

PROJECT REPORT

T-REC: Strengthening capacity for blood transfusion research in Ghana and Zimbabwe

Alison Dunn¹, Daniel Ansong², David Mvere³, Justina Ansah⁴, Shirley Owusu-Ofori⁵, Exnevia Gomo⁶, Imelda Bates⁷

1. Alison Dunn is T-REC Communications Officer at Liverpool School of Tropical Medicine (LSTM).
2. Daniel Ansong is Senior Lecturer in the Department of Child Health, School of Medical Sciences, Kwame Nkrumah University of Science & Technology, Ghana.
3. David Mvere is Chief Executive Officer of the National Blood Service Zimbabwe.
4. Justina Ansah is National Director of the Ghana National Blood Service and Principal Investigator for T-REC Ghana.
5. Shirley Owusu-Ofori is Head of Transfusion Medicine Unit, Komfo Anokye Teaching Hospital, Kumasi and Deputy Principal Investigator for T-REC Ghana.
6. Exnevia Gomo is an Immunologist at the University of Zimbabwe.
7. Imelda Bates is Professor in Tropical Haematology and Head of International Public Health at LSTM.

CORRESPONDANT

Imelda Bates

LSTM, Pembroke Place, Liverpool, L3 5QA

Tel: +44 (0)151 705 3115

Email: ibates@liverpool.ac.uk

KEYWORDS

Blood transfusion, research, capacity strengthening, Africa

ABSTRACT

Without home-grown expertise to initiate and carry out high-quality research, the capacity of blood transfusion services in sub-Saharan Africa to produce context-specific evidence to inform policy and practice is limited. Since 2011, the T-REC consortium of academics and health service practitioners and policy makers has been collaborating to bring academic rigour and research expertise into the transfusion services in Ghana and Zimbabwe, equipping individuals with research skills while strengthening research systems within transfusion services.

T-REC provides funding and support for PhD students undertaking research addressing the highest priority needs of the transfusion services, a Professional Diploma course in Project Design and Management to build the competence and confidence of health service professionals in research and drive the development of institutional research systems, and bursaries allowing university students and their supervisors to explore the wealth of opportunities for research that is available within the transfusion service.

This article provides an update on the project to date, and illustrates its successes and challenges with reference to some of the students, courses and institutions involved.

The range of projects successfully undertaken within T-REC suggests that the lack of research funding opportunities targeted specifically towards blood transfusion should and can be addressed. Future research collaborations beyond the time span of the project should be promoted between transfusion services and academic institutions to strengthen the research ethos and put sustainable structures and systems in place.

INTRODUCTION

A critical deficit in the capacity of transfusion services in sub-Saharan Africa (SSA) to initiate and carry out high-quality research was identified by participants at a pan-Africa meeting in 2008 in Mombasa. The meeting participants, who included transfusion service policy makers, managers, users and researchers, emphasised that strengthening this capacity was a top priority for the region because without this expertise it would be difficult to generate much-needed evidence to guide blood transfusion policies and practices in SSA. Almost all the evidence used to formulate transfusion policies in SSA has been generated in wealthy countries and therefore does not take account of the challenges faced by transfusion services in SSA, such as unreliable electricity supply, poor road networks and the high prevalence of transfusion-transmitted infections (including malaria). Context-specific evidence produced by home-grown researchers is therefore essential to inform transfusion policies and practices that meet the needs of SSA.

Following the Mombasa meeting, the European Commission funded a four-year Transfusion Research Capacity Strengthening project (T-REC 2011-2015) to bring together academics and transfusion practitioners from Africa and Europe to improve blood transfusion research skills in SSA. Recent evidence on how to strengthen research capacity effectively stresses the need to look beyond the individual to include the institution and the national and international networks within which it operates. This is because individuals do not work in a vacuum; their skills and how they use them are strongly influenced by institutional and supra-institutional factors. In designing the T-REC project, we therefore took a broad view of capacity strengthening as a process of improving individual skills, processes and structures at the institutional level, and the networks and context in which transfusion institutions function.

At the individual level T-REC is equipping students and individuals from transfusion services with research skills, while at institutional level it is strengthening research systems within transfusion services in Ghana and Zimbabwe. At international level, T-REC brings academics from universities in Ghana, Zimbabwe, Denmark and the Netherlands together with transfusion service professionals and policy makers, with the project being managed by the Liverpool School of Tropical Medicine (LSTM) in the UK. Annual face-to-face meetings of all the partners are organised to coincide with meetings of the International Society for Blood Transfusion (ISBT) or the African Society for Blood Transfusion (AfsBT).

