

COMMENTARY

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Lost in translation: barriers and progress in harnessing basic medical science into community practice in Indonesia

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Abstract

Translational research carries over fundamental laboratory research findings into clinical and community settings in order to 'translate' the findings into practice. In addition to its potential in accelerating the time of basic discoveries to be delivered into the population, translational studies also provide opportunities for interdisciplinary collaborations in identifying knowledge gaps. However, several issues hindering the advancement of translational research studies have risen in developing countries, such as limited funding, insufficient research evaluation and recognition, absence of government model or consortium, and insufficient communication among researchers and stakeholders. While the original concept of the 'bench to bedside' has been known for years, the practice of bilateral flow from bench to bedside, and back to the bench was found lacking. Lack of interactions and involvement of the clinicians, community and resources further deplete translational ability of the research itself. Without understanding the priorities and the environment in which the decision makers work, specific research aims needed by the communities may be failed to be formulated and may result in devaluation of research by formulating similar key questions repetitively. The current commentary aimed to highlight the importance of connecting population health systems, basic demands, and academic institutions, to own the issues, to address the issues, and to translate research findings.

Keywords: Translational research, Barriers, Progress, Community needs, Indonesia

In the context of medical science, growing interest in basic medical research aims to achieve major medical advances, including creating new drug discoveries, diagnostic tools, as well as disease modeling. The term 'translational research' carries over these fundamental laboratory research findings into clinical and community settings through another research effort in order to 'translate' the findings into practice, resulting in substantial health outcomes. In recent years, scientists have been exploring more translational research works, possibly through clinical trials and modeling in several fields, one of which being infectious disease. One of the

major drives being the political push from both research funders and the government to focus on the translational research prospective of the researchers' current work. In addition to its potential in accelerating the time of basic discoveries to be delivered into clinical and community settings, translational studies also provide opportunities for interdisciplinary collaborations, which will gather new insights from other fields of expertise that will be utmost beneficial in identifying knowledge gaps, hence opening up new research opportunities. Translational studies in infectious diseases have been more commonly performed in developing countries as well, including in Indonesia. The concept of translational research has been brought to light among Indonesian academics since over 10 years ago, as evidenced by the formulation of multidisciplinary consortiums in

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collaborative translational research, as well as promotion of specific-themed academic journals as media in translational research dissemination. During these years, however, the employment of 'translating' basic research was held back by multiple factors, hence lost in translation.

There are several issues hindering the advancement of translational research studies in developing countries. These include limited funding, insufficient research evaluation and recognition, absence of government model or consortium of research, and insufficient communication among researchers and stakeholders [1, 2]. Limited funding is a principal barrier in both performing and implementing translational research [3]. As translational research is mostly expensive, multiple sources of funding is needed. These include governmental health agencies, private foundations, and self-funding [2]. In most countries, medical scientists rely mainly on the funding source given by the government, either annually or biannually [4]. Nevertheless, the reliance on this funding source has led to uncertainty in funding patterns due to national financial stress, or even fierce competition for annual appropriations. Typically, Indonesian researchers have had to rely on yearly funding from the annual national budget, which invests only 0.08% of the country's gross domestic product in scientific research [5]. As a result, a number of research work by Indonesian researchers that relied solely on the annual national budget were poor in quality. In this context, the government is required to modify their thoughts on the long-term investment in a more stable research funding, as advances in health research may produce vital intellectual capital infrastructure that will be crucial stimuli for both economic and social prosperity in the future [4]. Moreover, finding collaborators has also been also a challenge, as unfamiliar fields of expertise may present significant obstacles to the initial proposed area of research. The long time periods and costs necessary for development and approval of new medical discoveries have negatively affected basic research and development. Funding translational studies should never replace funding for basic medical research, but rather needs to operate in parallel. Whenever appropriate, funding for translational research may be engaged from budgeting for basic medical research, as they share similar ultimate goals. Additionally, governments and independent organizations are required to develop interdisciplinary collaborative centers to promote more funding for translational studies.

