

Evaluating Health Research Capacity Building: An Evidence-Based Tool

Imelda Bates*, Alex Yaw Osei Akoto, Daniel Ansong, Patrick Karikari, George Bedu-Addo, Julia Critchley, Tsiri Agbenyega, Anthony Nsiah-Asare

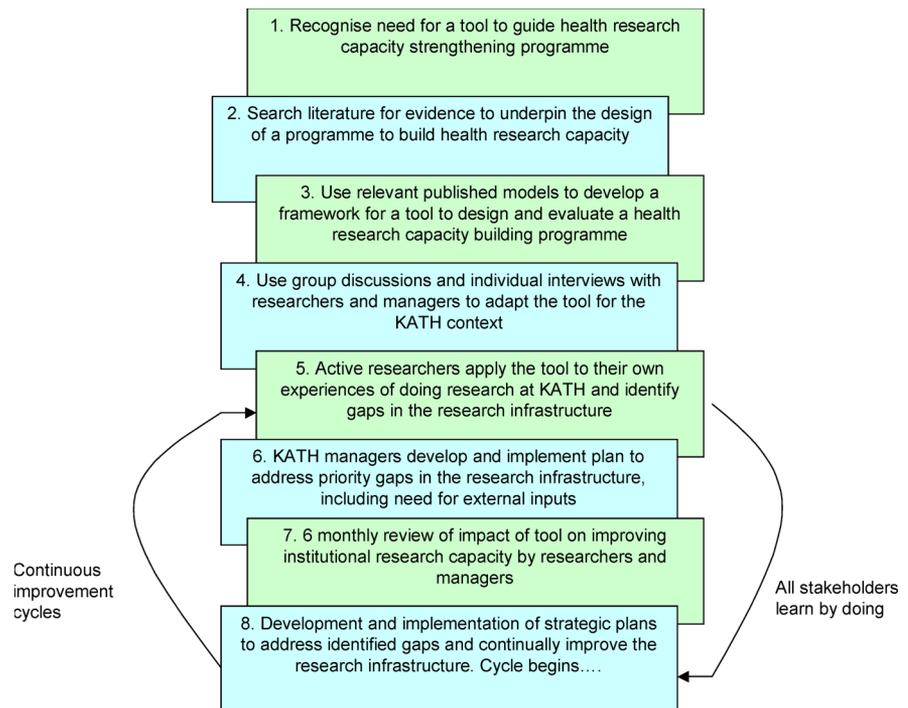
An increasingly important goal of governments and external agencies in developing countries is the need for “capacity building” in health research. Although a poorly defined and understood concept, capacity building would essentially enable de novo health research programmes to be facilitated and existing programmes to be strengthened (see [1] and page 14 in [2]). For health research, the goal of building capacity is thus to improve the ability to conduct research, to use results effectively, and to promote demand for research (see page 14 in [2]). Prioritising the need for the international community to make a “quantum leap in capacity building”, as suggested in 1998 by the Director General of the World Health Organization (WHO), would improve health and reduce poverty in developing countries [3].

To achieve this goal, there is an urgent need for an evidence-based tool for determining whether the required infrastructure is present in a given setting, as well as for underpinning the design and evaluation of capacity-building programmes in health research. Here, we describe the development and use of such a tool through analysis of published models and effective capacity-building principles, together with structured reflection and action (see page 9 in [2]) by stakeholders at the Komfo Anokye Teaching Hospital (KATH) in Kumasi, Ghana.

