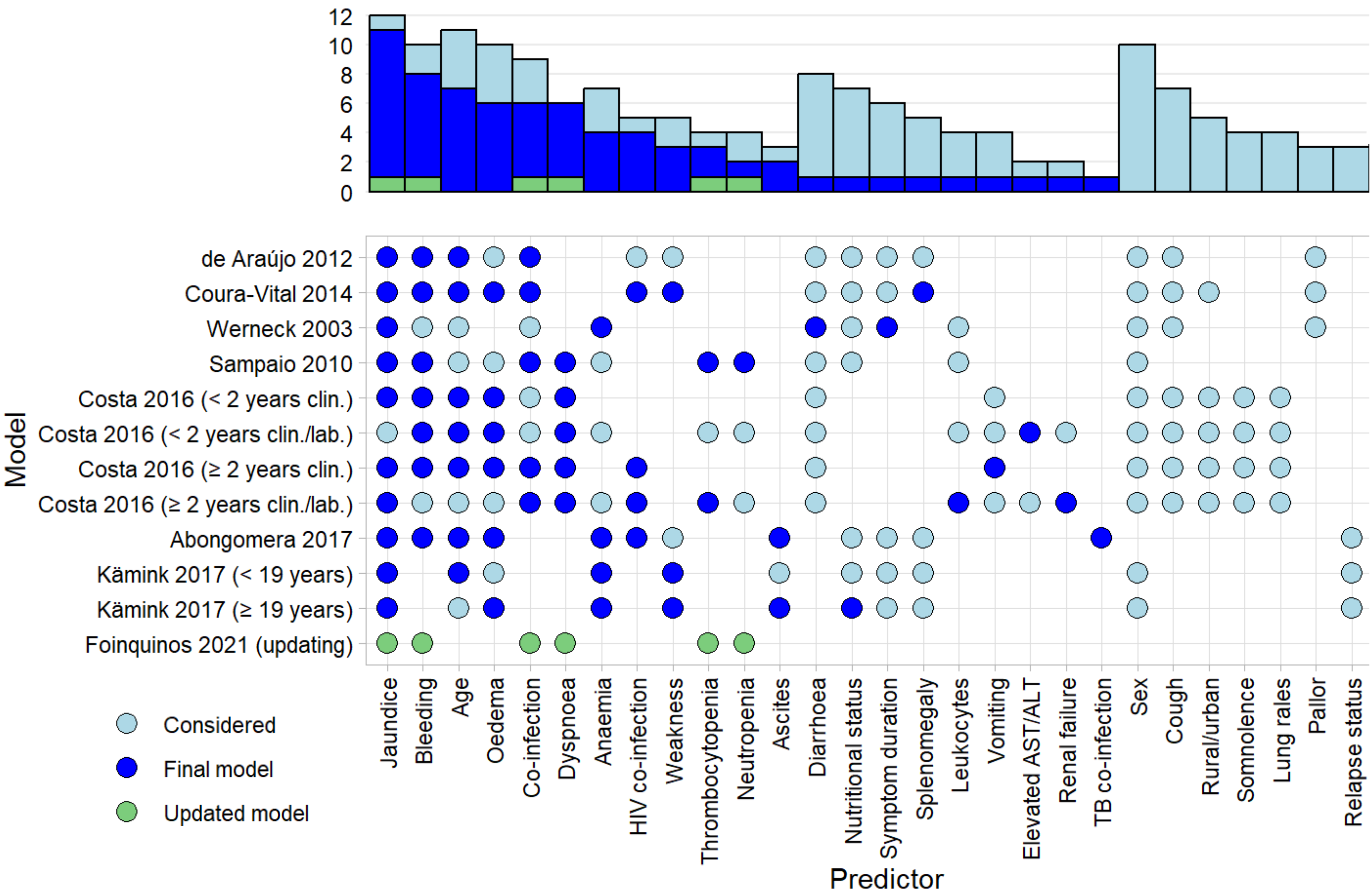


Figure 1: Summary of the predictors across the identified prognostic models. Considered predictors (light blue) were investigated for model inclusion, but omitted from the final model

## Conclusion

- No prognostic models for relapse were identified, highlighting an area for future research. As we enter the elimination phase, identifying patients at high risk of relapse is important to control spread
- Individual-participant data (IPD) from clinical trials could be used to develop a robust model predicting relapse
- Identified models present a high risk of bias, limiting their use for clinical decision making of VL patients and wider recommendations

## Methodology

- With no language restriction, we searched 5 bibliographic databases from inception to March 1<sup>st</sup> 2023, for all published studies that developed, validated or updated models predicting future VL clinical outcomes
- Screening, data extraction and risk of bias assessment (using PROBAST) were performed in duplicate
- We follow recently published guidance on the reporting of systematic reviews of prognostic models (TRIPOD-SRMA)

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| Author, Year                | Model type | Eligibility criteria | Data Source  | Location              | Years   | Events/n (%)      | Events/variable |
|-----------------------------|------------|----------------------|--------------|-----------------------|---------|-------------------|-----------------|
| Registry reported mortality |            |                      |              |                       |         |                   |                 |
| de Araújo 2012              | Dev        |                      | Registry     | Brazil (B. Horizonte) | 2007-09 | 49/376 (13.0%)    | 1.0             |
| Coura-Vital 2014            | Dev        |                      | Registry     | Brazil (Nationwide)   | 2007-11 | 770/12,333 (6.2%) | ≤ 26.6          |
| In-hospital mortality       |            |                      |              |                       |         |                   |                 |
| Werneck 2003                | Dev        |                      | Case-control | Brazil (Teresina)     | < 2003  | 12/90 (13.3%)     | ≤ 0.8           |
| Sampaio 2010                | Dev        | < 15 yrs             | Retro.       | Brazil (Recife)       | 1996-06 | 57/546 (10.4%)    | 3.8             |
| Costa 2016                  | Dev/Val    | < 2 yrs, clin.       | Prosp.       | Brazil (Teresina)     | 2005-08 | -/314 (-%)        | ≤ 0.9           |
| Costa 2016                  | Dev/Val    | < 2 yrs, clin+lab.   | Prosp.       | Brazil (Teresina)     | 2005-08 | -/291 (-%)        | ≤ 0.7           |
| Costa 2016                  | Dev/Val    | ≥ 2 yrs, clin.       | Prosp.       | Brazil (Teresina)     | 2005-08 | -/569 (-%)        | ≤ 1.6           |
| Costa 2016                  | Dev/Val    | ≥ 2 yrs, clin+lab.   | Prosp.       | Brazil (Teresina)     | 2005-08 | -/538 (-%)        | ≤ 1.2           |
| Abongomera 2017             | Dev/Val    |                      | Retro.       | Ethiopia (Abdurafi)   | 2008-13 | 99/1,686 (5.9%)   | 6.2             |
| Kämink 2017                 | Dev/Val    | < 19 yrs             | Retro.       | South Sudan (Lankien) | 2013-15 | 116/4,931 (2.4%)  | 5.8             |
| Kämink 2017                 | Dev/Val    | ≥ 19 yrs             | Retro.       | South Sudan (Lankien) | 2013-15 | 70/1,702 (4.1%)   | 3.3             |
| Foinquinos 2021             | Up/Dev     | < 15 yrs             | Retro.       | Brazil (Recife)       | 2008-18 | 10/156 (6.4%)     | 10              |

Table 1: Identified prognostic models; ordered by outcome and year of study publication. Dev: Development; Val: Validation; Up: Updating; Prosp: Prospective; Retro: Retrospective.