A number of research initiatives have been established to fund innovations to speed up the translation from basic to practice, including the Clinical and Translational Science Awards (CTSA) and the National Institutes of Health (NIH) in the US, the Medical Research Council (MRC) and the National Institute of Health

Research (NIHR) in the UK, and many more [6, 7]. In less than 10 years ago, the Indonesia Endowment Fund for Education (*Lembaga Pengelola Dana Pendidikan*, known as LPDP) of Indonesia launched the Productive and Innovative Research Funding (RISPRO) to accelerate the national invention through research collaborations [8]. This has marked a shift in research funding scheme toward broader, interdisciplinary context. In high-income countries, public and philanthropic funding organizations play a vital role in health research [9], while in low- to middle-income countries, medical crowdfunding for research is growing in the light of increasing difficulties in getting research funding through customary channels [10, 11]. Through crowdfunding, early-career researchers may benefit in initiating translational medical research or health-related innovations that can fulfill the bench-to-bedside knowledge gap ("crowding the gap") in order to reduce health disparities while promoting social engagement in philanthropy [11, 12]. Although it may sound promising, crowdfunding for medical research has its own challenges, including difficulty in assessing the research proposals and non-tangible research outputs [10].

While it is important that researchers propose funding and establish collaborations with multiple sectors of expertise for their basic research projects, more work needs to be done to support translational studies for these promising discoveries to be recognized in the society. Thus, greater access to translational expertise for broader communities including industries and stakeholders will benefit the research project itself. In order to develop a well-established research network and community recognition, Indonesian government and the US has established the Indonesia Research Partnership on Infectious Disease (INA-RESPOND) to translate basic research into clinical practice particularly in the field of infectious diseases [13]. However, key questions chosen by researchers may not always align with the priorities of the decision makers, and that research findings are not always presented relevantly to the current condition. Thus, it is imperative that translational research be evaluated thoroughly, particularly in terms of timeline synchronicity of basic medical research with the proposed implementation goals. The evaluation should include research starting point and endpoint, what is being translated, and whether the research is a bridging process or a continuous one as a multiphase process or a series of interventions. Looking at translational research as an endpoint is the complete opposite of looking at research translation as the input to the work of improving population health [1]. The absence of research governance or consortium also plays a role in hindering acceleration of research translation into practice [6]. By formulating good research governance or research consortium, fellow

researchers will be able to interact with their peers to promote their critical research expertise, which will lead to matchmaking of potential research collaborations.

It is increasingly clear that employing new knowledge in community settings requires interdisciplinary collaborations from various sectors. In the early phase, insufficient communication between basic and clinical or field researchers or practicing physicians serves as principal barrier in translational studies, and removal of this communication barrier can initiate more rapid translation of information from basic science into useful applications. It is imperative to understand that the scientific research team should act as a continuum rather than separate entities of basic scientists, clinical and public health researchers. A number of practicing physicians are often unfamiliar with research techniques and infrastructure, hence creating substantial communication gaps in 'reverse translation' to basic researchers. On the other hand, basic medical scientists might have felt that lack of knowledge and experience in commercializing their research products served as a barrier to research translation into clinical practice [6, 14]. This needs to be addressed by practicing self- and team-awareness, particularly in understanding each other's capacities and building trust, so that synchronicity between the team goals and individual aspirations from both basic and clinical researchers is met [15]. In the context of team development, Indonesian researchers are generally lacking the skills as they mostly work according to their individual expertise, hence mutual understanding is hardly achieved. The question "what's in it for me" chiefly affected individual perspectives in their performance in a research team, as one might have been reluctant to contribute in the teamwork because the effort will only assist his professional career development the least [15]. Similar issues will be encountered during the implementation of basic research in the community, the phase of which involves broader sectors of community, including the government and the community themselves. Potential public backlash was observed in several countries where the basic researchers intended to release genetically modified mosquitoes to reduce transmission of dengue and malaria, showing the importance of community engagement [16, 17]. The deployment triggered safety concerns and from the government and the community, as well as cross-border issues. However, community acceptance was shown in a study regarding the release of *Wolbachia*-infected mosquitoes in Indonesia, showing good communication among the researchers, stakeholders, and communities [18].

Originally, the concept of translational research in medical science, or translational medicine, emphasized on translating laboratory discoveries into practical clinical applications that would benefit the patient, or more

commonly called as the 'bench to bedside' concept. This one-way research concept mainly focuses on laboratory (bench) research while missing important feedback from practitioners (bedside). This resulted in the inability to redefine or create new hypotheses for innovative research efforts due to lack of returning information from the clinical findings to research laboratories. Until recently, the European Society for Translational Medicine (EUSTM) proposed a new concept of translational medicine that involves three principal pillars: bench, bedside and community [19]. The community may provide valuable inputs to researchers, hence validating and enhancing implemented research outcomes, as well as giving general background on current public health conditions, all of which can benefit in framing novel hypotheses. The community is a vital entity in engaging certain groups in the government or public bodies in accordance with formulation of new policies regarding implementation of translational research [20, 21].

