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Editorial

Thinking globally about cancer research on World Cancer Day

Addressing the global burden of cancer requires commitment to action across many domains of human activity. Key determinants of progress include improving health surveillance data, strengthening cancer research as well as building public awareness of the importance of cancer research. Without a commitment to ongoing cancer research, we will not be able to understand why cancers occur, how to prevent and screen them, how best to treat individuals with cancer, how to manage symptoms related to cancer and cancer treatment and how to help as many individuals diagnosed with cancer as possible return to normal family and work life. Without translation of research findings into easily accessible messages for healthcare providers, cancer patients and their families and the general population, the impact of research findings may be far too limited.

Strengthening health surveillance relevant to cancer must be seen as an integral part of strengthening health surveillance in general, consistent with global efforts to improve vital registration and address the many challenges of the Sustainable Development Goals. The robust health surveillance systems in Scandinavia and The Netherlands, for example, provide excellent models of how linking data from all individuals residing in a country can make possible broad-based epidemiological investigations, vaccination registries, cancer screening registries, cancer registries linked to death registries as well as the capacity to evaluate patterns of cancer care and quality of cancer care, after the diagnosis of cancer[1,2]. Robust health surveillance systems also permit programme monitoring and evaluation, as well as the evaluation of novel interventions to prevent, screen for, diagnose and treat cancer and its symptoms.

The use of a unique personal identifier (UPIN) assigned at birth and routinely used in an individual's interactions with the health system, both public and private, helps to facilitate such robust health surveillance systems. In addition, such data systems can make annotation of biospecimens, including cancer and normal tissues, much easier and more comprehensive. Well-annotated biospecimens are critical to cancer research and many other fields of biomedical research.

Robust health data systems must be seen as a key component of cancer research. Other key components include research training across the cancer continuum, facilitation, funding, national and international research networks and partnership with civil society, medical professional societies and, as appropriate, industry. Two reports from the Organization for Economic Cooperation and Development (OECD) Global Science Forum help lay out the importance of these components[3,4]. Didactic programmes in schools of medicine, nursing, pharmacy and other healthcare specialities should include education on the principles of clinical and population-based research. Teaching hospitals should routinely offer more advanced training in clinical research, as well as recognize the work of healthcare professionals who participate in clinical research conducted in the public interest in terms of promotion, salary and protected time for research. Population-based research which is conducted with patient and community participation, is central to understanding cancer epidemiology as well as identifying strategies for the translation of research evidence.

Both at the national and the institutional levels, regulations should support and guide the timely and ethical conduct of well-designed prospective clinical research. Focused workshops such as those organized by the Tata Memorial Hospital and the Indian Cancer Grid, the Medical Oncology Group of Australia, the American Association of Cancer Research and

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the American Society of Clinical Oncology and the European Society of Medical Oncology present opportunities for young investigators to develop ideas for clinical research with mentoring by senior researchers and biostatisticians. Similar training programmes developed by the US National Cancer Institute (NCI) provide opportunities for mentoring research training in implementation science.

Partnership with civil societies, including patient advocacy groups, is also critical to cancer research. Civil societies can help disseminate research findings, advocate with policymakers for support and facilitation of clinical research as well as encourage individuals, families and communities to consider participation in clinical research. Medical professional societies can also help advocate for cancer research, teach their members about the principles of clinical and population-based research and promote the findings of research at their meetings and in their journals. An open and transparent framework for working with industry is also a key component of cancer research. Industry can help bring novel agents and devices to the clinic for investigation and validation, as well as make these products found to be effective available for use in the public and private sectors.

Another key element for cancer research is funding. This includes funding for the development of research proposals; regulatory support; time for doctors, nurses, pharmacists and other healthcare providers to participate in research; funding for biostatistical design and analysis; funding for data collection and quality assessment/quality control and for laboratory and clinical studies directly related to the research. In those countries with the strongest national support for cancer research, healthcare providers pay the routine patient care costs associated with standard cancer treatment for individuals who are enrolled in prospective cancer research conducted in the public interest. Funding for cancer research can come from individual institutions, State and national governments and non-governmental organizations, including patient advocacy groups.

