

From Inputs to Impacts: Assessing and Communicating the Full Value of Biomedical Research

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Abstract

Assessing and communicating the full value of biomedical research is essential to answer calls from the government and the public demanding accountability for the spending of public funds. In academic settings, however, research success is measured largely in terms of grant funding received or the number of peer-reviewed publications produced. These credible and time-tested metrics miss the full picture of the scientific process, which continues to confer

benefits to patients, communities, and the health care system well after an article is published. In this context, in 2012, the Association of American Medical Colleges, in collaboration with RAND Europe, initiated a program to provide resources and guidance for leaders of medical schools and teaching hospitals interested in evaluating—in novel ways complementary to traditional methods—the outcomes and impacts of the research that emanates from

their institutions. This Perspective provides context for this initiative and delineates the process through which researchers, evaluation experts, and other stakeholders—including legislators, health system leaders, and community members—identified and vetted novel “metrics that matter” in advance of a pilot test at the University of Wisconsin–Madison, which sought to assess and communicate its community-engaged science and scholarship.

Over 92% of Americans believe it is important for the United States to be the global leader in medical innovation and research, and they credit such research and innovation for improving health, contributing to the economy, advancing new discoveries, and creating jobs.¹ In academic settings, research success is measured largely in terms of the volume of grant funding received or the number of peer-reviewed articles published, which are time-tested and credible academic measures, as they rely, in part, on the peer review process; however, metrics that depend solely on quantifying funding inputs and academic outcomes miss the full picture of the scientific process that continues to confer benefits to patients, communities, policy makers, and the health care system even after an article is published (see Figure 1).

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Acad Med. XXXX;XX:00–00.

First published online

doi: 10.1097/ACM.0000000000001639

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In addition, recent developments require the research community to expand on traditional metrics for assessing the full value of medical research. Such developments include the following:

- the unrelenting growth in health inequities, which while not resolvable by medical research alone, draw attention to the unmet needs of society that would benefit from scientific investigations;
- burgeoning calls from the government for accountability for the spending of public funds on research, especially in light of increasing concerns about global and national political and economic constraints;
- welcomed increased engagement of patients, their families, and patient advocacy groups not only in the conduct of medical research but also in the improvement of its efficiency and impact; and
- the democratization of data through social media.

Heeding these calls, institutional leaders are revisiting both how to assess their investments in medical research and how to communicate the impact of their research to local stakeholders using metrics that matter to groups beyond the academy including, among others, state governors and legislators, boards of directors, community partners,

and patients and their families. The research community has responded to the widespread media calls for additional metrics with both support and wariness.^{2–4} Researchers understand that evaluating medical research is not easy; the methodologies required to do so are complex and necessitate transparent and explicit explanations of the rationale and approaches used to identify, define, and validate outcome measures. They have expressed dismay at what some term the misuse and overuse of the word “impact,”⁴ and they worry about reliance on evaluation methods du jour that are chosen uncritically. Many perceive a lack of appreciation among policy makers and the public of the inevitable time lag for research to lead to improvements in health. Scientists are also concerned about an upwelling of unfunded mandates that create laborious regulations, including unnecessary reporting requirements and often-redundant conflict-of-interest disclosures, which take time and effort for researchers to navigate. Researchers and scientists also startle at calls for a total abandonment of peer review, a foundation at the heart of evaluating research in the United States and worldwide. Still, when compared with the practical, timely, and principled obligations for assessing research, these concerns should not become barriers to engaging in evaluation; rather, they should serve as reminders of landmines

