

EDITORIAL

Open Access

BMC Medicine: a decade of open access medical research

Sabina Alam* and Jigisha Patel

Abstract

On 24 November 2003, *BMC Medicine* published its first article. Ten years and over 900 articles later we look back at some of the most notable milestones for the journal and discuss advances and innovations in medicine over the last decade. Our editorial board members, Leslie Biesecker, Thomas Powles, Chris Del Mar, Robert Snow and David Moher, also comment on the changes they expect to see in their fields over the coming years.

Keywords: Open access, Translational medicine, Clinical oncology, Evidence-based medicine, Reporting guidelines

Editorial

Just a few months after the Human Genome Project was declared complete [1] *BMC Medicine* was launched as an open access [2,3], open peer review journal (i.e. where signed peer review reports are published with the article) [4,5], with the aim of making high impact clinical peer-reviewed research of general interest, accessible to everyone from the basic scientist to the practicing clinician. The journal, initially under the direction of Pritpal Tamber and then Melissa Norton as Editor-in-Chief, was launched amidst a raging debate about the viability of open access publishing [6]. But open access survived and evolved [7,8], and *BMC Medicine* now ranks 8th out of 155 journals in the 2012 general and internal medical journals category of the Journal Citation Reports [9].

While mainly focused on primary research in its early days, the journal responded to the needs and demands of its readers and contributors by providing, for example, a platform for discussing controversies in medical practice [10-15] and embracing social networking technology to promote open scientific discussion and debate [16-19]. Although proud of its Impact Factor (IF) of 6.68, *BMC Medicine* recognizes that the IF is a restrictive metric that does not fully reflect the

influence of individual articles post-publication. The journal therefore provides informative article metrics which are immediately available on published articles - a feature which has proven to be popular with many of our authors [20].

Of course, innovations in publishing and technical advances notwithstanding, *BMC Medicine* owes its success to the scientific contributions made by its authors, reviewers and expert editorial board members. To celebrate its 10th anniversary, we recently reviewed some of our most successful articles in terms of accesses [21], citations [22] and 'impact' in news and social media [23], and also summarized author and reviewer experiences [24] and explored our author demographics [25]. As a general medical journal with a very broad scope, it is not possible for us to cover all the main advances in medicine featured in the journal over the last decade, but in this editorial we present a selection of our favorite recent content, together with predictions by our editorial board members on possible future directions for their respective fields of research.

Translational medicine: how far have we come with stem cells, biomarkers and 'Omics' research?

Stem cell research and therapy has advanced rapidly in the last decade, and clinical trials for a wide range of diseases are already underway [26,27]. In 2012, the journal published an intriguing study by Zhao and colleagues, who used Stem Cell Educator therapy to

* Correspondence: Sabina.Alam@biomedcentral.com
BioMed Central Ltd, 236 Gray's Inn Road, London WC1X 8HB, UK

safely reverse Type 1 diabetes. The researchers used stem cells from cord blood to 're-educate' T cells in patients with Type 1 diabetes, thereby restoring pancreatic function and reducing the need for insulin [28]. These compelling results highlight how stem cell therapies may become part of mainstream treatment for many diseases.

Within the last 10 years, major advances have also been made in biomarker research and 'Omics' studies in a preclinical setting. Advances in whole genome sequencing have allowed the identification of genes involved in a large number of diseases, and biomarkers that indicate disease severity or susceptibility to treatment are increasingly being characterized [29-32]. As Leslie Biesecker points out (Box 1), clinical exome and genome sequencing are already being used in the clinic for diagnostic and prognostic purposes. However, Biesecker also indicates that these new technologies are not without problems and alludes to the role the journal plays in ensuring the latest research is appropriately validated and disseminated.

Box 1

Leslie G. Biesecker

National Human Genome Research Institute, USA

Genomics has provided new modes of discovery in the basic sciences and is now doing the same for clinical research. It has already started to change medical practice with clinical exome and genome sequencing. These two assays are now being used in thousands of patients, for example, to provide a genome-wide diagnostic assay for uncharacterized disorders of birth defects or neurologic disorders and in tumor sequencing to identify targets for cancer therapeutics. *BMC Medicine* has a critical role to fulfil in this process by providing a forum for critical evaluation of these new technologies. The objective could not be more important - to preserve what works well in medicine and remake what does not. It is hard to imagine a more exciting time for our field.

