Biosecurity Education in Support of the Tianjin Guidelines

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1. WHO GLOBAL GUIDANCE FRAMEWORK:

content

Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research (2022) *Page 2*

- "Scientific and technological advances in the life sciences and converging technologies can raise significant ethical, legal, societal, safety and security risks. This framework focuses on the safety and security risks of health- related research caused by accidents, inadvertent or deliberate misuse with the intention to cause harm. The same scientific information and technologies that can generate potential benefits for health and society could also accidentally or deliberately be misused and potentially cause harm to humans, nonhuman animals, plants and agriculture, and the environment…"

- "…This raises the challenge of how to develop and implement governance tools and mechanisms that mitigate the risks posed by life sciences research, without hampering the development and use of such research for global health and society…."

2. WHO GLOBAL GUIDANCE FRAMEWORK: elements of governance

Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research (2022) Page 49, 61-62

- "Effective and robust biorisk governance is multifaceted and includes multiple goals, multiple stakeholders and different governance tools and mechanisms, as outlined below."

- "…There have also been initiatives to outline high-level principles that can serve as references in developing or amending codes of conduct at national or institutional level. The most recent is the Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists *(115)*. Inspired by the Hague Ethical Guidelines that were developed by the Organisation for the Prohibition of Chemical Weapons, the Tianjin Biosecurity Guidelines emerged from foundational work by China and Pakistan and were developed collaboratively by InterAcademy Partnership (IAP) leaders, Tianjin University's Centre for Biosafety Research and Strategy, and Johns Hopkins University's Center for Health Security, with input from scientists from 20 countries."

3. WHO GLOBAL GUIDANCE FRAMEWORK: lack of awareness

Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research (2022) *Page 28*

- "A chronic and fundamental challenge in biorisk management is a widespread lack of awareness that work in the area of the life sciences could be conducted or misused in ways that result in health and security risks to the public. The lack of awareness is unsurprising, given that biorisks are often overlooked or underemphasized in both educational curricula and on-the-job training. If they are unaware of the potential for misuse and potential malicious application, stakeholders cannot accurately weigh the risks and benefits of proposed research or order…"

- "The lack of awareness can be reinforced by a lack of institutional incentives to attend to safety and security concerns, coupled with ambiguities around the roles and responsibilities of different stakeholders. In addition, there are few opportunities for shared feedback and learning forums for exchange of information on such concerns."

4. WHO GLOBAL GUIDANCE FRAMEWORK: definitions

Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research (2022) Pages xviii,xx

- Awareness Raising
  - "Provision of information for the scientific community and the broader global community of the importance of biorisks as an essential part of responsible working practices in basic and applied life sciences."
- Biorisk
  - "The probability or chance that an event caused by accidents, inadvertent or deliberate misuse of the life sciences can adversely affect the health of humans, nonhuman animals, plants and agriculture, and the environment."
- Education
  - "The systematic provision of knowledge, competencies, skills and tools on aspects of biorisks."

5. WHO GLOBAL GUIDANCE FRAMEWORK: scale of the challenge

Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research (2022) Page 29

- "The scale of the need for awareness raising and education should be understood. Globally, there are millions of life scientists, and it is likely that their numbers will increase in the future with the current biotechnology revolution. Only a small percentage of life scientists are aware of, and have the ability to manage, biosafety, biosecurity and dual-use issues. Improving biorisk management will require resources. Collaborative ambition among stakeholders combined with improvements in awareness raising, education, training, professional development and cultural shifts will be critical to help with meeting the challenge."

6. WHO GLOBAL GUIDANCE FRAMEWORK: examples of education and training

Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research (2022) Page 73

- "…To ensure uptake and use of these foundational elements, awareness raising, education, codes of conduct, ethical reviews, training and capacity-building are required for stakeholders in the research ecosystem (*e.g* scientists, research institutions and funders).

- "Much has already been done in support of awareness raising and engagement in basic and applied science and related fields, including in the chemical field. Some illustrative examples are provided in *Annex 3*. Although some exercises have completed evaluations that demonstrate success, the extent of such activity is sometimes unacknowledged or underacknowledged. Moreover, although some initiatives have proven both successful and sustainable, it is not always clear whether all such initiatives have been effective. "

7. THE TIANJIN GUIDELINES
Education and training

China, Pakistan and Brazil (2022) The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists, BWC/CONF.IX/PC/WP.10.

- Elements:
  - Ethical Standards; Laws and Norms; Responsible Conduct of Research; Respect for Research Participants; Research Process Management; Education and Training; Research Findings Dissemination; Public Engagement on Science and Technology; Role of Institutions; International Cooperation.

- 6. Education and Training

  - **“Scientists, along with their professional associations in industry and academia, should work to maintain a well-educated, fully trained scientific community that is well versed in relevant laws, regulations, international obligations and norms. Education and training of staff at all levels should consider the input of experts from multiple fields, including social and human sciences, to provide a more robust understanding of the implications of biological research. Scientists should receive ethical training on a regular basis.”**

8. BIOSECURITY EDUCATION SURVEY: the projects

- "Our view from the information that was gathered in the literature review was that the projects that had been carried out since the turn of the century (when the problem of dual use became prominent) numbered at most about 100…"

- "…We knew that we could not obtain important information on some biosecurity education projects, for example, the major activities carried out in Ukraine, and we also failed to get information on some projects that we knew had taken place. Given that many of the projects were of short duration and carried out over a 20-year period, these difficulties were anticipated.

