

Security Summit, which wrapped up on 1 April. More than 50 countries attended, most represented by heads of state, making a variety of commitments to reduce the risk of nuclear terrorism.

These projects are also a reminder of just how slow progress has been — and how much remains to be done.

Obama launched the agenda in a 2009 speech in Prague, calling on governments to secure or eliminate all vulnerable nuclear materials in four years. His speech underscored the fact that the threat of a nuclear attack has increased even as the danger of apocalyptic nuclear warfare has receded. Recent revelations that the Islamist terrorist group ISIS may have been targeting a nuclear facility in Belgium make this all too clear.

The initial focus has been on HEU, because of simple physics. Whereas plutonium must be compressed with explosives to produce a nuclear explosion — a feat that is probably beyond the technical capability of terrorist groups — the process is simpler for weapons-grade HEU, which is also used in many reactors. The United States and Russia, which have supplied the world with the bulk of HEU, have stepped up efforts to secure, remove or blend these materials into low-enriched uranium (LEU), which has 20% or less of the key isotope uranium-235. Security has been upgraded at 32 facilities, and 12 countries have been declared HEU-free since 2010.

Many of these materials are located at civilian research reactors. The risks were recognized long ago; in 1978, for example, the United States began eliminating HEU fuel in these reactors. In 1992, the US Congress enacted a law requiring countries that receive its HEU to commit to converting reactors to LEU fuel. To maintain reactor performance, however, scientists needed to develop a new generation of high-density LEU fuels, which are now available for most research facilities.

This is good news, but challenges remain. Existing high-density LEU fuels cannot be used without degrading performance in 11 specialized

US and European research reactors. Certifying new fuels and converting these reactors could take nearly two decades. In January, the US National Academies of Science, Engineering, and Medicine recommended that specialized US reactors adopt an interim solution and convert to less-enriched fuel sources containing 30–45% uranium-235. This could — and should — be accomplished over several years, without impeding efforts to complete the shift to safer LEU fuel as soon as possible.

**“Research reactors are just one part of the puzzle.”**

Researchers also need a comprehensive strategy to maintain research reactors. The European Commission is sponsoring a research consortium called HERACLES to do just that. The White House Office of Science and Technology Policy should convene agencies and research facilities to develop a path forward, and engage internationally. Many of these specialized research reactors are getting old; in some cases, given delays with new LEU fuels, it may make sense to start anew.

But research reactors are just one part of the puzzle, and the question now is how to carry the broader nonproliferation agenda forward once Obama leaves office. His four nuclear summits have boosted political attention and accelerated progress, but the world is awash with nuclear materials. Nuclear safety and security falls to a problematic patchwork of international institutions, including the International Atomic Energy Agency (IAEA), Interpol and the United Nations, and the latest summit produced a variety of initiatives to bolster these institutions.

That is a start. Ultimately, the world needs a new convention that sets specific standards for nuclear security and allows inspections and enforcement by the IAEA. In the meantime, governments must work through existing institutions to share and implement best practices. Regardless of cost, research facilities must ensure that their nuclear materials are safe and secure. ■

## Mind matters

*Mental illness is moving up the global agenda — but there is still much to do.*

Nominally, 2016 should be a good year for mental health. On 13 and 14 April, the World Health Organization (WHO) and the World Bank will hold an unprecedented joint conference in Washington DC to discuss mental health as both a global disease and an economic problem.

It is a welcome gesture after many snubs. Mental illness was left out of the United Nations’ influential high-level meeting on non-communicable diseases (NCDs) in 2011. Almost begrudgingly, the UN gave mental health a brief mention in the entry for NCDs in its 2015 Sustainable Development Goals. As well as reducing deaths from NCDs such as heart disease by one-third, it said, the world should also “promote mental health and well-being”.

The UN failed to recognize that in terms of impact, mental disorders are at least as harmful as those better-recognized and better-funded diseases. Mental-health conditions account for 37% of the healthy life years lost to NCDs. This reflects shortened lifespans and a loss of ability to work effectively, and it translated to a global loss of US\$2.5 trillion in 2010; that figure is projected to rise to \$6 trillion by 2030 (see [go.nature.com/dfdkbh](http://go.nature.com/dfdkbh)). Simply ‘promoting’ mental health is not enough.

Many developed countries scarcely give mental illness more than lip service. In the United States, for instance, the topic is brought up only when a mass shooting launches a ‘conversation’ about the poor state of mental-health treatment — and then only as a distraction from the gun-control debate. Such attention rarely leads to new funding for mental-health research.

Underlying much of this neglect is the persistent bias, conscious or

not, towards believing that many mental-health conditions are a moral failing rather than the result of complex biology, despite overwhelming evidence for the latter. For poor countries wracked by infectious and childhood diseases, it can be easier to confine people with psychosis than to try to treat them. And treatment is hard to find the world over: globally, there are only nine mental-health providers for every 100,000 people, and some countries have only one or two providers. A Comment on page 25 calls for a global strategy to combat care deficiencies in both developing and developed countries.

Even in developed countries, people find it difficult to consider depression as a condition to be combated with the same clarity of purpose as heart disease. This is exacerbated by the failure to develop drugs for depression that are as clear-cut and effective as statins. This is unlikely to change soon: if anything, neuroscience is painting a bleaker picture by showing how complex these diseases are. More than 100 genetic regions have been associated with schizophrenia — and autism and depression are probably even more complex. Addressing all of these will require entirely new approaches. A News Feature on page 20 looks at the latest developments on one emerging, but still unproven, front: phone apps intended to assist people with mental-health disorders.

The annual Mental Illness Awareness Week in October promotes mental health, as do many organizations devoted to erasing the stigma and bias that harm patients and inhibit politicians. But so much more is needed in terms of improved treatments and access to care.

Finance ministers at the meeting next week should recognize the positive economic returns of investing in this direction. The UN, the WHO, the World Bank and governments should be expected to contribute something tangible to this pressing issue. The summit’s attendees should come away with plans for creating specific development targets, and mechanisms for funding research, ensuring that treatment is available in low-income countries, and holding nations responsible for giving mental illnesses as prominent a place in health care as other NCDs. ■

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