

Open Science: As Open As Possible for Health Development

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Abstract

Open science has the potential of making the scientific process more transparent, inclusive and democratic. Our recommendations provides an internationally agreed definition, as well as a set of shared values and guiding principles for open science. It also identifies a set of actions conducive to a fair and equitable operationalization of open science, with a special focus on improving maternal and child mortality and morbidity. Of all the health statistics monitored by the World Health Organization (WHO), maternal mortality and morbidity (both physical and mental), shows the largest discrepancy, between developed and developing countries. Artificial Intelligence (AI) has the potential to revolutionize healthcare. Within obstetrics and gynecology, it has proven to be useful for diagnostic and outcome predictions, particularly within maternal-child health and reproductive health research. AI also has been used to harness the massive data sets produced by surgery, particularly robotic-assisted surgery, that are difficult to interpret with traditional statistical methods.

Background

In view of the scale of today's global challenges and the great potential of science, technology and innovation to deliver responses, it is necessary to mobilize financial and knowledge resources from governments, businesses, academia and civil societies. Both public and private sectors play important roles in financing, research, and development. When Open-science, artificial intelligence (AI) and big data management meet the social reality of human cooperation and governance, it becomes more sustainable, and help to close digital divide.

Every day, at least 700 women and girls die, one every two minutes, due to complications of pregnancy and childbirth. And hundreds more have short- and long-term disabilities. 90% of these deaths and disabilities occur in the developing countries.¹

¹Trends in maternal mortality 2000 to 2023: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. Geneva: World Health Organization; 2025

Women's Health and Education Center (WHEC) is well positioned to advance all Sustainable Development Goals (SDGs), with special focus on 1, 2, 3, 4, 5, 16 and 17. Building sustainable partnerships, through WHEC's e-Learning, e-Health, and e-Government initiatives; such as [LINK \(Learning, Innovating, Networking, for Knowledge\) Access Project](#) – *To disseminate reproductive health information and research*, will offer way forward. Digital technologies including AI and Big Data Management have the potential to eradicate poverty and reduce inequalities. While obligations to promote the rights of women's and children are protected by international conventions, difficulties in putting moral obligation into practice still abound. By supporting reproductive health and research, and open dialogue and objective analysis, WHEC, has laid the groundwork for mutual understanding among countries.

Our Collective Advocacy/National & International Platform/Making Open Science Reality

Future of health and education sectors is digital, in each and every country, rich and poor alike. Knowledge and understanding are precondition for action at all level. The Women's Health and Education Center launched an e-learning project in association with the Department of Public Information (DPI) of the United Nations (UN) on 24 October 2002

(<http://www.WomensHealthSection.com>).²

It has reached 227 countries and territories – serving about 14 million visitors, every year. Continuing medical education is a lifetime commitment requiring knowledge of current trends and developments in the science, technology and economics of healthcare. Convenience of provider-directed independent study activities allows healthcare professionals to reach the learning goals that must be incorporated into their demanding professional schedules. Our efforts:

<http://www.womenshealthsection.com/content/cme/>

SDGs and UN's 2030 Agenda is attainable provided countries of North and South work together. The healthy future of society depends on the health of today's children and their mothers, SDGs and UN's 2030 Agenda is attainable provided countries of North and South work together. "Health for All" and "Education for All" are expressions of the UN commitment to health and education.

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²Luthra, R. Internet health learning to improve women's health. *Bulletin of the World Health Organization*; July 2005, 83 (7):Page 557available @ http://www.womenshealthsection.com/content/documents/Bull_WHO_July_2005_J_83_7_Page_557.pdf

who are guardians of that future. Because the SDGs are inseparably linked, they must be achieved concurrently.

AI and Applications / Automation in Clinical Medical and Surgical Practices

Automation of robotic surgeries - just like self-driving cars (vehicles); some researchers are aiming for autonomous robotic surgery with the hope of improving surgical outcomes. Similar to anatomic-structure identification, a major challenge is having the model adjust to soft tissue irregularity, unpredictable deformation, and mobility of structures. Smart Tissue Autonomous Robot (SMART) to perform more consistent semi-autonomous robotic closure of a synthetic vaginal cuff has been seen very helpful. Similar to anatomic-structure identification, a major challenge is having the model adjust to soft tissue irregularity, unpredictable deformation, and mobility of structures.³ STAR achieved better consistency in suture spacing and bite size than surgeon-controlled robotic performance of vaginal cuff anastomosis. This represents the early steps of organizing gynecologic surgical data for future semiautonomous or fully autonomous surgery.