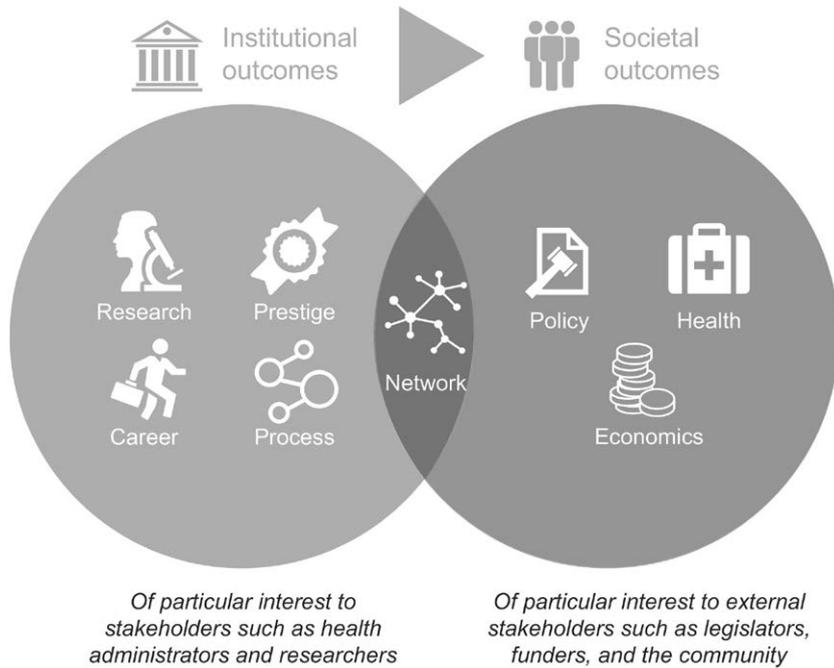


Figure 1 Illustration of the different outcomes that are of interest to different stakeholder groups. The figure, used through an agreement with RAND Europe, first appeared in Guthrie S, Krapels J, Lichten C, Wooding S. 100 Metrics to Assess and Communicate the Value of Biomedical Research: An Ideas Book. Santa Monica, CA: RAND Corporation; 2016. http://www.rand.org/pubs/research_reports/RR1606.html. Accessed January 31, 2017.

to avoid. The savvy use of metrics requires building consensus around a menu of measures that fit the goals, needs, and values of an institution or a specific research program.

In this context, in 2012, the Association of American Medical Colleges (AAMC), in collaboration with RAND Europe, initiated a program to provide resources

and guidance for medical school and teaching hospital leaders interested in evaluating—in novel ways complementary to traditional methods—the outcomes and downstream effects of the research emanating from their institutions. The first stage in this process included a comprehensive review of extant frameworks for research evaluation currently in use around the globe.⁵ The

purpose of the review was to stimulate debate on how research outcomes can be measured in different contexts and to address different needs of various stakeholder audiences, specifically noting that distinct audiences care about distinct outputs, outcomes, and long-term impacts of the research enterprise.

During the second stage of this work, seeking to identify medical research stakeholder groups and the metrics that matter to them, the AAMC convened three expert panels, each representing a distinct area of the research spectrum: (1) basic scientists, (2) clinical outcomes researchers, and (3) community-engaged health equity researchers. The AAMC and RAND Europe asked each group to list whom they considered to be crucial stakeholders for their research. All three panels deemed some stakeholders—institutional leaders and research funders—to be key parties; however, differences also emerged.

While basic scientists identified philanthropic donors, neither of the other two panels listed that group of stakeholders as a core audience. Clinical outcomes researchers were more likely to want to communicate the outcomes of their research to scientists and leaders at other institutions, while health equity researchers more often called out local legislators and community residents as particularly relevant stakeholder groups.

The third stage of the stakeholder and metric identification process involved reaching out directly to members of the identified audiences—local and state legislators, community representatives, health system leaders—both to verify and to add to the list of measures proffered by the expert panels. Charts 1 and 2 present a selection of metrics that appeal to stakeholders both internal and external to academic health centers. The metrics are grouped into domains reflective of the categories identified by the experts and corroborated by stakeholders themselves as important potential areas of impact.

After the completion of Stage 3, the AAMC and RAND Europe felt that showcasing the concrete results of an actual research evaluation, rather than simply providing lists, would be vital. A companion piece to this Perspective (by Guthrie and colleagues⁶) describes the methodologies used and the initial

Chart 1

Research Outcomes of Particular Interest to Internal and Institutional Stakeholders

Research	Career	Prestige	Process	Network
<ul style="list-style-type: none"> Number of journal articles published Number of citations Success rate of grant applications Number and size of grant awards 	<ul style="list-style-type: none"> Number of PhD graduates Five-year career outcomes for PhD students Number of publications per PhD K award (career development) to R award (independent investigator) conversion rate 	<ul style="list-style-type: none"> Number of media appearances Number of editorships of high-profile journals Number and type of prizes Number of applications per open post 	<ul style="list-style-type: none"> Start-up time for clinical trials How decisions are made to apply for grants Average time from funding to publication Number of projects completed within deadline and budget Proportion of funds spent on administration 	<ul style="list-style-type: none"> Number of research projects engaging community partners Number of articles coauthored with community partner Number of collaborations on grant applications Number of staff members engaged in outreach Description of range of collaborations