Despite the discovery of many biomarkers for cancer in particular, so far very few have been used within the clinical setting [33], which is partly due to a lack of consistency and clarity in the reporting of prognostic tumor markers. This prompted the development of the Reporting Recommendations for Tumor Marker Prognostic Studies (REMARK) checklist [34], which

was updated in 2012 by Altman and colleagues [35] and more recently, the development of criteria to address the lack of scientific rigor when evaluating preclinical evidence to support translation of omics-based predictors to clinical trials [36,37].

The continued identification of new genes and biomarkers specific to disease subtypes and individual patients is essential for translation into personalized medicine, in terms of estimating both disease risk and response to therapy. As highlighted above, the field which has seen the most progress in this area is clinical oncology, and Thomas Powles explains what further changes are required to achieve effective personalized cancer therapies (Box 2).

Box 2

Thomas Powles

St Bartholomew's Hospital, London, UK

The field of medical oncology is moving at a breathtaking speed. A plethora of new agents are now available based on the molecular biology of specific tumors. The next step is to identify subsets of patients who benefit from therapy and move away from 'one size fits all' strategies. Therefore, biomarkers predicting response to these therapies are required. The application of whole genome sequencing, novel tracers within the context of functional imaging and circulating biomarkers, such as free circulating tumor DNA will be important pieces in this complex puzzle. There is also a need to develop therapies which focus on inducing longer remission rather than temporary disease controls. A collaborative international approach is required to achieve these goals.

Evidence-based medicine: education, communication and collaboration

There has been increasing international focus on public health initiatives, development of healthcare policies and evidence-based guidelines to improve medical practice [38,39]. This is embedded in effective education strategies, which is evident from a continuing medical education intervention aimed at strengthening links between evidence-based and values-based medicine in healthcare personnel [40]. Researchers found this intervention led to improved values, such as openness to change, which are essential for improving medical care.

Chris Del Mar (Box 3) recommends that going forward a more collaborative approach to decision-making between clinicians, patients and policy makers needs to be developed, and highlights the importance of transparency and communication.

Box 3

Chris Del Mar

Bond University Gold Coast, Australia

Medicine will enter a new phase of concern about decreasing gains for increasing harms - including not just cost but also over-diagnosis and over-treatment. The medical profession has not been able hitherto to demonstrate an ability to make such cost-benefit decisions sensibly alone, and therefore there will be increasing input from society; increased demand for shared decision-making with the patient; and more directives from government. One important element of quality will soon be considered to be the extent to which the clinician has explicitly, clearly and carefully communicated the evidence in such a way that every patient is in a position to express a preference for the range of management options available. Evidence-based medicine will no longer be some hidden activity that clinicians may (or may not) engage in: it will become the currency expected for patient-clinician communication.

There is also increasing focus on involving researchers based in low-to-middle income countries as principal investigators in local research projects. This is especially important as local knowledge helps to ask the 'right' questions in health research, ensures the best available evidence is accumulated and that all ethical aspects have been considered [41-43]. This is vital to guide health-care policies and identify new tools and strategies; the consequences of not doing so is evident from a recent bibliometric analysis of childhood immunization research output from Africa. Since the onset of the Expanded Program on Immunization in 1974, vaccine research productivity in Africa has skewed toward those funded privately, with minimal research input from African authors, suggesting a need for better communication among all stakeholders [44]. Robert Snow points out (Box 4), conditions for research are now improving in Africa, and it is important that local researchers and governments work closely to drive the research output from these regions forward.

Box 4

Robert William Snow

Kenya Medical Research Institute, Kenya

Since I started work in Africa 30 years ago the landscape of science and research capacity has changed enormously. It is no longer legitimate to make excuses that model-based computing, laboratory science or gene sequencing can only be done in the north. The infrastructure and human capacity now exists in Africa to provide the best possible science for public health problems that face the continent. A fundamental requirement for any form of development is that countries have to take ownership of their problems. The next decade requires an active promotion by governments in Africa, and international partners that support regional development, of the expanding cohorts of African scientists who champion the very highest standards of medical and public health science within the region. Generating new research from within Africa holds untold promise. Unlike external research agendas and funding 30 years ago, this new research will have a much greater and much faster impact on the health of communities in Africa over the next decade.

