

Open access: a giant leap towards bridging health inequities

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Abstract Access to health research publications is an essential requirement in securing the chain of communication from the researcher to the front-line health worker. As the diagram of the knowledge cycle from the Canadian Institutes of Health Research shows, health knowledge generated in the world's laboratories is passed down the information chain through publications, through its impact and application, its subsequent "translation" into appropriate contexts for different user communities, arriving finally with health workers and the general public. This article focuses on the first link in the chain, from research author to reader, and the free online access to peer-reviewed published articles that are the building blocks for future health innovation developments.

Une traduction en français de ce résumé figure à la fin de l'article. Al final del artículo se facilita una traducción al español. الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

Introduction

Health knowledge generated in the world's laboratories is passed down the information chain through publications, through its impact and application, its subsequent "translation" into appropriate contexts for different user communities, arriving finally with health workers and the general public, as the diagram of the knowledge cycle from the Canadian Institutes of Health Research has shown.¹ Studies have shown that access to published health research by the research communities in developing countries is no longer "fit for purpose".² As has been well documented, rising costs of subscriptions and permission barriers imposed by publishers have barred access to the extent that local health research and health care have been damaged through lack of information.^{3,4} For example, Yamey⁵ tells of a physician in southern Africa who could not afford full access to journals but based a decision to alter a perinatal HIV prevention programme on one single abstract. The full text article would have shown that the findings were not relevant to the country's situation.

With the advent of the internet there is little justification for continuing to create barriers to access. Richard Smith, as the former editor of the *British Medical Journal*, said, "Most research is publicly funded, and when the internet appeared it made no sense for research funders to allow publishers to profit from restricting access to their research".⁶ This is true not only for publicly funded research but for private health charities around the world. As the Open Access Policy of the Wellcome Trust states, "We . . . support unrestricted access to the published output of research as a fundamental part of its charitable mission and a public benefit to be encouraged wherever possible".⁷

Science is a collaborative process and openness is fundamental to knowledge advancement. Nowhere has this been shown more clearly than by the 2003 outbreak of SARS (severe acute respiratory syndrome) during which, at the height of the epidemic, there was unprecedented openness and willingness to share critical research information, leading to the identification and the genetic mapping of

the responsible coronavirus by 13 collaborating laboratories from 10 countries.⁸ The recent release of essential H1N1 data published in several toll-access journals relevant to the H1N1 influenza pandemic points to the recognition that access to health research information is critical in the containment of infectious outbreaks.⁹

It is difficult to see how the United Nations' Millennium Development Goals can be achieved without free international access to the world's publicly funded research findings or without collaborative initiatives. Goals 4 to 7 depend on the sharing of research findings for success, while Goal 8, which emphasizes the need for global partnerships for development, recognizes that sharing knowledge and capacity building establish the infrastructure for building future aid programmes.

Any solution to the inequality of access to health-care information must be based on the development of an independent and sustainable national research base. Lessons in development aid from the past few decades clearly show that mechanisms that reinforce the dependency culture are no longer appropriate.^{10,11}

Solutions

The United Nation's HINARI, AGORA and OARE programmes, whereby registered libraries or qualified institutions in countries with a Gross Domestic Product (GDP) of < US\$ 1250 per capita are provided free access to journals contributed by partner commercial publishers, have successfully filled information gaps for selected users.¹² However, such donor programmes have several limitations.¹³ They are not driven by science (journals are donated by publishers at their own discretion rather than selected by researchers); they are only available to the poorest countries (as countries' economies improve, they no longer qualify); some low-income countries are excluded (e.g. India, even though its GDP level qualifies it for access) because publishers fear damage to their existing sales; access is only available from

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registered libraries and on provision of a password controlled by libraries; publications may be withdrawn and there are no contractual arrangements regarding content continuity.

In a letter to *PLoS Medicine*, Villafuerte-Gálvez et al. said that, since 2003, Peruvian medical students and health professionals have substantially benefited from access to high-quality scientific information through HINARI but that recently students and faculty had not been able to gain access to several top journals that were available at the launch of the programme.¹⁴ Moreover, the number of users had dropped by 52% in 3 years. Such was the value of the donor material that copies were made available to colleagues unable to access them.