Chart 2
Research Outcomes of Particular Interest to External Stakeholders

Economic	Policy	Health	Network
<ul style="list-style-type: none"> • Level of local spending • Amount of direct employment • Number of patent applications and awards • Number of patent citations 	<ul style="list-style-type: none"> • Number of citations in clinical guidelines • Number of citations in policy documents • Number of invitations from policy makers • Number of policy secondments 	<ul style="list-style-type: none"> • Narrowing of health/health care disparities • Number of treatments developed in-house • Improved life expectancy of patients • Improved quality of care • Improved awareness of preventive measures in community 	<ul style="list-style-type: none"> • Number of research projects engaging community partners • Number of articles coauthored with community partner(s) • Number of collaborations on grant applications • Number of staff members engaged in research

results of a research evaluation pilot at the University of Wisconsin–Madison (UWM) to document important short-, medium-, and long-term outcomes of its community-engaged research and scholarship. UWM researchers and leaders selected the following measures to consider: (1) metrics related to its health equity and community-engaged research training programs; (2) the academic outputs of UWM health equity scientists; and (3) community- and population-level effects related to the reach of UWM’s health-equity-related research, its impact on community partners, and its estimated effect on local community economic outcomes.

Results indicate that, over the five-year period (2010–2015), community-engaged scientists and trainees at UWM have begun to outpace the world average for relative citations of their scholarly output while simultaneously increasing research collaborations both within and beyond the university.⁶ Additionally, UWM’s community-based partners agree that these research collaborations have increased community members’ research skills, ability to understand data, and capacity to advocate effectively on their own behalf. While the evaluation estimates that over 275,000 community residents have been “touched” by UWM’s community-focused research efforts (e.g., as formal research partners, as research participants, or as members of a community impacted by UWM research), the quantifying of metrics focused on health impacts attributable

directly to UWM’s community-engaged science and scholarship has presented challenges. Some of the challenges are due to historical confounding resulting from policies or community health improvement activities implemented concomitantly with UMW research that make the unique effects of said research difficult to isolate.⁶

The lessons learned through development of these novel metrics bring into high relief challenges institutions will face as they embark upon their own research evaluations: current data collection might not support the calculation of some metrics that matter; certain measures are predicated on a series of assumptions for which corroborating information might not be available (e.g., the cost savings resulting from obesity averted); and a comparison group will not be readily available unless other institutions adopt comparable metrics. Furthermore, institutions with minimal experience in evaluation science and methods, or those without staff dedicated to such efforts, will not be easily able to use the tools we have developed and described.

Despite these potential barriers, the results of the UWM pilot not only demonstrate that research evaluation is possible but also provide a more holistic view of the many ways in which research benefits institutions, learners, communities, and the country. The next challenge for UWM—and for other institutions that undertake such research evaluation efforts—will be

to communicate the results of these assessments to their target audiences as a means to increase support for biomedical research locally and more broadly.

As additional institutions explore assessing and communicating the value of their research in new and powerful ways, current stressors on the research enterprise—that is, calls for accountability, fiscal concerns regarding investments in research, ongoing inequity—can be better addressed and potentially assuaged. Academic health centers and the AAMC are committed to improving the lives of all through research. Now we have the tools to show—to everyone for whom it matters—all the ways in which we are living up to that promise.

Acknowledgments: None reported.

Funding/Support: None reported.

Other disclosures: None reported.

Ethical approval: The work presented in this Perspective was determined to be exempt from human subjects review by the human subjects administrator of the Association of American Medical Colleges on March 13, 2014.

Previous presentations: The figure, used through an agreement with RAND Europe, first appeared in Guthrie S, Krapels J, Lichten C, Wooding S. 100 Metrics to Assess and Communicate the Value of Biomedical Research: An Ideas Book. Santa Monica, CA: RAND Corporation; 2016. http://www.rand.org/pubs/research_reports/RR1606.html. Accessed January 31, 2017.

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