2022 WHO verbal autopsy instrument revision

Webinar upon the release of 2022 WHO verbal autopsy instrument

6 April 2022

Erin Nichols, Co-chair of the WHO Verbal Autopsy Reference Group, US CDC National Center for Health Statistics
WHO VA Instrument Maintenance Process

*LABELS (e.g.: P/U/S/B)*
Types of change:
- Editorial
- Patch
- Structure/design
- Content

Urgency:
- Urgent
- Not urgent

Kinds of issue:
- Word change
- Hint
- Consistency across tools
- Skip pattern
- Q by Q

Platform:
- Paper
- Electronic
- Both

* MILESTONE
  e.g.: 1.5.2 release
  Version 2.0 Major revision

**CRITERIA**
- SME / Medical input
- Historical context
- Impact on COD assignment
- Impact on programming

Issue reported via GitHub
Issue Tracker via verbalautopsy@who.int
OR by direct entry

Technical Lead assigns issue to Product Manager(s)
(Aurelio to Jordana, Erin)

Product Manager applies labels for each issue*
(Jordana, Erin)

Product Owner publishes updates and release notes on WHO website for major revision or as otherwise recommended (Robert)

Product Manager coordinates updates to other corresponding materials as needed.
(Jordana, Erin)

Product Owner approves updates and release notes (Robert, Daniel)

Technical Lead / Product Manager compile release notes; publish on Public GitHub
(Beta version for testing)
(Aurelio, Jordana, Erin)

Product Manager compiles CRITERIA for issues to be satisfied and proposes update; consults with others as needed**
(Jordana, Erin)

WHEN READY FOR NEXT RELEASE: Product Manager circulates to WG for review, comment, and agreement (4 weeks to review)

Product Owner reviews/approves recommended updates (Robert, Daniel)

Product Manager provides options to Product Owner for decision and recommended update (Robert, Daniel)

Consensus on update?

Product Manager compiles CRITERIA** for issue to be satisfied and proposes update; consults with others as needed (Jordana, Erin)

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Consensus on update?
Objectives of the revision process

- To resolve known issues and improve and simplify the interview process
- To reduce the duration of the interview and the number of questions without impairing the instrument’s diagnostic performance

Response pattern analysis of representative community VA dataset (28,427 VAs)
- % Don’t know/Refused to answer/Yes/No responses
- Response validity measure
- Response variability measure
- Frequency tables, cross tabulations, prevalence ratios

Feedback from field and users’ inputs
VA experts’ inputs + cognitive testing
Methodology

Qualitative Cognitive Testing, 3 countries

- Kenya 2014 (N=58)
- Morocco 2019 (N=65)
- Zambia 2019 (N=65)

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Methodology

### Qualitative Cognitive Interviewing, 3 countries
- Kenya 2014 (N=58)
- Morocco 2019 (N=65)
- Zambia 2019 (N=65)

### Global VA dataset, 2016 WHO VA instrument, 28,427 deaths
- 13 countries
- 50% female
- 77% adults
- 13% children
- 11% neonates
- 4% maternal deaths

#### Response pattern analysis of representative community VA dataset (28,427 VAs)
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#### Country Representation
- Burkina Faso
- Ghana
- Ivory Coast
- Kenya
- Mozambique (COMSA)
- Morocco
- South Africa
- Thailand
- Zambia
- CHAMPS: Bangladesh, Ethiopia, Kenya, Mali, Mozambique, Sierra Leone, South Africa
Methodology

Qualitative Cognitive Interviewing, 3 countries
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<table>
<thead>
<tr>
<th>Abdominal Pain (Id10194)</th>
<th>Yes # (Row% / Col%)</th>
<th>No</th>
<th>Don’t Know</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Problem (Id10193)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4076 (88%, 87%)</td>
<td>459 (10%, 4%)</td>
<td>100 (2%, 17%)</td>
<td>4635 (27%)</td>
</tr>
<tr>
<td>No</td>
<td>613 (5%, 13%)</td>
<td>10860 (94%, 96%)</td>
<td>140 (1%, 24%)</td>
<td>11613 (70%)</td>
</tr>
<tr>
<td>DK</td>
<td>15 (3%, 0.3%)</td>
<td>53 (13%, 0.5%)</td>
<td>333 (83%, 58%)</td>
<td>402 (2%)</td>
</tr>
<tr>
<td>Total</td>
<td>4704 (28%)</td>
<td>11372 (68%)</td>
<td>573 (3%)</td>
<td>16652</td>
</tr>
</tbody>
</table>
Methodology

**Qualitative Cognitive Interviewing, 3 countries**
- Kenya 2014 (N=58)
- Morocco 2019 (N=65)
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**Global VA dataset, 2016 WHO VA instrument, 28,427 deaths**
- 13 countries
- 50% female
- 77% adults
- 13% children
- 11% neonates
- 4% maternal deaths

**Reference death dataset, 2016 WHO VA instrument, 10,822 deaths**
- Sources: CHAMPS (n=1,567), Ghana maternal death study (1,367), Thailand (2,500) and South Africa (n=5,388),
- 52% female
- 83% adults
- 6% children
- 11% neonates
- 4% maternal deaths
Methodology