A key to resolving the deep knowledge gap lies in creating a global knowledge base that includes essential research emanating from both research communities in developing countries as well as from “international” research. Without regional knowledge, the picture is incomplete and may result in inappropriate programmes. As an example, bacille Calmette–Guérin vaccine developed in Europe for combating tuberculosis is of limited efficacy in China and India, the countries hardest hit.¹⁵ Molecular typing studies by van Embden of the Netherlands have shown that the Indian tuberculosis strains are different from those in western countries.¹⁶ Similarly, as Andrew Hattersley has pointed out, effective treatments for diabetes in the United Kingdom may not work in India and vice versa, as environmental and genetic factors can affect the success of treatments.¹⁷

It is equally crucial to ensure distribution of publications between neighbouring countries since they may share similar health problems that are seldom covered by established international journals. A study by Lown & Banerjee to assess the *New England Journal of Medicine's* coverage of health issues of the developing world, found that in 416 weekly issues over an eight-year period < 3% of articles were devoted to such issues.¹⁸ Other studies have shown similar evidence of systematic bias by medical journals from developed countries against highlighting diseases of poverty, and recent reports have documented the problem of neglected tropical diseases.^{19,20}

Overcoming the limitations

The statement and recommendations of the Budapest Open Access Initiative on which all subsequent open access developments are based, is concerned with free public access to peer reviewed publicly-funded research publications.²¹ It recommended two routes to achieving open access: (i) deposit author's copy of already published articles in the author's institutional repository (or a subject-based central repository where an appropriate one exists); or (ii) publish in an open access journal.

Both these routes have the major advantage of being driven by science and building research capacity as researchers can compile personal collections of material specific to their work, regardless of whether it has been published in local or international journals.²² Open access is sustainable as the establishment of institutional repositories is low cost in the developing world and publishing in open access journals is mostly free to authors (only a minority of commercial journals charge a document management fee, usually waived for authors from developing countries). Services that have focused on providing maximum visibility to regional journals, such as Bioline International²³ (70 open access journals from 17 developing countries), SciELO²⁴ (approximately 500 journals from Latin American and other Spanish and Portuguese-speaking countries) or MedKnow Publications²⁵ (79 journals mainly from India), show high usage both from neighbouring developing countries and from wider international communities alike. The example of Bioline International usage in 2008, showing 4.2 million full-text downloads from a global audience, is typical. Usage from the interoperable institutional repositories is equally high, and rising. The usage of full-text material from institutional repositories that have installed statistical data packages shows low-income countries are among the top users – again demonstrating a real need for previously unattainable information.^{26,27}

As open access has become established, major international institutes and funders have begun to require that copies of articles that result from their support are deposited in institutional repositories or published initially in open access journals. In the United

Kingdom, more than 90% of publicly funded medical research is covered by open access mandates. In the United States of America, the research access policy of the National Institutes of Health promises to make available publicly about 80 000 articles per year. Globally, as at 5 June 2009, there were 84 open access mandates²⁸ from such prestigious organizations as Harvard University, Massachusetts Institute of Technology, Southampton University, all the United Kingdom Research Councils, the Wellcome Trust and many other institutes, universities and departments, 17% of which are from developing countries. There are now 4184 open access journals published,²⁹ 15% in developing countries and 1351 institutional repositories³⁰ – approximately 17% of these are located in developing countries. At the same time, there is much supporting infrastructure activity – developing institutional repository networks, developing software that allows harvesting between repositories and similar regional developments.^{31,32} These figures demonstrate the increasing global acceptance of open access policies as a way to enhance research around the world.

Misconceptions

There have been many misconceptions about open access that have retarded its acceptance. It has been said that open access is equivalent to “vanity press” and that it lowers scholarly standards, but this is not the case since copies of author's final accepted articles deposited in institutional repositories have already been accepted for publication following review and open access journals incorporate rigorous peer review. Again, whereas it had been feared that the imposition of author-fees by some commercial open access journals would disenfranchise authors from developing countries, it is now clear that revenues can be maintained in alternative ways, such as print subscriptions, other publishing services or reprint sales. As has been shown by the MedKnow Publications service, Mumbai, there has been an increase in subscriptions to the hard copy version since providing open access to the online version.²⁵