The T-REC vision is that the new collaborations with academic institutions will bring academic rigour and research expertise into the transfusion services, and that academics will benefit by having access to the rich research opportunities and data within the transfusion services. Close collaboration between transfusion service managers, policy makers and researchers at all stages of the programme will ensure that the research meets local needs, that newly strengthened research capacity is sustainable, and that research outputs are used to influence policy and practice.

The purpose of this paper is to describe the design and results of the T-REC project so far, and to explain how the design is informed by evidence about effective capacity strengthening. The challenges encountered and lessons learnt are illustrated through the perspectives of different partners, and it is intended that this paper could inform future similar initiatives.

METHODS

T-REC has three main components, each led by one of the African partners. The European partners provide support as research facilitators, mentors and programme coordinators. To build research capacity in any organisation, it is necessary not just to focus on enhancing the most sophisticated research skills (for example, doctoral training) but also to include research training for more junior postgraduates and undergraduates, who are essential to feed the researcher 'pipeline'. While these may have been exposed to research methods and findings, they are unlikely to have the skills to design and conduct a programme of their own. Each of T-REC's three pillars is focussed on enhancing research skills of different cadres, while each has a different purpose. The three components are as follows:

1. Funding for four PhD students - to generate internationally competitive transfusion research and to become transfusion research leaders in Africa. Each PhD student has supervisors from both Africa and Europe. Research topics are in line with pre-defined research priorities for SSA transfusion services. A medical practitioner, for example, is researching strategies to encourage repeat blood donations among first-time voluntary and replacement donors. This should help determine the predictors of intention and donor return, and examine how they influence one another. A biomedical scientist chose his research topic in response to a recent case of transfusion-transmitted syphilis in a child in Ghana.⁴ T-REC has provided an opportunity to conduct research into ways of preventing this neglected but re-emerging disease. The increasing prevalence of HIV in new blood donors prompted research into risk-mitigation of blood safety in Zimbabwe. It will address how low-risk populations can be identified and motivated to donate blood, and calculate the residual risk of HIV and Hepatitis B and C transmission. The current policy of not using first-time donor blood will also be scrutinised for cost effectiveness. The health economics of blood and blood products underpins a review and analysis of reports of clinical transfusion reactions, donor records and patient medical records. It will contribute to the design of policies which ensure a cost-effective and sustainable transfusion service, and help identify and quantify the risk associated with blood transfusion.
2. Research skills training for 42 professionals working in the transfusion service—to provide them with practical experience of generating, planning and conducting their own research project. A successful Professional Diploma course in Project Design and Management (DPDM) has been running for several years in Kumasi, Ghana. Through T-REC, this one-year, part-time professional diploma has been extended to sites in Accra, Ghana and Harare, Zimbabwe and opened up to carefully selected transfusion service staff. Research capacity building for health professionals is important if clinicians are to be capable of completing their fellowship programme. This requires a dissertation and, in our experience, DPDM graduates are able to satisfactorily complete this component because they understand the research process and they have the confidence to undertake it. The course is very effective at not only building competence and confidence of individuals in research⁵, but also for driving the development of institutional research systems (e.g. dedicated research budgets, research management units, research supervision expertise).⁶ The more health professionals there are on the wards who understand the research process, the better the research output is likely to be and the more impact it will have.

DPDM was developed in 2002 through a partnership with the Kwame Nkrumah University of Science and Technology, KomfoAnokye Teaching Hospital and the Liverpool School of Tropical Medicine, which awards the diploma. It therefore meets UK quality standards while enabling participants from health-related professions to undertake their own research project without leaving their workplace. The association with LSTM provides an added incentive by giving credibility to individuals, allowing them to secure scholarships and opportunities to study for Master's degrees. DPDM is based on the principle of learning by doing, and of benefitting from the learning of others through peer support. The course is punctuated by four workshops and a data-collection period of eight to twelve weeks. Because the participants are mature learners, the sessions use facilitated discussions rather than traditional lectures. *The four workshops cover the following aspects:*

- Research methodologies, ethics approval processes, reflective writing on what research skills they are learning and how they learnt them, proposal writing and budgeting
- Data management and data collection skills, preparation of data collection tools for their projects (e.g. questionnaires)
- Analysis, interpretation and presentation of data
- Project report writing (including recommendations and referencing).