Indonesia has been putting more effort in research governance by integrating health research activities into its national agenda. These include putting health research as a part of the national health system, as well as community involvement in translational research. One of the major responses was the deployment of the Indonesian Science Fund (ISF) back in 2016 to boost investment in research and to improve quality of research. Nevertheless, a number of roadblocks persist. Indonesia's diverse geography and culture, decentralized health system, and variation in population health profile and disease endemicity, all of which makes vigorous effort needed to address major health issues. As the community is a key stakeholder in translational research, it is essential to engage community trust, to ensure acceptance of research results dissemination. In regards to translational research, sociocultural factors are the principal barrier in implementation of new policy in the community. A number of molecular epidemiology studies in infectious disease might have demonstrated inapplicability of their results in the general community, showing only population-specific results [22, 23]. Furthermore, the results of molecular epidemiology studies may not be relevantly aligned with the current issue faced by Indonesian government, and the results may not be applicable anymore by the time the government needs it in many years to come. While earlier study suggested that it took an average of 17 years for research evidence to reach clinical practice at a rate of 50% use in relevant population [24], aiming for more generalisable applicability and community for translational research implementation becomes a priority. However, decreasing the quality of basic medical research in order to reduce the cost and temporality of research, or to simply adjust the preference of practicing physicians and stakeholders

may only confound transformative discoveries, which would further deplete the translational concept of the research [25].

Lack of interactions and involvement of the community and resources further deplete translational ability of the research itself. Indonesian researchers along with the government have attempted various practices in 'translating' research findings into practice through establishment of funding bodies and collaborative research consortiums. In practice, however, research funding seemed to be unequally distributed and subjects involved in translational research were greatly affected by individual interests. Without understanding the priorities and the environment in which the decision makers work, specific research aims needed by the communities may be failed to be formulated. This may result in devaluation of research, formulating similar key questions repetitively. Additionally, the vital foundation of research translation is representing vulnerable populations who are most directly affected by the health problems. These community members possess useful hints of knowledge regarding the needs of a particular group, or the community itself. Lastly, getting the community to be engaged in research is not the main issue in translational research, but it is how researchers can become engaged in the community, making their work more relevant to the stakeholders to improve public health. It is of utmost importance that connecting the components of community including health systems, community members, basic needs, and academic institutions, to own the issues, to address the issues, and to translate research findings.

Abbreviations

CTSA: Clinical and Translational Science Awards; EUSTM: European Society for Translational Medicine; ISF: Indonesian Science Fund; LPDP: *Lembaga Pengelola Dana Pendidikan* (Indonesia Endowment Fund for Education); MRC: Medical Research Council; NIH: National Institutes of Health; NIHR: National Institute of Health Research; RISPRO: Productive and Innovative Research Funding

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Authors' contributions

AD conceived the study and wrote the original draft of the manuscript. MH conceived the study and finalized the manuscript. All authors have read and approved the final manuscript.

Authors' information

AD is both lecturer and translational researcher in the field of infectious disease. MH is a translational researcher and an expert in population-based health studies.

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Competing interests

AD and MH declare that they have no competing interests.