It is also incorrect to say that self-archiving automatically infringes copyright in all cases. The majority (63%)

of non-open access journals allow deposit of copies of published articles in institutional repositories (sometimes with an embargo period) and most open access journals allow authors to retain copyright (see statement on copyright from Science Commons and the Scholarly Publishing and Academic Resources Coalition, SPARC).³³ It has been said that the connectivity problems in developing countries render open access inappropriate, yet these problems, while real, apply equally to non-open access online publications. Moreover, the International Development Research Centre (IDRC) recently reported that the research needs for access to new information drive connectivity and vice versa.³⁴ While much remains to be done, both connectivity and access to broadband are improving globally, and new mobile technology is beginning to play a major role in health care communication. It has been said that research information is not appropriate for health workers, yet access to new research drives development of new health applications and builds a strong national science base which in turn strengthens medical services and national economies.³⁵

The way ahead

It is our view that the United Nations and other international organizations should give strong support to the open access movement, which holds such promise for both research and public health. In this respect, it is gratifying to see that one of the stated objectives in the report of the Intergovernmental Working Group on Public Health, Innovation and Intellectual Property is to “promote public access to the results of government funded research, by strongly encouraging that all investigators ... submit to an open access database an electronic version of their final, peer-reviewed manuscripts”.³⁶ It is hoped that this will translate into action in the form of vigorous support for low-cost institutional repositories and local open access journals, as well as by raising awareness of the many benefits of open access. Initiatives such as TropIKA,³⁷ incorporating open access medical publications for tropical diseases that are most prevalent in developing countries, are encouraging, as is the recent announcement by the Council of Scientific and Industrial Research in India, urging the establish-

ment of institutional repositories in each of its more than 35 laboratories as well as conversion of all their journals to open access.³⁸ The recent adoption of an open access mandate by the University of Pretoria in South Africa again demonstrates recognition of the importance of open access for developing regions.³⁹

While it may be helpful to continue the donor programmes as long as they are needed, it is only through removing the barriers to access to global research that health improvements can be accelerated. Open access delivers free access to millions of research articles for all with Internet access regardless of institutional affiliation or national GDP. It builds research and health-care independence and replaces the dependency culture that is now widely criticized.⁴⁰ The report of the Global Forum for Health Research states, “Strengthening research capacity in developing countries is one of the most effective and sustainable ways of advancing health and development . . . and of helping correct the 10/90 gap in health research”.⁴¹ Open access is a necessary first step. ■

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Résumé

Accès libre aux connaissances : un pas de géant vers le comblement des inégalités en matière de santé

L'accès aux publications sur la recherche en santé est une exigence essentielle pour garantir le fonctionnement de la chaîne de communication entre le chercheur et le travailleur sanitaire en première ligne. Comme le montre le schéma du cycle de connaissances établi par les Instituts de recherche en santé du Canada, les connaissances sur la santé générées par les laboratoires du monde entier passent dans la chaîne d'information à partir des publications, sont transmises par biais de leur impact

et de leur application, sont transposées ultérieurement dans des contextes appropriés pour différentes communautés d'utilisateurs, puis parviennent finalement aux travailleurs sanitaires et à la population générale. L'article se concentre sur le premier lien de la chaîne, de l'auteur d'un travail de recherche au lecteur, et sur l'accès en ligne gratuit aux articles publiés et révisés par des pairs, qui apportent les éléments de construction pour les futures innovations dans le domaine sanitaire.

Resumen

Acceso libre: un paso de gigante para resolver las inequidades sanitarias

El acceso a las publicaciones sobre investigaciones sanitarias es un requisito esencial para asegurar la continuidad de la comunicación entre los investigadores y los trabajadores sanitarios que actúan en primera línea. Según se indica en el diagrama del ciclo de conocimientos de los Institutos Canadiense de Investigaciones en Salud, los conocimientos sanitarios generados en los laboratorios de todo el mundo entran en la cadena de información a través de las publicaciones, pasando luego por un

proceso de impacto y aplicación y su posterior «traslación» de adecuación a diferentes comunidades de usuarios, para llegar finalmente al personal sanitario y el público general. Este artículo se centra en el primer eslabón de la cadena, el que liga al autor de la investigación y el lector, y el acceso gratuito en línea a artículos publicados revisados por homólogos que constituyen los pilares básicos para las futuras innovaciones en salud.