Challenges Faced in Building and Supporting Research Capacity at KATH

KATH benefits from a new management team that is committed to developing the hospital and medical

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Figure 1. Outline of Programme to Develop and Test Tool for Evaluating Research Capacity at KATH

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Abbreviations: EBM, evidence-based medicine; KATH, Komfo Anokye Teaching Hospital; LSTM, Liverpool School of Tropical Medicine; QA, quality assurance; WHO, World Health Organization

Imelda Bates is a senior clinical lecturer, Malaria Knowledge Programme, Liverpool School of Tropical Medicine, Liverpool, United Kingdom. Alex Yaw Osei Akoto is a paediatrician specialist and research skills programme convenor, Daniel Ansong is a paediatrician specialist and biostatistician, Patrick Karikari is Medical Director, Anthony Nsiah-Asare is Chief Executive Officer, and George Bedu-Addo is Head of Medicine at Komfo Anokye Teaching Hospital, Kumasi, Ghana. George Bedu-Addo is also at the School of Medical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. Julia Critchley is a lecturer, Effective Health Care Alliance Programme, Liverpool School of Tropical Medicine, Liverpool, United Kingdom. Tsiri Agbenyega is Dean of the School of Medical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

* To whom correspondence should be addressed. E-mail: ibates@liverpool.ac.uk

school into a regional centre of excellence for research, teaching, and clinical care. Although local clinicians had previously been involved in multinational research projects, these projects had largely been generated by external agencies. Local staff lacked experience in the conception and design of projects, and the hospital lacked local role models and tutors for generating *de novo* research. Consultant posts at KATH remained vacant because senior clinical trainees had difficulty in completing the prerequisite research component of their exit examinations for the West African Colleges. Tellingly, when asked why they had not completed their specialist exams, the most common reason given by health professionals in KATH was apprehension of beginning their own research programmes.

KATH management needed a tool that they could use to ensure that all necessary resources were in place to support local research. Unfortunately, the literature specifically describing the building of health research capacity is scarce and tends to emphasise microlevel activities, such as the choice of research trainees (e.g., Nchinda TC [3]), without considering how these activities can be integrated into the wider research system. Moreover, much of the available information on

building research capacity is based on retrospective reports of external consultants, and the perspective of implementing capacity building in a developing country is almost never represented [4]. Our aim therefore was to develop an evidence-based tool that could be used to guide the design, implementation, and evaluation of capacity building in health research programmes.

Developing an Appropriate Evaluation Tool

We used a three-stage approach: (1) searching the literature for existing tools and models; (2) analysing best-practice examples to guide the overall framework; and (3) adapting the framework into an operational tool that met the specific needs of KATH. By using translational research principles to analyse our findings, we systematically extracted and extrapolated stakeholders' evidential and experiential stories (see page 9 [2], and used this information to inform the overall design of our programme. Figure 1 outlines the stages of development and testing of the tool.

Literature search. We searched the following electronic databases: MEDLINE, Ingenta, and Science Direct using keywords, such as “capacity building”, “capacity development”,

“developing countries,” and “Africa”. We retrieved the full text of any relevant papers, including articles cited in the reference lists of these papers. Because there is limited information about health research capacity building in peer-reviewed literature, we also consulted books, Web sites of organisations working on health and research capacity building (e.g., Web sites of WHO, United Nations agencies, the European Community, and the International Development Research Centre), and references provided by colleagues. This evidence was used to derive a definition of health research capacity building, to identify existing capacity-building models, and to synthesise best-practice examples to derive key principles. Dataset S1 gives a detailed overview of our literature review on capacity building.

We found that many different definitions have been applied to capacity building according to the particular level—“micro”, “meso”, or “macro” (focused on in [5])—but that one of the most widely used definitions is “an ability of individuals, organisations or systems to perform appropriate functions effectively, efficiently and sustainably” [6].

By combining the definition for generic “capacity building” with published evidence and our practical

Table 1. Framework for Designing and Evaluating a Health Research Capacity-Building Programme

Phase	Characteristics	Activities	Indicators of Progress
Awareness	Local decision makers identify need and purpose of research capacity-building programme	Demonstrate need (e.g., baseline assessment and comparative data) Create local awareness Plant seed of “need for change”	Deliberate decision to improve research capacity to improve quality of care
Experiential	Organisation introduces and evaluates research “learning”	Implement small-scale, local research activities	Increased leadership with evidence of improved research support services (e.g., research committees established and improved access to resources)
Expansion	Strategic expansion of research activities in scale and scope Increased organisational capacity to conduct research	Develop mechanisms for dissemination of results and lessons learned Develop strategies for expansion (e.g., expand into national-level programme) Invest in developing research leadership	Demonstrable improvements in research quality Agreed commitment to long-term continuation
Consolidation	Anchor research activities into organisational/national operations Identify and prioritise to address gaps in capacity	Wide dissemination Develop strategy to take corrective action for weaker components of programme Enhance coordination or research strategies and activities Consolidate research learning environment	Full implementation of research activities that are integrated into daily responsibilities throughout the organisation