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References

1. Woolf SH, Purnell JQ, Simon SM, Zimmerman EB, Camberos GJ, Haley A, et al. Translating evidence into population health improvement: strategies and barriers. *Annu Rev Public Health*. 2015;36(1):463–82.
2. Pober JS, Neuhauser CS, Pober JM. Obstacles facing translational research in academic medical centers. *FASEB J*. 2001;15(13):2303–13.
3. Better support translational research. *Nat Microbiol*. 2017;2(10):1333.
4. Klein R. A new paradigm for funding medical research. *Stem Cells Transl Med*. 2012;1(1):3–5.
5. World Bank. Indonesia: research & development financing. Jakarta: The World Bank Office Jakarta; 2013.
6. Fudge N, Sadler E, Fisher HR, Maher J, Wolfe CDA, McKeivitt C. Optimising translational research opportunities: a systematic review and narrative synthesis of basic and clinician scientists' perspectives of factors which enable or hinder translational research. *PLoS One*. 2016;11(8):e0160475.
7. Homer-Vanniasinkam S, Tsui J. The continuing challenges of translational research: clinician-scientists' perspective. *Cardiol Res Pract*. 2012;2012: 246710.
8. LPDP (Indonesia Endowment Fund for Education). Productive and Innovative Research Funding (RISPRO) [cited 17 September 2020]. Available from: <https://www.lpd.kemenuke.go.id/in/page/riset-inovatif-produktif>.
9. Røttingen JA, Regmi S, Eide M, Young AJ, Viergever RF, Ardal C, et al. Mapping of available health research and development data: what's there, what's missing, and what role is there for a global observatory? *Lancet*. 2013;382(9900):1286–307.
10. Sauermaun H, Franzoni C, Shafi K. Crowdfunding scientific research: descriptive insights and correlates of funding success. *PLoS One*. 2019;14(1): e0208384.
11. Jin P. Medical crowdfunding in China: empirics and ethics. *J Med Ethics*. 2019;45(8):538–44.
12. Kenworthy NJ. Crowdfunding and global health disparities: an exploratory conceptual and empirical analysis. *Glob Health*. 2019;15(1):71.
13. Karyana M, Kosasih H, Samaan G, Tjitra E, Aman AT, Alisjahbana B, et al. INARESPOND: a multi-Centre clinical research network in Indonesia. *Health Res Policy Syst*. 2015;13:34.
14. Morgan M, Barry CA, Donovan JL, Sandall J, Wolfe CDA, Boaz A. Implementing 'translational' biomedical research: convergence and divergence among clinical and basic scientists. *Soc Sci Med*. 2011;73(7):945–52.
15. Bennett LM, Gadlin H. Collaboration and team science: from theory to practice. *J Investig Med*. 2012;60(5):768–75.
16. Okorie PN, Marshall JM, Akpa OM, Ademowo OG. Perceptions and recommendations by scientists for a potential release of genetically modified mosquitoes in Nigeria. *Malar J*. 2014;13(1):154.
17. Subramaniam TSS, Lee HL, Ahmad NW, Murad S. Genetically modified mosquito: the Malaysian public engagement experience. *Biotechnol J*. 2012; 7(11):1323–7.
18. Anders KL, Indriani C, Ahmad RA, Tantowijoyo W, Arguni E, Andari B, et al. The AWED trial (applying Wolbachia to eliminate dengue) to assess the efficacy of Wolbachia-infected mosquito deployments to reduce dengue incidence in Yogyakarta, Indonesia: study protocol for a cluster randomised controlled trial. *Trials*. 2018;19(1):302.

19. Cohrs RJ, Martin T, Ghahramani P, Bidaut L, Higgins PJ, Shahzad A. Translational medicine definition by the European Society for Translational Medicine. *New Horiz Transl Med*. 2015;2(3):86–8.
20. Eder MM, Evans E, Funes M, Hong H, Reuter K, Ahmed S, et al. Defining and measuring community engagement and community-engaged research: clinical and translational science institutional practices. *Prog Community Health Partnersh*. 2018;12(2):145–56.
21. Hebert JR, Brandt HM, Amstead CA, Adams SA, Steck SE. Interdisciplinary, translational, and community-based participatory research: finding a common language to improve cancer research. *Cancer Epidemiol Biomark Prev*. 2009;18(4):1213–7.
22. Pava Z, Noviyanti R, Handayuni I, Trimarsanto H, Trianty L, Burdam FH, et al. Genetic micro-epidemiology of malaria in Papua Indonesia: Extensive *P. vivax* diversity and a distinct subpopulation of asymptomatic *P. falciparum* infections. *PLoS One*. 2017;12(5):e0177445.
23. Sasmono RT, Taurel AF, Prayitno A, Sitompul H, Yohan B, Hayati RF, et al. Dengue virus serotype distribution based on serological evidence in pediatric urban population in Indonesia. *PLoS Negl Trop Dis*. 2018;12(6):e0006616.
24. Balas EA, Boren SA. Managing clinical knowledge for health care improvement. *Yearb Med Inform*. 2000;1:65–70.
25. Berglund L, Tarantal A. Strategies for innovation and interdisciplinary translational research: removal of barriers through the CTSA mechanism. *J Investig Med*. 2009;57(2):474–6.

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