Enhancing research with reporting guidelines

Without clear guidelines for conducting and analyzing medical research, there is a limit to how far medicine can progress, and the last few years have seen many important improvements in reporting standards. In 2010, *BMC Medicine* co-published the updated CONSORT (CONsolidated Standards of Reporting Trials) statement by Schulz and colleagues [45]. This statement guides authors on the reporting of two-parallel design randomized controlled trials by using a checklist and flow diagram based on the latest methodological evidence. More recently, in response to the particular challenges in reporting economic evaluations of health interventions, the Consolidated Health Economic Evaluation Reporting Standards (**CHEERS**) was published [46]. This statement consolidates existing guidelines with the aim of providing more 'user-friendly' guidance for researchers and editors.

As research methods become more sophisticated, so too do the methods via which literature analysis can be conducted. The '**RAMESES**' (Realist and Meta-review Evidence Synthesis: Evolving Standards) statement [47,48] was published to provide researchers, institutes and journals with guidance on how to conduct these new forms of literature analysis, and adherence to the guidelines will lead to quality assurance and uniform reporting of studies.

Ensuring consistency is a challenging task, and David Moher explains (Box 5) that journals and editors play a key role in providing peer reviewers and authors with the tools and guidance to ensure that medical research is appropriately reported.

Box 5

David Moher

Ottawa Hospital Research Institute, Canada

To reduce the considerable waste of inadequately published research, medical journals will need to develop long-term innovative strategies, such as developing core competencies for editors and peer reviewers, as well as accreditation programs for journals. More immediately, they can help foster greater implementation of reporting guidelines by facilitating the development of applications that can take manuscript content and automatically populate reporting guideline checklists. Such information can provide immediate feedback about the completeness of reporting of manuscripts to authors, editors and peer reviewers.

We hope you have enjoyed our selection of just some of the most exciting content from *BMC Medicine*, and hope this has prompted you to seek out favorites of your own.

As an open access general medical journal, we aim to promote better informed clinical decisions and improved therapies. We will continue to publish content that has the potential to improve clinical practice, research and reporting. We especially encourage debate on health related issues not just within the clinical community, but also for the general public who should be, after all, the primary beneficiaries of the research.

Competing interests

Both authors are employees of BioMed Central, the publisher of *BMC Medicine*.

Authors' information

Sabina Alam is the Editor of *BMC Medicine*. Jigisha Patel is the Medical Editor at BioMed Central.

Acknowledgements

We thank our academic editorial board and our reviewers for the contribution they have made to the success of *BMC Medicine* and our authors and readers for their ongoing support.

Received: 18 December 2013 Accepted: 18 December 2013

Published: 09 Jan 2014

References

- Collins FS, Green ED, Guttmacher AE, Guyer MS: **A vision for the future of genomics research: a blueprint for the genomic era.** *Nature* 2003, **422**:1–13.
- Tamber PS, Godlee F, Newmark P: **Open access to peer-reviewed research: making it happen.** *Lancet* 2003, **362**:1575–1577.