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- % Don’t know/Refused to answer/Yes/No responses
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Feedback from field and users’ inputs

VA experts’ inputs + cognitive testing

Propose solutions for issues
Identify questions with poor performance

Significance analysis using reference death dataset (10,822 VAs)
- Targeted Maximum Likelihood Estimation (TMLE) – to evaluate the contribution of each question to each COD
- Entropy Coefficient - to evaluate the contribution of each question to the distribution of ALL COD in the dataset
Methodology

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Feedback from field and users’ inputs
VA experts’ inputs + cognitive testing

Identify questions with poor performance

Propose solutions for issues not essential for COD

Expert-led review
- Clinician panel to infer on relevance for PCVA performance
- Triangulation of findings
Limitations

- Sample of deaths
  - Convenience sample based on available verbal autopsies
  - Some geographic limitations in representativeness
  - Limited for some causes of death and age groups
- Quality of information
  - Did not have ability to implement quality control measures during data collection
  - Variations in how VAs were conducted (differing skip patterns)
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Propose solutions for issues
- Identify questions with poor performance

Expert-led review
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- Triangulation of findings

Identify questions not essential for COD

5 workshops
- Protocol development
- Review of issues
- Significance analysis
- Mixed-methods review
- Item reduction
1. **Information on the decedent**
   1. Age, sex
   2. Date and place of death, place of residence, marital status, parents, education, economic activity

2. **Information on the respondent**

3. **Open narrative section**

4. **Cause of death related indicators**
   1. Medical history
   2. History of injuries and accidents
   3. General signs and symptoms
   4. Signs and symptoms associated with pregnancy
   5. Neonatal and child history, signs and symptoms
   6. Risk factors
   7. Health service utilization

5. **Death certification and health record**

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**2022 WHO Verbal Autopsy Instrument**

- Testing effect on algorithms
- Field testing

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Mock interview at IMHDSS-MUCHAP, Uganda

Testing was also conducted by:

- Ghana Health Service
- KEMRI/CDC HDSS, Kisumu, Kenya
- MRC/Wits RPHTRU, Agincourt, South Africa
- Ministry of Health, Zambia
**2022 WHO Verbal Autopsy Instrument**

- > 100 questions removed
- Approx. 18% reduction number of questions overall
- 10 new questions added
- Approx. 88% of questions improved
  - Re-ordered sections
  - Improved skip patterns
  - Revised hints
- COVID-19 target cause of death added
- Compatible with automated software* for assigning cause of death and physician coding

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**Features of the 2022 WHO VA Instrument**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deployment versions</td>
<td>Paper (PDF) and Tablet (ODK)</td>
</tr>
<tr>
<td>Languages</td>
<td>English, soon: Arabic, French, Kiswahili, Portuguese, Spanish</td>
</tr>
<tr>
<td>Age specific modules</td>
<td>Neonatal: 0-under 4 weeks Child: 4 weeks to 11 y Adult: 12 years and above</td>
</tr>
<tr>
<td>Compliance with UN Statistics</td>
<td>Yes</td>
</tr>
<tr>
<td>Instruments, software, training materials</td>
<td>Available for download from WHO:</td>
</tr>
</tbody>
</table>

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*The probability matrices for all automated cause of death software still needs to be updated for 100% compatibility and optimal performance, including adding COVID-19. However, initial testing using the existing matrices has indicated feasibility.*
Format of 2022 WHO VA Questionnaire

An Excel table presents all the questions with skip patterns and other instructions in a format that facilitates implementation in software.

Table of indicators
- Sections
- Unique Id of questions
- Definitions
- Categorization
- Skip patterns

Ideal for training purposes and data managers
- Sections
- Unique id of questions
- Skip patterns

Printable forms available as PDF files – if necessary.
Acknowledgements

WHO Verbal Autopsy Reference Group (VARG) Revision Task Group: Aurelio Di Pasquale, Swiss TPH; Azza Badr, WHO; Carine Alsoekh, WHO; Daniel Chandramohan, London School of Hygiene & Tropical Medicine; Samuel J. Clark, The Ohio State University; Daniel Cobos, Swiss TPH; Don de Savigny, Swiss TPH; Erin Nichols, Centers for Disease Control and Prevention (CDC), Bloomberg Philanthropies Data for Health Initiative (D4H); Jordana Leitao, Angola; Peter Byass, Umeå University Centre for Global Health, and Robert Mswia, Vital Strategies, D4H.