ملخص

الإتاحة المفتوحة للمعلومات: قفزة عملاقة نحو تجاوز الجور الصحي

ومن ثمَّ "ترجمتها" اللاحقة إلى السياق الملائم لمجتمعات المستخدمين المختلفة، لتصل في النهاية إلى العاملين الصحيين وعامة الناس. ويركز هذا المقال على الحلقة الأولى في هذه السلسلة؛ أي من الباحثين المؤلفين إلى القراء، وعلى الإتاحة المفتوحة على الإنترنت لمقالات محكمة منشورة، والتي تمثل لبنة البناء الأساسية لمستقبل التطوير الابتكاري للصحة.

يُعد الوصول إلى نشرات البحوث الصحية من المتطلبات الأساسية لضمان حلقة تواصل تبدأ من الباحثين وتنتهي بالعاملين الصحيين الذين يعملون في الخطوط الأمامية. وكما توضح مخططات حلقة المعارف في المعهد الكندي للبحوث الصحية، فإن المعارف الصحية التي تنشأ في مختبرات العالم تسلك طريقها ضمن سلسلة المعارف عبر النشر، ومن خلال أثرها وتطبيقها.

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Round table discussion

A key piece of the jigsaw for improving world health

Alma Swan^a

“Open access is good for science, the research community and mankind.” Sir John Sulston, biologist and Nobel Laureate

Impaired access to research information in health-related fields is not solely the preserve of developing countries but it is hugely exacerbated in poorer regions of the world. While these regions bear the brunt of the world's health problems, only 10% of health research effort goes into these areas (referred to as the “10/90 gap”).¹ If we are going to achieve what the World Conference on Science held by UNESCO and the International Council for Science in 1999 termed the true “orienting of scientific progress towards meeting the needs of humankind”, then we must improve the research effort on the health problems that afflict the greatest part of the world's population. That cannot happen until research communication is optimized: at the turn of the new millennium more than half of research-based institutions in lower-income countries had no current subscriptions at all to international research journals.²

Open access changes this. It permanently delivers free research information to any would-be user. The security of long-term free access is relevant here because other programmes that purport to deliver health research information on an equitable basis to the developing world are not guaranteed for the long-term.³ Access may be discontinued because new rules have been applied. No health research or practitioner programmes can operate properly under such circumstances.

Open access literature, by definition, is freely available on a permanent basis. Some distinguished examples of open access journals in the health sciences are *PLoS Neglected Tropical Diseases* and BioMed Central's *Malaria Journal*, which have the top two impact factor scores in the tropical medicine category of Thomson Reuter's Journal Citation Reports service, and *Environmental Health Perspectives*, the journal of the National Institute of Environmental Health

Sciences in the United States of America (USA), which has recently recommitted itself to an open access policy.

Open access journals are just one route to open access for health research literature. Open access repositories or archives are perhaps even more important, collecting as they do the outputs from research organizations around the world. Currently over 1400 in number, they have been established at an average of one per day for the past 3 to 4 years. Two of the largest, PubMed Central at the National Institute of Health, USA,⁴ and United Kingdom PubMed Central⁵ (run by a consortium of medical research charities and the British Library), presently provide free access to 1.4 million biomedical research articles.

“Key areas of critical need include: open access to CDC's research publications for other scientists and the public (rapid, free, and unrestricted online access) to CDC sponsored peer reviewed research and access to ‘data in progress’ among scientists, especially during emergencies like SARS.” Dr Julie Geberding, Director, Centers for Disease Control and Prevention (CDC), USA.

Why are such influential bodies as the Australian National Health & Medical Research Council, the Canadian Institutes of Health Research, CDC and the National Institute of Health in the USA, the United Kingdom Medical Research Council and the Wellcome Trust promoting open access? Because it brings such benefits to health research including: (i) increased visibility for research outputs; (ii) a concomitant increased usage and impact; (iii) an increase in the speed at which scientific research progresses; (iv) the facilitation of interdisciplinary research; and (v) the enabling of new semantic computing tools to create new knowledge from existing knowledge.⁶ Open access is a key piece of the jigsaw for improving world health. All stakeholders in that vision should commit themselves to its implementation. ■

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