- Suber P: *Open Access.* Cambridge, MA: MIT Press; 2012.
- BMC Medicine: **Publication and peer review process.** <http://www.biomedcentral.com/bmcmed/about#publication>.
- Godlee F: **Making reviewers visible: openness, accountability, and credit.** *JAMA* 2002, **287**:2762–2765.
- Solomon DJ: **Talking past each other: making sense of the debate over electronic publication.** *First Monday* 2002, **7**. <http://dx.doi.org/10.5210/2Ffm.v7i8.978>.
- Björk B-C, Solomon DJ: **Open access versus subscription journals - a comparison of scientific impact.** *BMC Med* 2012, **10**:73.
- Laakso M, Björk B-C: **Anatomy of open access publishing: a study of longitudinal development and internal structure.** *BMC Med* 2012, **10**:124.
- Journal Citation Reports® 2013 Release. http://wokinfo.com/products_tools/analytical/jcr/.
- Greenhalgh T, Winglehurst D: **Studying technology use as social practice: the untapped potential of ethnography.** *BMC Med* 2011, **9**:45.
- Autier P, Boniol M: **Breast cancer screening: evidence of benefit depends on the method used.** *BMC Med* 2012, **10**:163.
- Puliti D, Zappa M: **Breast cancer screening: are we seeing the benefit?** *BMC Med* 2012, **10**:106.
- Franco R, Saag MS: **When to start antiretroviral therapy: as soon as possible.** *BMC Med* 2013, **11**:147.
- Lundgren JD, Babiker AG, Gordin FM, Borges AH, Neaton JD: **When to start antiretroviral therapy: the need for an evidence base during early HIV infection.** *BMC Med* 2013, **11**:148.
- Nemeroff CB, Weinberger D, Rutter M, MacMillan HL, Bryant RA, Wessely S, Stein DJ, Pariente CM, Seemüller F, Berk M, Malhi GS, Preisig M, Brüne M, Lysaker P: **DSM-5: a collection of psychiatrist views on the changes, controversies, and future directions.** *BMC Med* 2013, **11**:202.
- Timimi FK: **Medicine, morality and health care social media.** *BMC Med* 2012, **10**:83.
- Social media in healthcare.** <http://storify.com/BMCMedicine/draft-storify>.
- The growth of open access journals.** <http://storify.com/BMCMedicine/oaweeek2012>.
- Open access, medical research and global health.** <http://blogs.biomedcentral.com/bmcblog/2013/10/25/open-access-medical-research-and-global-health-a-bmc-medicine-twitter-chat/>.
- BMC Medicine article metrics FAQ.** <http://www.biomedcentral.com/bmcmed/about/articlemetrics>.
- Barnard C: **BMC Medicine's top 10 most accessed articles.** <http://blogs.biomedcentral.com/bmcblog/2013/11/25/bmc-medicines-top-10-most-accessed-articles/>.
- Alam S: **BMC Medicine: our ten most highly cited articles.** <http://blogs.biomedcentral.com/bmcblog/2013/11/26/bmc-medicine-our-10-most-highly-cited-articles/>.
- Denyer J: **Impact of BMC Medicine articles in the news and social media.** <http://blogs.biomedcentral.com/bmcblog/2013/11/27/impact-of-bmc-medicine-articles-in-the-news-and-social-media/>.
- D'Souza U: **BMC Medicine: authors and reviewers experiences.** <http://blogs.biomedcentral.com/bmcblog/2013/11/28/bmc-medicine-authors-and-reviewers-experiences/>.
- Lee L: **Demographics over the past 10 years - where are our authors based?** <http://blogs.biomedcentral.com/bmcblog/2013/11/29/demographics-over-the-past-10-years-where-are-our-authors-based/>.
- Trounson A, Thakar RG, Lomax G, Gibbons D: **Clinical trials for stem cell therapies.** *BMC Med* 2011, **9**:52.
- Politis M, Lindvall O: **Clinical application of stem cell therapy in Parkinson's disease.** *BMC Med* 2012, **10**:1.
- Zhao Y, Jiang Z, Zhao T, Ye M, Hu C, Yin Z, Li H, Zhang Y, Diao Y, Li Y, Chen Y, Sun X, Fisk MB, Skidgel R, Holterman M, Prabhakar B, Mazzone T: **Reversal of type 1 diabetes via islet β cell regeneration following immune modulation by cord blood-derived multipotent stem cells.** *BMC Med* 2012, **10**:3.
- Warren JD, Xiong W, Bunker AM, Vaughn CP, Furtado LV, Roberts WL, Fang JC, Samowitz WS, Heichman KA: **Septin 9 methylated DNA is a sensitive and specific blood test for colorectal cancer.** *BMC Med* 2011, **9**:133.
- Hsu YC, Chen HY, Yuan S, Yu SL, Lin CH, Wu G, Yang PC, Li KC: **Genome-wide analysis of three-way interplay among gene expression, cancer cell invasion and anti-cancer compound sensitivity.** *BMC Med* 2013, **11**:106.
- Brothers JF, Hijazi K, Mascaux C, El-Zein RA, Spitz MR, Spira A: **Bridging the clinical gaps: genetic, epigenetic and transcriptomic biomarkers for the**