- However, we thought that if we could get 25 replies, we would have grounds for at least making some tentative conclusions as to what had been attempted and achieved despite not having a proper random sample from all of the projects that had been undertaken. In the end, we received 26 responses to the questionnaire, but as might be expected, not all responders answered all questions.

Key issues in the implementation of the Tianjin Biosecurity Guidelines for codes of conduct for scientists: A survey of biosecurity education projects (Shang, L. *et al*, https://doi.org/10.1016/j.bsheal.2022.08.003

9. BIOSECURITY EDUCATION SURVEY:
our objective

- “We are not aware of any full compilation of all of the biosecurity education projects that have been carried out over the last two decades, and we are certain that we have not managed to obtain responses from some projects that have been carried out such as those in Ukraine and in the Middle East and North Africa and in West Africa…”

- ”… Therefore, our aim was not to carry out a systematic random survey of all of the projects that have been carried out and to provide a detailed account of this research effort. However, given our limited resources, that was never our aim. Our purpose was rather to try to answer the question “What range of resources and experiences have been developed in these biosecurity projects that might be helpful to States Parties interested in effectively implementing the Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists after the 9th Review Conference of the BTWC in late 2022? “

Shang *et al*, 2022

10. BIOSECURITY EDUCATION SURVEY: the closed and open questions

- "The closed (multiple choice) questions were:

(1) Main people involved
(2) Name of the Organisation
(3) Name of the project
(4i) Name of the funding organisation
(4ii) Scale of funding received
(4iii) How easy was it to obtain the funding
(4iv) Source of funding
(5) Country in which the project was done
(6) Duration of the project
(7) Background of the project team
(8) Was dual use the main focus of the project
(9) What was the purpose of the project
(10) Was the project conducted for educational purposes
(11) Main targets of the project
(12) Ways to teach Biosecurity
(13) Method of teaching involved…"

Shang *et al*, 2022

11.BIOSECURITY EDUCATION SURVEY: the closed and open questions

The open questions that asked for more details in the responders' own words were:

(14) Object of the project
(15) Content (outline) of the material used
(16) Method of the project
(17) Method of evaluation (if attempted)
(18) What was the intended impact of the project
(19) Means used to sustain the use of the knowledge developed in the project
(20) Publications on the project
(21) Other information (if any).

The questionnaire was distributed using Google Forms due to its efficiency, low cost and flexibility for customizing."

Shang *et al*, 2022

12. BIOSECURITY EDUCATION SURVEY: positive results

- "…how close are we to the ideal situation which we would like to be in, should the States Parties to the BTWC decide to adopt and begin to implement the Tianjin Guidelines? Our survey indicates… that most of the organisers of the biosecurity awareness-raising and educational activities undertaken to date were academic life scientists. Therefore, there is probably a good cohort of life scientists with knowledge of how to set up these activities that can be called upon to assist in new ventures. Moreover, as the projects were carried out in a wide range of different countries, this expertise should also be widely spread in different countries around the world…."

- "…The projects surveyed were focused… mainly on awareness-raising and teaching, with some also including researching and debating dual-use issues to better understand the problem. So again, there should be a good cohort of people who have experience of the practicalities of carrying out these projects."

Shang *et al*, 2022

13. BIOSECURITY EDUCATION SURVEY:
issues that need to be addressed

- "…it should be noted that the original language used in these projects was usually English and very few involved making translations of the material used even into the six official UN languages. This is a problem that will have to be addressed if the kind of progresses needed is to be achieved. Unfortunately, the responses to our survey also indicate that there have not been many people in the Humanities (that is with specific expertise in ethics) involved and given the emphasis on ethics in the Tianjin Guidelines, this is a gap in capabilities that will probably have to be seriously and quickly addressed…"

- "…The methods of teaching in addition to developing resources… were diverse with delivering lectures using active learning processes, seminars and presentations being well represented. Other methods such as interactive online courses and on-the- job training were less evident. It seems to us that to meet the scale of the awareness-raising and education requirements in biosecurity for life and associated scientists, much more effort will have to be put into finding ways of engaging larger numbers of people such as through developing innovative methods including manga, cartoons, animations and films and making them freely available on the internet…"

Shang *et al*, 2022

15. BIOSECURITY EDUCATION SURVEY: the utility of networks

- “This…raises the question of how local, national, regional and international networks may be important in the future implementation of the Tianjin Biosecurity Guidelines and the continued development of the incorporation of dealing with dual use issues and biosecurity in general within the concept of responsible conduct of research…”

- “… information on relevant networks plus the growing use of self-assessment systems to enable the engagement of in dividual scientists can be seen as additional mechanisms for gearing up the development of biosecurity awareness-raising and education. In the longer term we believe that a dedicated international network similar to the International Nuclear Security Education Network (INSEN) run through the International Atomic Energy Agency (IAEA) will be required to properly support the cultural change needed in the life and associated sciences. “

Shang *et al*, 2022

16. BIOSECURITY EDUCATION SURVEY: general conclusion

“In conclusion, we suggest that

our survey shows that while all of the ideal elements required to effectively implement the Tianjin Guidelines are obviously not yet in place,

the efforts of multiple groups over the last two decades has put in place resources and experience that can be fruitfully used in that endeavour over coming years,

and that the deficiencies identified here can also be remedied relatively quickly if efficiently addressed.”

Shang *et al*, 2022

Thank You