There are three assignments (submitted electronically) for the course, and the examinations are overseen by an LSTM examinations board and externally appointed examiner. DPDM is open to all health professionals at the hospital and blood transfusion service, be they clinician or doctor, nurse, laboratory technician or technologist, or staff in hospital administration and finance, data management and information systems. Here, many of the T-REC DPDM projects are clinical or laboratory-based, but some participants have explored topics such as the attitudes of donors to replacement donation, or the fall-off in repeat donations. A good example is a DPDM study on sharps injuries to health professionals. Following the research report, there has been widespread promotion of the use of yellow boxes, sharps disposal programmes and the training of health staff on to manage sharps.

3. Bursaries for sixty undergraduate and Master's students- to undertake short projects on transfusion-related topics. These bursaries expose students and their university supervisors to the wealth of opportunities for research that is available within the transfusion service with the aim of promoting future research collaborations between the transfusion services and academic institutions. The importance of involving policy makers and practitioners in deciding the research priorities, in utilising the outputs of research and in the actual process of doing research is often neglected in capacity strengthening projects, but is critical if the research generated through T-REC is to impact on practice and policy. An essential part of the project was therefore promotion of research as a mainstream activity of the transfusion services, and included close involvement of transfusion service directors and senior managers in deciding on the research topics undertaken by students. We recognised that it would not be possible to create completely sustainable transfusion research systems and expertise within the four-year timescale, but we did incorporate monitoring indicators into T-REC that are associated with a high likelihood of sustainability. Such indicators included incorporation of research activities into transfusion service strategies, workplans and budgets, acquisition of additional non-T-REC research funding, and evidence that the research has influenced policy and/or practice.^{7,8}

RESULTS

T-REC started in April 2011 and the internal management processes (such as quarterly reporting on budgets and progress) are well established and running smoothly. There was a steep initial learning curve for all partners, but particularly for those from Africa who had no previous experience of working on projects funded by the European Union (EU). The stringent regulations concerning, for example, completion of timesheets by all staff and the need for 'third-party agreements' with associated institutions (such as universities) were particularly challenging. Regular teleconferences and Skype calls between the UK project administrators and partners were essential for clarifying the processes, and for trouble-shooting. Similarly, training sessions on financial management held during the annual meetings proved invaluable.

Research skills training for individuals

- **PhD scholarships**

Two students in each of Ghana and Zimbabwe were selected through a competitive process by a panel of academics and transfusion service directors to undertake PhD programmes. Although initial delays were experienced by some students in the registration process and in obtaining ethical approval to undertake their research, all now have well developed protocols. They communicate regularly with their local and overseas supervisors, and have undergone short periods of training in the EU. They all presented papers at international transfusion conferences in 2012 (AfSBT, Mauritius) and in 2013 (ISBT, Amsterdam) and have given national-level academic talks in Ghana, Zimbabwe, Denmark and the Netherlands. Two papers have been published⁹ or submitted for publication in peer-reviewed international journals, and some of the research results (for example, those concerning ways of reducing transfusion reactions) have already been incorporated into staff training programmes.

- **Research skills course for transfusion service professionals**

Individuals from the transfusion services in Ghana and Zimbabwe undergo a competitive selection process before being enrolled on the DPDM course. While the course qualification is awarded by the Liverpool School of Tropical Medicine, the course is run entirely by the Ghanaian DPDM faculty in Kumasi. Originally, facilitators from LSTM taught DPDM but within four years, colleagues from Kumasi were completely responsible for its delivery. The course has now been extended to two other sites in Accra (37 Military Hospital) and Harare (National Blood Service Zimbabwe, NBSZ), where Kumasi facilitators support local colleagues in its delivery and administration. Within the next two years, T-REC aims to ensure that DPDM in Harare will be administered and taught entirely by local personnel, with programme co-ordination from the team in Kumasi, Ghana and quality oversight from LSTM. The sustainable business model shown to work in Kumasi (whereby the costs of the course are shared between the students and their institutions) has been introduced in the new sites to ensure that the course is not dependent on T-REC in the long term. By the end of the programme, at least 42 employees will have benefited from direct sponsorship through T-REC, and the transfusion services themselves will have supported others.

