Global Biosafety: Now and Tomorrow

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Most of us do not doubt that we live in a truly internationally integrated world. Personal computers, planes, cars, and services ranging from medical consultation to technology and travel support are among the few examples of goods and services assembled and provided by multinational platforms for customers across the globe. One needs only to read *The World is Flat* by Thomas Friedman for more numerous examples, how this occurred, and where it is leading. In this new international era, emerging diseases have the capacity to spread rapidly across borders. SARS exemplifies the potential health and economic impacts from these global threats. Several recent reports, legislative bills, and proposed changes to existing recombinant DNA guidelines demonstrate a level of concern on the part of lawmakers regarding the potential for acts of bioterrorism and biological proliferation, and the need to strengthen biosafety and biosecurity in a meaningful and effective manner (Graham & Talent, 2007; NIH, 2009; Select Agent Program, 2009).

Now more than ever, tackling these biological threats calls for global cooperation and collaboration. This message was clearly outlined in the report *A Safer Future: Global Public Health Security in the 21st Century* (WHO, 2007). The report calls for "global solidarity" in increasing laboratory capacity and responding to outbreaks of infectious disease, of which biosafety is a key and integral component. In fact, we have seen a significant increase in the number of containment laboratories being built worldwide to address this growing need. In the past few years, the United States has seen an increase in the number of BSL-3 and BSL-4 laboratories across all sectors, including universities (GAO, 2007). These laboratories are working together both nationally and internationally and establishing networks on a global scale. For example, the Emerging and Dangerous Pathogens Laboratory Network, a network of BSL-3 and BLS-4 facilities, is now being created to effectively respond to outbreaks of emerging and dangerous diseases worldwide (ASM, 2009).

Together with this increase in laboratory infrastructure, activity has increased in the establishment of regional and national biosafety associations and working groups, international outreach and training programs, and biosafety legislation (which typically includes biosecurity). The newly created African Biosafety Association (www.afbsa.org) and Biosafety Association for Central Asia and Caucasus (www.bacac.org) are a few examples.

Even with all of these positive signs, much work still needs to be done to foster the development of institutional biosafety programs, regional associations, recognition of biosafety professionals, and to provide even greater and more effective biosafety training and outreach. All of this must be done in the context of balancing work with existing capabilities, building toward nearterm enhancements, and tending to immediate needs. Currently, many countries are utilizing the *Laboratory Biosafety Manual* (WHO, 1997) or *Biosafety in Microbiological and Biomedical Laboratories* (*BMBL*) (CDC, 2007) as a baseline for facility design and biosafety principles and practices. As countries move towards developing their own national standards, they are also examining best practices from other existing national biosafety and biosecurity guidelines. We have also seen a proliferation of countries making their national guidelines available in different languages (e.g., U.S. *BMBL* into Spanish, Canadian *Laboratory Biosafety Guidelines* into Russian and Kazakh, and WHO *Laboratory Biosafety Manual* (3rd edition) into several languages).

Many countries and institutes are at the crossroads of developing a culture of biosafety and implementing a viable program that is congruent with international norms and best practices. Knowledge transfer is an essential enabler to achieve this goal. This is true for hospitals handling infectious diagnostic samples, universities involved in basic research, institutions focused on applied research, and facilities developing vaccines, as well as public and veterinary health authorities, to name a few.

The question at hand is: How do we leverage the many existing global biosafety associations, international programs, and other resources, all of which have true biosafety expertise, to provide assistance? The answer certainly does not lie in one central entity or approach.

One solution is for the more established biosafety associations to encourage and assist in the formation of new biosafety working groups and new national or regional biosafety associations in neighboring countries. This approach of mentorship and leadership to newly forming associations will encourage the culture of collective responsibility and cooperation and promote biosafety and biosecurity around the globe. A global

approach is required as infectious agents have no respect for nationality, race, and man-made boundaries.

Other solutions include bilateral and multilateral international programs among government agencies with a mission that includes fostering biosafety. For example, Canada's Global Partnership Program provides biosafety and biosecurity assistance to countries in the former Soviet Union, based on international standards and best practices. This is consistent with the World Health Assembly Resolution 58.29 that calls for member states to mobilize national and international resources to improve laboratory biosafety (WHO, 2005).

Institutes and organizations can further bolster their efforts by enlisting the assistance of recognized biosafety professionals to provide overarching biosafety training and specialized training directed at specific requirements.