Other WHO VA Reference Group members: Chalapati Rao, Australian National University; Carla Abou-Zahr, D4H; Riley Hazard, CDC Foundation; Sonja Firth, CDC Foundation; Tita Rosita Wiguno, Indonesia Agency for Health Research and Development; Shams El Arifeen, International Centre for Diarrhoeal Disease Research; Henry Kalter, Johns Hopkins Bloomberg School of Public Health (JHSPH); Lalit Dandona, Public Health Foundation of India, Samuel Cheburet, Ministry of Health, Kenya; Arvind Pandey, National Institute of Medical Statistics, India; Vishnu Rao, National Institute of Medical Health, Kenya; Abdul Razak Nuhu, Kintampo Health Research Centre, Ghana; Hicham Darfouf, Ministry of Health, Morocco; Jamila El Mendili, Ministry of Health, Morocco; Kanitta Bundhamcharoen, Thailand Ministry of Public Health; Kathleen Kahn, University of the Witwatersrand, South Africa; Karim Derra, Clinical Research Unit of Nanoro, Burkina Faso; Kwaku Poku Asante, Kintampo Health Research Centre, Ghana; Jeff Koplan, Emory University, USA; Martin Nyahoda, Ministry of Home Affairs, Zambia; Pamela Groenewald, SAMRC; Papa Larbi-Debrah Patrick, Ghana Health Service; Patricia Nyugura, WHO Kenya Country Office; Rob Breiman, Emory University, USA; Sam Notzon, CDC; Siaka Kone, Centre Suisse de recherches Scientifiques en Cote d’Ivoire; Solomon Kagulura, WHO country office, Zambia; Steve B. O. Odihambo, Kenya Medical Research Institute; Titus Kwambai, CDC. Acknowledgement is also given to the Bill & Melinda Gates Foundation and the Child Health and Mortality Prevention Surveillance (CHAMPS) and Countrywide Mortality Surveillance for Action (COMSA) Initiatives.

Contributors to the WHO Global Dataset: Aaron Samuels, CDC; Abdul-Razak Nuhu, Kintampo Health Research Centre, Ghana; Aqbesi Amouzou, Johns Hopkins University, USA; Anthony Ofosu, Ghana Health Service; Beth Barr, CDC; Bonfho Bassirou, Centre Suisse de recherches Scientifiques en Cote d’Ivoire; David Schellenberg, WHO; David Opor, Kenya Medical Research Institute; Debbie Bradshaw, SAMRC; Dianna Blau, CDC; Dominic Atweam, WHO; Fidelia Dake. Data for Health Initiative: Gordon Okomo, Ministry of Health, Kenya; Grace Manu, Kintampo Health Research Centre, Ghana; Hicham Darfouf, Ministry of Health, Morocco; Jamila El Mendili, Ministry of Health, Morocco; Kanitta Bundhamcharoen, Thailand Ministry of Public Health; Kathleen Kahn, University of the Witwatersrand, South Africa; Karim Derra, Clinical Research Unit of Nanoro, Burkina Faso; Kwaku Poku Asante, Kintampo Health Research Centre, Ghana; Jeff Koplan, Emory University, USA; Martin Nyahoda, Ministry of Home Affairs, Zambia; Pamela Groenewald, SAMRC; Papa Larbi-Debrah Patrick, Ghana Health Service; Patricia Nyugura, WHO Kenya Country Office; Rob Breiman, Emory University, USA; Sam Notzon, CDC; Siaka Kone, Centre Suisse de recherches Scientifiques en Cote d’Ivoire; Solomon Kagulura, WHO country office, Zambia; Steve B. O. Odihambo, Kenya Medical Research Institute; Titus Kwambai, CDC. Acknowledgement is also given to the Bill & Melinda Gates Foundation and the Child Health and Mortality Prevention Surveillance (CHAMPS) and Countrywide Mortality Surveillance for Action (COMSA) Initiatives.

Data analysis, interpretation, and other support: Afrin Iqbal, icddr, Bangladesh; Alicia Perez, University of the Basque Country; Ana Luisa Bierenbach, Hospital Sirio Libanês, Brazil; Arantza Casillas, University of the Basque Country; Asri Adisasmita, University of Indonesia; Brent Vickers, CDC; Brian Munkombwe, CDC; Chomba Mwango, Data for Health Initiative; Zambia; Clarissa Surek Clark, The Ohio State University, USA; Dan Kajungu, Makerere University, Uganda; Diane Morof, CDC South Africa office; El Marnissi Abdellah, Ministry of Health, Morocco; Eman Aly, EMRO; Francis Yeji, Data for Health Initiative; Frank Baiden, LSHTM; Geoffrey Semu, Tanzania; Greg Kabadi, Data for Health Initiative; Hermon Gebrehiwet, Capella University, USA; Isaac Ilayu, Ifakara Health Institute, Tanzania; Jason Thomas, The Ohio State University, USA; Joyce Mugasa, Muhimbili National Hospital, Tanzania; Kristen Pettrone, CDC; Morris Ndemwa, Kenya Medical Research Institute; Nana Akosua Anshah, Navrongo Health Research Centre, Ghana; Oluwatoyin Awoytion, SAMRC; Owen Trigueros, University of the Basque Country; Patrick Ansah, Navrongo Health Research Centre, Ghana; Paul Scanlon, CDC; Patricia Soliz, PAHO; Peter Choi, The Ohio State University, USA; Saied Soofi, The Aga Khan University, Pakistan; Sudhir Benara, Indian council of medical research; Tyler McCormick, University of Washington, USA; Vilma Gawryszewski, PAHO; Yue Chu, The Ohio State University, USA; and Zehang Li, University of California, USA. Support was also provided by the CDC Foundation through the Bloomberg Philanthropies Data for Health Initiative.

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