In addition to surgical skill, part of the challenge of surgery is the identification of often complex and variable anatomy. Anatomic structure recognition via augmented reality intraoperatively could improve the visualization and reduce

³Kam M, Saeidi H, Wei S, Opfermann JD, Leonard S, et al. Semi-autonomous robotic anastomoses of vaginal cuffs using maker enhanced 3D imaging and path planning. *Med Image Comput Comput Assist Interv* 2019;11768:65-73. doi: 10:1007/978-3-030-32254-0_8

complications; this previously has been demonstrated for liver resection. Anatomy recognition is particularly difficult to apply to gynecologic surgery due to the mobility of pelvic structures. Although many studies represents a promising future, they all use and are limited by small data sets and lack of external validation. Aside from Johns Hopkins University-Intuitive Surgical Gesture and Skill Assessment Working Set (JIGSAWS), which is a publicly available collection of video clips with table-top surgical steps and corresponding kinematic measurements for suturing, knot tying, and needle passing⁴ most of the data sets are not publicly available.

We need mechanisms, such as a data lake, to pool data and improve study power and generalizability. Beyond clinicopathologic features, there is ever-growing evidence that surgical skill significantly influences postoperative outcomes. Active robotic systems work autonomously under supervision by a surgeon, whereas semi-active systems have programming that complements surgeon control. Controller-manipulator-type systems, which are most common in robotic-assisted surgery, are solely controlled by the surgeon.

The application of AI continues to advance in healthcare. Machine learning represents an opportunity to harness the massive data sets produced from surgery, could revolutionize surgical planning, outcomes prediction, intraoperative guidance, and training and credentialing. The review of literature shows exciting early steps of this type of initiatives and research.

⁴Ahmidi N, Tao L, Sefati S, Gao Y, Lea C, et al. A dataset and benchmarks for segmentation and recognition of gestures in robotic surgery. *IEEE Trans Biomed Eng* 2017;64:2025-2041. doi: 10.1109/TBME.2016.2647680

Recommendations

Our interconnected world needs open science to help solve complex social, environmental, and economic challenges and achieve the SDGs. Access to scientific knowledge should be as open as possible, but sometimes access may need to be restricted, for example to protect human rights, confidentiality, intellectual property rights, personal information, threatened or endangered species, and sacred and secret indigenous knowledge.

Women's Health and Education Center (WHEC) recommends, promotes and implements UNESCO Recommendation on Open Science.⁵ It asks Member States to:

1. Promote a shared understanding of open science and set out diverse paths to achieving it.
2. Invest in infrastructure and activities that contribute to open science.
3. Invest in training, education, digital literacy and capacity building to support open science.
3. Foster a culture of open science and standardization of data collection and interpretation.
4. Extra emphasis should be on the explainability of artificial intelligence (AI) models to optimize their acceptance, as partners in patient care, and to ensure patient and physicians safety, within medical and surgical clinical practice.

⁵UNESCO. An introduction to the UNESCO Recommendation on Open Science. Canadian Commission for UNESCO. 2022. Available <https://unesdoc.unesco.org/ark:/48223/pf0000383771> Last accessed 3 January 2026

Conclusion

Open science provides an internationally agreed definition, as well as a set of shared values and guiding principles for open science. It also identifies a set of actions conducive to a fair and equitable operationalization of open science for all at the individual, institutional, national, regional and international levels.

Women's Health and Education Center (WHEC), believes that a dedicated place is needed, in the United Nations to develop and refine appropriate norms, policies and pilots; promote future-ready human

capabilities; and mobilize financing for public innovation ecosystems, for **Education and Health Initiatives** to succeed. Openness in science is an essential component of the scientific process.

Science is a global public good that belongs to all of the humanity. By promoting science that is more accessible, inclusive and transparent – we believe, open-science furthers the right of everyone to share in scientific advancements. Open science also encourages scientists, to develop tools and method for managing data, so that as much as possible can be shared, as appropriate.

References

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