Looking to the future, we must continue to work together on an international scale. A balanced and effective approach to global biosafety can be achieved only by recognizing the many viewpoints and approaches to biosafety around the world. There is no "one size fits all" approach and we must continue to be open-minded and flexible in our thinking. We can not predict the ideas and novel solutions that are on the forefront or where they will originate. It is inspiring to witness and learn from those who practice safe microbiology with dangerous disease-causing agents despite the various limitations they face. Coping with limited funding and inefficient equipment, and lacking reliable 24/7 infrastructure services such as water and power often lead to creativity, resourcefulness, and subsequently being able to safely conduct vital work. Taken together with more modern "Western-style" approaches to biosafety, these ideas can result in a balanced solution that may have wider applicability on a global scale.

To integrate as a global community, there must be a focal point; without it, the result may be a world where the international biosafety community remains fragmented and where differences outnumber commonalities. While some developed countries have their own biosafety guidelines and standards, most developing countries do not. Perhaps the World Health Organization's *Laboratory Biosafety Manual* (3rd edition) (WHO, 1997) can be a good start as most of the countries in the world are member states of the World Health Assembly. This approach is in line with the revised International Health Regulations (WHO, 2005), which is a legally binding international document for all member states with the aim of preventing the spread of diseases and providing a framework to mobilize resources and support in response to any disease pandemic.

To support this framework on an international scale, perhaps the time has come for all national and regional biosafety associations around the globe to come together, consolidate resources, and form the International Biosafety Association. In the fight to contain outbreaks of disease and prevent accidental or deliberate release of infectious agents, we can be effective only when we stand together to face this common challenge.

No one country can be effective in its control if its neighboring countries are ill prepared. No one country can protect itself unless its neighbors are safe and protected as well. To prevent an outbreak or to be able to respond effectively to an outbreak, we must live and work together as one global community

In our quest to provide a safer world today and for the generations to come, we must shift our consciousness from national responsibility to one of a global responsibility…from a national community to a global community.

The authors invite and encourage all non-profit biosafety organizations to share their experiences and provide contact information for inclusion in *Applied Biosafety: Journal of the American Biological Safety Association.*

Disclaimer

These are solely the views of the authors.

References

American Society for Microbiology (ASM). (2009). *Proceedings of the ASM biodefense and emerging diseases meeting, Baltimore.* Washington, DC: ASM.

Centers for Disease Control and Prevention (CDC). (2007). *Biosafety in microbiological and biomedical laboratories (BMBL)* (5th ed.). Atlanta: CDC. Available at: www.cdc.gov/OD/ohs/biosfty/bmbl5/bmbl5toc.htm

Friedman, T. (2006). *The World is Flat.* New York: Farrar, Straus and Giroux.

Graham, R., (Chair) & Talent, J. (Vice Chair). (2008). *World at Risk: The Report of the Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism.* Washington, DC: Knopf Publishing Group. Available at: www.preventwmd.gov/report/

Government Accountability Office. *High-containment Biosafety Laboratories Preliminary Observations on the Oversight of the Proliferation of BSL-3 and BSL-4 Laboratories in the United States* (2007). Washington, DC: GAO. Available at: www.gao.gov/new.items/d08108t.pdf

National Institutes of Health (NIH). (2009). *NIH proposes revisions to the NIH guidelines for research involving recombinant DNA molecules.* Bethesda, MD: Office of Biotechnology Activities. Available at: http://oba.od.nih.gov/oba/rac/ProposeRevisionsNIHGuidelines-March-4-2009.pdf

Public Health Agency of Canada. (2004). *Laboratory biosafety guidelines* (3rd ed.). Ottawa, Ontario, Canada: PHAC.

Select Agent Program and Biosafety Improvement Act of 2009: Available at: www.govtrack.us/congress/billtext.xpd?bill=h111-1225

World Health Assembly. (2005). Available at: www.who.int/gb/ebwha/pdf_files/WHA58/WHA58_29-en.pdf

World Health Organization. (1997). *Laboratory biosafety manual* (3rd ed.). Geneva: WHO Press. Available at: www.who.int/csr/delibepidemics/WHO_CDS_CSR_LYO_2004_11/en/

World Health Organization. (2005). *International health regulations.* Geneva: WHO Press. Available at: www.who.int/ihr/en/

World Health Organization. (2007). *World health report 2007: A safer future: Global public health security in the 21st century.* Geneva: WHO Press. Available at: www.who.int/whr/2007/en/index.html