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^aAdapted from [10] by changing the original QA focus to a research focus. The QA framework described organisations as passing through four phases when they implement innovation: awareness, experiential, expansion, and consolidation (Table 1). For each phase, the authors identify “characteristics”, “potential strategies or activities”, and “indicators of readiness to progress”. We changed these to “characteristics”, “activities”, and “indicators of progress” for our framework, and replaced references to QA with references to research.

Table 2. Adaptation of the Framework into a Tool That Was Relevant to the Needs of KATH

Phase	Characteristics	Activities	Indicators of Progress
Awareness	Strategic aim to develop the hospital as a centre of research excellence	Baseline assessment of quality of care against guidelines	Commitment of funds from Ghana and UK partners to improve capacity for conducting research and utilising findings
	Hospital management has proactively encouraged evidence-based health care	Create local awareness of need to improve institutional research culture	Partners' roles and responsibilities defined
Implementation	Health professionals need research skills for career progression and to implement evidence-based health care	Plans for research capacity building discussed at local and national level and with donors	
	Develop a course at KATH to teach research skills using evidence-based educational methods	Establish research skills course and develop into UK-accredited diploma	Improved institutional research support services (e.g., Internet access, research support group, and local research funds)
Expansion	Identify available resources and gaps in provision to support research	Institutional assessment of needs to support research	Researchers awarded diploma
	Broaden research course participation to all health professionals and managers	Participants from clinical and nonclinical specialities enrolled in course	Broad research scope within and beyond the hospital
	Provide infrastructure support for expanded programme	Involvement of national organisations in the programme (professional colleges and Ministry of Health)	Educational QA processes operational
	Increase organisational capacity to conduct and utilise research	National dissemination meeting	Research results incorporated into audit cycles
Consolidation	Disseminate programme		Long-term funding secured
	Research activities anchored into organisational and national operations	Research activities integrated into daily responsibilities throughout the organisation	KATH-led research papers published and grants obtained
	Effective research infrastructure	Research support team established	Health research included in undergraduate/postgraduate curricula
			Departmental budgets allocated in proportion to research activities and outputs

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experiences of developing a planning and evaluation tool, we have defined building capacity for health research as “an ability of individuals, organisations, or systems to perform and utilise health research effectively, efficiently, and sustainably.”

Using published best-practice examples to design the evaluation programme. No tools exist that are specific for evaluating health research capacity-building programmes. However, the literature review was helpful for identifying ineffective capacity-building strategies, such as “bolting-on” capacity building to research projects initiated by a specific donor in developing countries [7]. It was also useful for highlighting generic principles underlying successful capacity building.

We grouped the generic principles that consistently emerged from the literature as best practices into themes that emphasised the importance of three concepts. The first theme was a “phased approach”; this requires the sequential involvement of all stakeholders in assessing capacity gaps, developing strategies to fill these gaps, and evaluating outcomes [6]. The second theme was “strengthening

of existing processes”; this is an iterative and flexible process that focuses on enhancing local ability to solve problems, define and achieve development needs, and then incrementally incorporate expanding circles of individuals, institutions, and systems [8]. The third theme was “partnerships”; for effective or sustained capacity building, the various partners involved must have similar concepts [5] and share responsibilities and obligations, with local partners taking ownership and leadership [6,9]. Thus, the role of external expertise is to facilitate the development of local skills through learning by experience, rather than acting as a “donor” who retains control of funds and expertise over a poorer “beneficiary” partner.