The importance of national and international collaboration in cancer research has also become clear. The 70 NCI-designated cancer centres in the USA participate in numerous research networks, including the National Cancer Trials Network and the National Comprehensive Cancer Network (NCCN)[5]. The India Cancer Grid, supported by the Tata Trust, also presents an excellent example of a national network of cancer centres focused on strengthening cancer research and the implementation of research results into routine clinical and public health practice[6]. Cancer research groups tracking broad populations come together through several mechanisms, such as the Cohort Consortium. This partnership, initiated by the US NCI, helps fulfil the need for pooling large quantities of data and biospecimens to conduct definitive cancer studies across a range of domains[7]. Clinical trials cooperative groups conducting treatment trials for women with breast cancer come together through several different mechanisms, including the Breast International Group and the Early Breast Cancer Trialists' Collaboration Group[8,9].

From their inception, the US NCI and NCI-designated cancer centres have been committed to helping build global capacity for cancer research and to work with researchers around the world to address key cancer research questions. The US NCI helped China undertake its first study of cancer incidence by province in 1979[10]. This initial work led to many in-depth epidemiologic studies and cancer prevention trials. Many NCI-designated cancer centres in the USA have made major investments over many years to build robust, bilateral cancer clinical research programmes that offer substantial research and programmatic and training benefits to the US partner and the low-income country partners. Notable examples include the collaboration between the University of North Carolina and the Malawi Ministry of Health[11] and the AMPATH partnership led jointly by the Indiana University and Moi University in Kenya[12]. Other examples include work focused on specific cancer. In gall bladder cancer, for example, the US NCI is working on cancer epidemiology and biology in partnership with researchers in India and Chile. Collaborations on oesophageal cancer research include partnership with China, Iran and multiple countries on the east coast of Africa, including South Africa, Tanzania and Kenya. Research on oral cancer, associated with the use of oral tobacco and/or oral areca nut use, includes joint work involving the USA, India and other countries in Southeast Asia and Oceania on aetiology, biology, screening and treatment[13,14]. Other examples of fruitful international collaborations in cancer research include work in the epidemiology and treatment of paediatric cancer[15]; screening for cervical cancer[16]; treatment of HIV-associated cancer[17]; global variation in the molecular biology and epidemiology of breast, lung and prostate cancers[18-20]; effects of environmental/occupational exposures such as arsenic and benzene[21,22] and delivery of palliative care[23]. As an example, the NCI's AIDS Malignancies Consortium[24] has invested in developing numerous clinical trial sites in Africa and Latin America over the last decade, to test interventions for the prevention and treatment of HIV-associated cancer through rigorous clinical trials conducted in high-burden settings, while simultaneously building critical capacity for clinical trials in these environments.

The call in May 19, 2018 by Dr Tedros Ghebreyesus, Director-General of the World Health Organization[25], for a global initiative on cervical cancer prevention and control underscores the importance of both strengthened data surveillance and cancer research to reduce the global burden of cancer. Based on estimates by the International Agency for Research on Cancer (IARC), in 2020, approximately 580,000 women will be diagnosed with cervical cancer and 27,500 women will die of cervical cancer[26]. Thanks to decades of cancer research, we know that all cases of cervical cancer are caused by chronic infection with the human papillomavirus (HPV), modified by other risk factors, including exposure to tobacco smoke, parity and immunologic status. We now have a prophylactic vaccine to prevent HPV infection, multiple approaches to screen pre-cancer of the cervix as well as evidence-based guidelines for treatment of women with invasive disease[27].

To conclude, the various initiatives highlighted above offer clear evidence that by working together to improve data, to conduct research across the continuum of cancer and to implement research findings into routine public health and clinical practice, we can decrease suffering and death from cancer around the world.

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