As with the PhD students, there were some delays in the ethical approval process for research projects. Nevertheless, as a result of T-REC, one of the new sites is establishing its own ethical review board, and the other has forged new and streamlined relationships with their local national ethics board.

It is expected that this will simplify future transfusion-related research applications. Other difficulties faced by the new sites included a lack of research supervisors, a lack of individuals with pedagogical skills to manage the facilitation-based learning demanded of the DPDM course, and the need to train those marking assignments to ensure they comply with the quality assurance requirements of the awarding institution in the UK. Sustainable solutions to all these issues have been achieved with support from the Ghanaian faculty members and an education expert employed through T-REC.

Examples of project topics covered by DPDM students include accessibility of data management systems, availability of blood in rural areas, inventory management, and use of anti-D immunoglobulin. Research on transfusion reactions and factors influencing recruitment and retention of blood donors is already being used to train doctors and medical laboratory scientists on standards for blood transfusion in Zimbabwe.

- **Student bursaries**

So far, 16 student bursaries have been awarded in Ghana through a competitive process involving 26 applicants. The students are predominantly from clinical and laboratory science degree programmes, and their supervision is provided by local university staff (with transfusion staff involved in providing advice on project topics, access to data and transfusion service facilities). Projects have covered a wide range of topics from donor-motivating factors (including superstition and awareness-raising), haemoglobinopathies and enzymopathies in donors, to the risk of infection with filariasis, serological complications, the use of platelets and more effective ways to monitor blood stocks.

- **Institutional systems**

Involvement of senior transfusion service managers in determining students' research topics ensured that any research undertaken in T-REC was in line with the highest priority needs of the transfusion services. Rapid uptake of research results was promoted by setting up a panel in each transfusion service with representatives from higher education and transfusion services. As a result of the new and active research culture within the transfusion services and the introduction of research 'role models', demand for places on the research training programmes has increased. Furthermore, regular research seminars have been established in the transfusion services in order to showcase and discuss research findings.

Closer ties between the transfusion services in Ghana and Zimbabwe as a result of the T-REC programme are illustrated by the creation of joint reports for the EU and by sharing documentation concerning research policies. NBSZ enhanced its own research framework by integrating T-REC into some aspects of its research strategy, although its own research strategy remains the guiding policy for all research that the service does. NBSZ has an organogram which already includes a research unit and has recently updated its research strategy, with researchers from T-REC (including PhD students, DPDM candidates, and bursary students) now represented on its research committee. Ghana's National Blood Service (GNBS) is currently revising its organogram to incorporate a research unit, which it plans to establish in new premises to be occupied in late 2013.

Participating in T-REC has also meant that key resource people (such as supervisors from Universities in the Netherlands, Denmark and the UK) are available to provide additional support. Some of these academics are now research fellows to the blood service, and are more likely to collaborate with them in the future on an area of research most relevant to the local context. Through T-REC, a channel has been created enabling NBSZ to provide advice to the national blood service in Ghana on transfusion research frameworks as the country begins to develop and implement its own new research unit.

- **International research networks**

Holding annual face-to-face T-REC management meetings in association with meetings of the ISBT or AfSBT enabled programme managers, researchers and students to share their experiences with others working in transfusion services, to present their research and attend sessions at the meeting, and to exploit opportunities for networking. The open session hosted by T-REC at the 2012 AfSBT meeting (which focused on gauging interest in a pan-Africa research network) generated a database of those interested or active in transfusion research in SSA. Management of this now expanding network will gradually be transferred from T-REC to AfSBT in order to facilitate its sustainability. As a result of fostering a close working relationship between the transfusion services and academic departments, arrangements are now in place for research results emanating from T-REC to be presented at events hosted by both universities and transfusion services.

DISCUSSION

This paper outlines the way in which the T-REC project was conceived and designed, its achievements so far, and some of the key lessons learnt. The need to strengthen transfusion research capacity in order to generate context-specific evidence for practice and policy making was clearly articulated by transfusion service managers and users from SSA in 2008. The goal of the T-REC project was therefore not only to meet this very practical need, but also to give the processes underpinning the project international credibility by basing them on state-of-the-art evidence on how to design effective capacity strengthening efforts. The plan for T-REC was therefore based on the three-level model for capacity strengthening, which considers individual, institutional and international levels¹⁰. T-REC design also incorporated the three principles of effective capacity strengthening: start small with phased expansion, build on what is already there, and establish trusting and equitable partnerships¹¹. From these sound foundations, the project has already started to generate outputs and changes at all three capacity levels.

