WHO fungal priority pathogens list to guide research, development and public health action



WHO fungal priority pathogens list to guide research, development and public health action



WHO fungal priority pathogens list to guide research, development and public health action

ISBN 978-92-4-006024-1 (electronic version) ISBN 978-92-4-006025-8 (print version)

© World Health Organization 2022

Some rights reserved. This work is available under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; https://creativecommons.org/licenses/by-nc-sa/3.0/ igo).

Under the terms of this licence, you may copy, redistribute and adapt the work for non-commercial purposes, provided the work is appropriately cited, as indicated below. In any use of this work, there should be no suggestion that WHO endorses any specific organization, products or services. The use of the WHO logo is not permitted. If you adapt the work, then you must license your work under the same or equivalent Creative Commons licence. If you create a translation of this work, you should add the following disclaimer along with the suggested citation: "This translation was not created by the World Health Organization (WHO). WHO is not responsible for the content or accuracy of this translation. The original English edition shall be the binding and authentic edition".

Any mediation relating to disputes arising under the licence shall be conducted in accordance with the mediation rules of the World Intellectual Property Organization (http://www.wipo.int/amc/en/mediation/rules/).

Suggested citation. WHO fungal priority pathogens list to guide research, development and public health action. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at http://apps.who.int/iris.

Sales, rights and licensing. To purchase WHO publications, see http://apps.who.int/bookorders. To submit requests for commercial use and queries on rights and licensing, see https://www.who.int/copyright.

Third-party materials. If you wish to reuse material from this work that is attributed to a third party, such as tables, figures or images, it is your responsibility to determine whether permission is needed for that reuse and to obtain permission from the copyright holder. The risk of claims resulting from infringement of any third-party-owned component in the work rests solely with the user.

General disclaimers. The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by WHO in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by WHO to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall WHO be liable for damages arising from its use

Design and layout by 400 Communications Ltd.

Contents

	Acknowledgements	V
	Abbreviations and acronyms	vi
	Executive summary	vii
1.	Background	1
2.	Aims	2
3.	Scope	2
4.	Target audience	2
5.	Approach	3
6. _	Key findings	4
7.	Final ranking of pathogens	6
8.	Important considerations and limitations	7
9.	Implementation and use of the WHO FPPL and priority areas for action	8
	9.1. Surveillance	8
	9.2. R&D and innovation	9
	9.3. Public health	10
Re	ferences	12
An	nex 1. Overall pathogens ranking across the MCDA stages	14
	nex 2. Brief description of each fungal pathogen	15
	Cryptococcus neoformans	15
	Candida auris	16
	Aspergillus fumigatus	17
	Candida albicans	18
	Nakaseomyces glabrata (Candida glabrata)	19
	Histoplasma spp.	20
	Eumycetoma causative agents	21
	Mucorales	22
	<i>Fusarium</i> spp.	23
	Candida tropicalis	24
	Candida parapsilosis	25
	Scedosporium spp.	26
	Lomentospora prolificans	27

Coccidioides spp.	28
Pichia kudriavzeveii (Candida krusei)	29
Cryptococcus gattii	30
Talaromyces marneffei	31
Pneumocystis jirovecii	32
Paracoccidioides spp.	33

List of tables and boxes

Table 1. Summary of the prioritization steps	
Table 2. Prioritization criteria, definitions and levels	5
Table 3. WHO fungal priority pathogens list	6
Box 1: Surveillance actions, interventions and strategies	9
Box 2: R&D and innovation actions, interventions and strategies	10
Box 3: Public health actions, interventions and strategies	11

List of figures

Fig. 1. WHO fungal priority pathogens list (WHO FPPL)	viii
Fig. 2. Proposed priority areas for action	8

List of Annexes

Annex 1. Overall pathogens ranking across the MCDA stages	14
Annex 2. Brief description of each fungal pathogen	15

Acknowledgements

This report was developed by the World Health Organization (WHO) Antimicrobial Resistance Division (AMR).

The following deserve particular recognition for their important contributions to this project and report: Hatim Sati (Project Leader, WHO, Switzerland), Ana Alastruey-Izquierdo (Instituto de Salud Carlos III, Spain), Justin Beardsley (University of Sydney, Australia), Orla Morrissey (Australia & New Zealand Mycoses Interest Group, ANZMIG, Australia), Jan-Willem Alffenaar (University of Sydney, Australia), Kirsten Howard (University of Sydney, Australia), Hannah Yejin Kim (University of Sydney, Australia), Pilar Garcia-Vello (WHO consultant, Switzerland). This project was developed under the supervision of Peter Beyer (WHO, Switzerland) and Valeria Gigante (WHO, Switzerland), and overall direction of Haileyesus Getahun (WHO, Switzerland).

WHO sincerely thanks all members of the WHO Advisory Group on the fungal priority pathogens list (WHO AG FPPL), the commissioned technical group, and all external global partners:

- WHO AG FPPL: Ana Alastruey-Izquierdo (WHO AG FPPL Chair), Felix Bongomin (Gulu University, Uganda), Arunaloke Chakrabarti (WHO Collaborating Centre for Mycology in India, India), Tom Chiller (Centers for Disease Control and Prevention, United States of America), Arnaldo Colombo (Federal University of São Paulo, Brazil), Nelesh Govender (WHO Collaborating Centre for AMR, University of Witwatersrand, South Africa), Tom Harrison (St George's University of London, and MRC Centre for Medical Mycology, University of Exeter, United Kingdom of Great Britain and Northern Ireland), Jutta Heim (Helmholtz Centre for Infection Research, Germany), Rita Oladele (University of Lagos, Nigeria), John Perfect (Duke University, USA), Volker Rickerts (Robert Koch Institute, Germany), Jong-Hee Shin (Chonnam National University of Verona, Italy) and Retno Wahyuningsih (Universitas Indonesia and Universitas Kristen Indonesia, Indonesia), David W. Denning (University of Manchester and Global Action for Fungal Infections, Switzerland), Marcio Nucci (Federal University of Rio de Janeiro, Brazil).
- WHO acknowledges the following external experts for their contribution to the systematic reviews: Wendy van de Sande (Erasmus University Medical Center, The Netherlands), Paul Verweij (Radboud University Medical Center, The Netherlands), Alexandre Alanio (Institut Pasteur, France).
- University of Sydney, Australia, commissioned group: Justin Beardsley, Jan-Willem Alffenaar, Kirsten Howard, Hannah Yejin Kim, Mrudhula Asogan, Sharon C Chen, Caitlin Keighley, Rakhee Raghunandan, Aiken Dao, Tra My Nu Duong, Hang Le, Sarika Parambath, Shukry Zawahir, Joshua Mark Chambers, Sophie Stocker, Thi Nguyen, Amy von Huben, Lifeng Kang, Philip Kwok and Merrilyn Walton.
- ANZMIG, commissioned group: Orla Morrissey (Monash University), Kathryn Garnham (Gold Coast Hospital), Blake Nield (Royal Prince Alfred Hospital), Brendan McMullan (University of New South Wales), Catriona Halliday (NSW Health Pathology), Sarah Kidd (National Mycology Reference Centre), Eric Moran (Western Health), Olivia Bupha-Intra (Capital and Coast District Health Board), Julia Clark (University of Queensland), Arthur Morris (Auckland District Health Board) and Tina Marinelli (Royal Prince Alfred Hospital).
- WHO headquarters AMR Division staff: Laura Jung (former), Sarah Paulin-Deschenaux, Alessandro Cassini, Jorge Raul Matheu Alvarez, Daniel Marcano Zamora, Beatrice Achan, Sergey Eremin and Carmem Lucia Pessoa Da Silva.
- WHO headquarters staff: Nathan Ford (Treatment and Care, Department of HIV, Hepatitis and Sexually Transmitted Infections), Benedikt Huttner and Lorenzo Moja (Essential Medicines, Department of Health Products Policy and Standards), Daniel Argaw Dagne (Prevention, Treatment and Care Unit, Department of Control of Neglected Tropical Diseases) Andre Ilbawi and Felipe Roitberg (Unit of Management of Noncommunicable Diseases, Department of Noncommunicable Diseases).
- WHO regional offices: Laetitia Gahimbare and Ali Ahmed Yahaya (WHO Regional Office for Africa), Marcelo Galas, Agustina Forastiero and Pilar Ramon Pardo (WHO Regional Office for the Americas), Adi AL-Nuseirat (WHO Regional Office for the Eastern Mediterranean), Saskia Andrea Nahrgang (WHO Regional Office for Europe), Terence Fusire, Stephan Jost and Siswanto Siswanto (WHO Regional Office for South-East Asia) and Takeshi Nishijima (WHO Regional Office for the Western Pacific).

Mycology societies for their technical input, and/or dissemination of the Discrete Choice Experiment (DCE) global survey: ANZMIG, European Confederation of Medical Mycology (ECMM), European Society of Clinical Microbiology and Infectious Diseases Fungal Infection Study Group (ESCMID-EFISG), Global Action Fund for Fungal Infections (GAFFI), International Society for Human and Animal Mycology (ISHAM), Latin American and Caribbean Network for Antimicrobial Resistance Surveillance (ReLAVRA, Spanish acronym), Medical Research Council Centre (MRC) and Mycoses Study Group Education and Research Consortium (MSGERC).

Special thanks to the WHO Strategic and Technical Advisory Group for Antimicrobial Resistance (STAG-AMR) for their advice and contribution.

Financial support: Funding for this report was kindly provided by the Government of Austria, the Government of Germany and GARDP.

Abbreviations and acronyms

AG	Advisory Group	IRIS	immune reconstitution	
AMR	antimicrobial resistance		inflammatory syndrome	
ANZMIG	Australia & New Zealand Mycoses Interest Group	ISHAM	International Society for Human & Animal Mycology	
BWS	best-worst scaling	LMIC	low- and middle-income country	
COPD	chronic obstructive pulmonary disease	MALDI- TOF	matrix-assisted laser desorption/ionization time	
COVID-19	coronavirus disease	- 101	of flight	
СТ	computed tomography	MCDA	multicriteria decision analysis	
DCE	discrete choice experiment	MEC	minimum effective	
EAR	emerging antimicrobial		concentration	
	resistance	MIC	minimum inhibitory	
EARS-Net	S-Net Antimicrobial Resistance Surveillance Network	MDC	concentration	
ECDC	European Centre for Disease	MRC	Medical Research Council Centre	
LODC	Prevention and Control	MSGERC	Mycoses Study Group	
ECMM	European Confederation of Medical Mycology		Education and Research Consortium	
ESCMID-	European Society of Clinical	PCR	polymerase chain reaction	
EFISG	Microbiology and Infectious Diseases Fungal Infection Study	РЈР	<i>Pneumocystis jirovecii</i> pneumonia	
	Group	R&D	research and development	
EML	WHO Essential Medicines List	ReLAVRA	The Latin American and	
GAFFI	Global Action for Fungal		Caribbean Natwork for	

预览已结束, 完整报告链接和二维码如下:

https://www.yunbaogao.cn/report/index/report?reportId=5 31905