- early detection of lung cancer in the post-National Lung Screening Trial era. *BMC Med* 2013, **11**:168.
32. Liu LY, Yang T, Ji J, Wen Q, Morgan AA, Jin B, Chen G, Lyell DJ, Stevenson DK, Ling XB, Butte AJ: **Integrating multiple 'omics' analyses identifies serological protein biomarkers for preeclampsia.** *BMC Med* 2013, **11**:236.
 33. Diamandis EP: **The failure of protein cancer biomarkers to reach the clinic: why, and what can be done to address the problem?** *BMC Med* 2012, **10**:87.
 34. McShane LM, Altman DG, Sauerbrei W, Taube SE, Gion M, Clark GM, Statistics Subcommittee of the NCI-EORTC Working Group on Cancer Diagnostics: **REporting recommendations for tumour MARKer prognostic studies (REMARK).** *Br J Cancer* 2005, **93**:387–391.
 35. Altman DG, McShane LM, Sauerbrei W, Taube SE: **Reporting recommendations for tumor marker prognostic studies (REMARK): explanation and elaboration.** *BMC Med* 2012, **10**:51.
 36. McShane LM, Cavenagh MM, Lively TG, Eberhard DA, Bigbee WL, Williams PM, Mesirov JP, Polley MY, Kim KY, Tricoli JV, Taylor JM, Shuman DJ, Simon RM, Doroshow JH, Conley BA: **Criteria for the use of omics-based predictors in clinical trials.** *Nature* 2013, **502**:317–320.
 37. McShane LM, Cavenagh MM, Lively TG, Eberhard DA, Bigbee WL, Williams PM, Mesirov JP, Polley MY, Kim KY, Tricoli JV, Taylor JM, Shuman DJ, Simon RM, Doroshow JH, Conley BA: **Criteria for the use of omics-based predictors in clinical trials: explanation and elaboration.** *BMC Med* 2013, **11**:220.
 38. Birbeck G: **Medicine for global health: can "simple interventions" improve the worldwide burden of disease?** *BMC Med* 2013, **11**:72.
 39. Birbeck G, Wiysonge CS, Mills EJ, Frenk JJ, Zhou XN, Jha P: **Global health: the importance of evidence-based medicine.** *BMC Med* 2013, **11**:223.
 40. Altamirano-Bustamante MM, Altamirano-Bustamante NF, Lifshitz A, Mora-Magaña I, de Hoyos A, Avila-Osorio MT, Quintana-Vargas S, Aguirre JA, Méndez J, Murata C, Nava-Diosdado R, Martínez-González O, Calleja E, Vargas R, Mejía-Arangure JM, Cortez-Domínguez A, Vedrenne-Gutiérrez F, Sueiras P, Garduño J, Islas-Andrade S, Salamanca F, Kumate-Rodríguez J, Reyes-Fuentes A: **Promoting networks between evidence-based medicine and values-based medicine in continuing medical education.** *BMC Med* 2013, **11**:39.
 41. Jacob ST, Lim M, Banura P, Bhagwanjee S, Bion J, Cheng AC, Cohen H, Farrar J, Gove S, Hopewell P, Moore CC, Roth C, West TE: **Integrating sepsis management recommendations into clinical care guidelines for district hospitals in resource-limited settings: the necessity to augment new guidelines with future research.** *BMC Med* 2013, **11**:107.
 42. Burgess PI, Msukwa G, Beare NA: **Diabetic retinopathy in sub-Saharan Africa: meeting the challenges of an emerging epidemic.** *BMC Med* 2013, **11**:157.
 43. Giordano J: **Ethical considerations in the globalization of medicine - an interview with James Giordano.** *BMC Med* 2013, **11**:69.
 44. Wiysonge CS, Uthman OA, Ndumbe PM, Hussey GD: **A bibliometric analysis of childhood immunization research productivity in Africa since the onset of the Expanded Program on Immunization in 1974.** *BMC Med* 2013, **11**:66.
 45. Schulz KF, Altman DG, Moher D, CONSORT Group: **CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials.** *BMC Med* 2010, **8**:18.
 46. Husereau D, Drummond M, Petrou S, Carswell C, Moher D, Greenberg D, Augustovski F, Briggs AH, Mauskopf J, Loder E, CHEERS Task Force: **Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement.** *BMC Med* 2013, **11**:80.
 47. Wong G, Greenhalgh T, Westhorp G, Buckingham J, Pawson R: **RAMESES publication standards: meta-narrative reviews.** *BMC Med* 2013, **11**:20.
 48. Wong G, Greenhalgh T, Westhorp G, Buckingham J, Pawson R: **RAMESES publication standards: realist syntheses.** *BMC Med* 2013, **11**:21.

10.1186/1741-7015-12-4

Cite this article as: Alam and Patel: *BMC Medicine*: a decade of open access medical research. *BMC Medicine* 2014, **12**:4

Submit your next manuscript to BioMed Central and take full advantage of:

- **Convenient online submission**
- **Thorough peer review**
- **No space constraints or color figure charges**
- **Immediate publication on acceptance**
- **Inclusion in PubMed, CAS, Scopus and Google Scholar**
- **Research which is freely available for redistribution**

Submit your manuscript at
www.biomedcentral.com/submit