At individual level, students (ranging from undergraduates and postgraduates to doctoral students) and transfusion service staff have acquired research skills that enable them to understand the place of research in improving the effectiveness of transfusion services in Africa. They have designed and conducted research, and presented their findings at academic meetings. Those projects of sufficient quality have been published in international journals and meetings proceedings. Even within the first two years of the project, there is evidence that some of the research results are already influencing transfusion practice in the African countries.

At institutional level, building a critical mass of scientists helps develop solutions to specific challenges by considering relevant and localised evidence from research activities and ensuring strong local ownership of research initiatives. Research projects have been formulated to address national priorities so that their findings can be linked directly to policy and practice.

The project topics reflect the diversity of activities within transfusion services, and range from biomedical projects to those that focus on social science or media representation. T-REC has fostered new national collaborations between the transfusion services and academic institutions which will facilitate future collaborative research. In order for the transfusion services to be able to continue to run the DPDM course after T-REC concludes, local tutors have been trained to manage and teach the programme in both Ghana and Zimbabwe. The course is underpinned by a viable plan for financial sustainability, so it is anticipated that the transfusion services will be able to continue to offer places to transfusion professionals in the long term.

At international level, T-REC has enabled researchers and transfusion practitioners in Africa and Europe to meet and exchange ideas, has created a network as a forum for researchers in Africa to communicate with each other, and has raised the profile of transfusion research within and beyond the AFSBT and ISBT.

T-REC also aims to strengthen the infrastructure and promote increased investment in conducting transfusion research in Africa. To ensure sustainability, transfusion service leaders and Ministries of Health of African countries will need to commit to making research and support for researchers an integral part of any blood transfusion service.

Challenges and potential pitfalls in future projects

The key challenges encountered during the implementation of the T-REC project and the lessons learnt have been highlighted below in order to inform future similar efforts. It is important to select only individuals to participate in the research training programmes who are committed to undertaking high-quality research, and who have adequate supervision. In practice, this means that a lot of effort needs to be put into optimising the timing of advertising for candidates, selecting the criteria for student recruitment, and engaging with university supervisors, departments and research systems (including ethical approval processes).

An important factor contributing to the critical lack of research capacity in SSA is a perceived lack of research funding opportunities targeted specifically towards blood transfusion. However, the range of projects undertaken within T-REC clearly illustrates that many opportunities for accessing research funds exist by tapping funds from a variety of programmes. Blood transfusion is a highly cross-cutting intervention which opens up opportunities for funding on a wide range of topics including, for example, child health, maternal care, infectious diseases, epidemiology, anthropology, media and the arts.

T-REC has supported the creation of a research network, but managing this in the long term so that it can be used to maximise the productivity of international research interactions requires a pro-active approach and dedicated resources. Early joint planning for transferring management of the network to the African Society for Blood Transfusion is important for smooth transition.

When NBSZ became a partner on the T-REC project, there was the potential for the project to run as a parallel initiative to the service's existing ambitions for research. However, NBSZ seized the opportunity to enhance its own research framework by facilitating integration of T-REC activities to implement some aspects of its research strategy.

The four-year time span of the T-REC project is too short to be able to gauge whether any of the institutional changes that have occurred will be sustainable in the long term, yet maintaining the impetus for research capacity building must be an ongoing concern in order to ensure that there is continuity and support beyond the programme.

Strenuous efforts to put structures and systems in place to facilitate sustainability need to continue beyond the project to further strengthen the research infrastructure within national transfusion services and to promote increased investment in transfusion research. Transfusion research capacity building is critical in this respect because it contributes to the sound evidence base required for decision-making in policy and practice in SSA Africa. These efforts will require not only strong leadership within and a greater degree of south-to-south collaboration between the transfusion services, but also commitment from other national agencies (such as Ministries of Health and Finance) and the international development and transfusion communities.

ACKNOWLEDGEMENTS

We are grateful to Oliver Hassall, Tracy Seddon, Susan Jones, Tony Cegiela, Rene van Hulst, Henrik Ullum, Maarten Postmaa and Ib Christian Bygbjerg who have provided invaluable support for the T-REC programme and for contributions to contents and/or preparation of this manuscript.

T-REC is funded by the EU FP Framework 7: Building Research Capacity of Blood Transfusion Services in Africa.

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