Developing and adapting the evaluation tool. An illuminating finding of the literature search was that there was no model that had been specifically designed with health research capacity building in mind. Indeed, the most useful model was one that had been developed for institutionalising quality assurance (QA) [10] because it focused on defining, measuring, and improving quality. This mirrors the processes required for capacity building in health

research: defining the institutional systems needed to support research, enumerating existing and missing resources, and improving research support by addressing identified gaps. The QA institutionalisation framework represented a synthesis of over ten years' experience in developing countries, and was derived from a combination of organisational development and QA literature. The framework described organisations as passing through four phases when they implement innovation: awareness, experiential, expansion, and consolidation (Table 1).

In the course of adapting our framework into a tool that was relevant to KATH, we were also influenced by a published framework for dissemination and implementation of evidence-based medicine (EBM) [11]. This prompted us to change the name of the “experiential” phase to “implementation”, as this was more appropriate to a research programme.

To meet the specific needs of KATH, local research stakeholders participated in adapting the tool. These stakeholders comprised ten KATH health professionals (nine clinicians and one physiotherapist), and senior

hospital managers—including the chief executive, medical director, and heads of departments. Individual and group discussions took place during a workshop for the health professionals. Stakeholders considered each phase in the framework (Table 2), and suggested characteristics, activities, and indicators of progress in building research capacity that met the needs of KATH and that could be feasibly measured or shown. The stakeholders' suggestions were incorporated into the framework to create an operational tool that could be used to identify gaps in the research infrastructural support at KATH (Table 2). This ensured that a holistic approach was taken to developing the research capacity in the hospital, rather than a fragmented, unfocused approach.

Using the Evaluation Tool at KATH

Identifying strengths and weaknesses in the research capacity.

In the year following development of the tool, the ten health professionals undertook a research project as part of a work-based course to prepare them for the research component of their professional exams. By comparing their actual research experiences at KATH with the components itemised

in the evaluation tool, they were able to identify aspects that were well supported by the institution and aspects where support was lacking or could only be provided by external facilitators. The comparison was achieved through group discussions and analysis of individual reflective statements about their research experiences, using a standard qualitative research approach known as “grounded theory”. Individual statements were scrutinised, and themes relating to research infrastructural support were extracted. Cycles of scrutinising, extracting data, and allocating it to themes were repeated until no new themes emerged [12].

A comparison between the themes that emerged from this process with the capacity-building evaluation tool identified strengths and weaknesses in the research infrastructural support. Strengths included the peer-support mechanisms within KATH, which occurred predominantly in three different contexts (peer group committees to review research proposals, small group work within course workshops, and cross-departmental research meetings). Peer support to promote work-

based learning is an evidence-based educational approach [13], so the peer-support mechanisms in KATH corresponded to components of the evaluation tool. Weaknesses that emerged included gaps in knowledge concerning research resources available on the Internet, particularly systematic searching of the published literature.

Prioritising and implementing actions for addressing gaps in the research capacity. A nominal group technique [14] was used to achieve consensus among researchers about aspects of research support that were lacking in KATH and to agree on which of these should be prioritised. For this technique, researchers used their experiences of doing research and the evaluation tool to write their own observations on areas of research infrastructure that were lacking at KATH. These were categorised into themes by the whole group and ranked according to their importance for supporting research. Gaps that were identified as priorities included provision of local statistical expertise, lack of researcher skills in critical literature reviews, and inadequate Internet access. These gaps were presented by the researchers to senior managers in KATH as a list of

Table 3. Use of the Evaluation Tool to Identify and Address Gaps in Research Capacity within 18 Months

Priority Gaps Identified in the Research Capacity at KATH	Progress in Filling the Research Capacity Gaps
Improve access to Internet and research literature, especially electronic resources (e.g., journals, CDs, Cochrane reviews), and training in computer skills to access these efficiently	Workshops on critical appraisal and literature search techniques held annually in KATH run by local facilitators Dedicated Internet suite provided in KATH for researchers, and Internet access within each department improved KATH researchers receive regular updated Cochrane review information
Training in biostatistics and better access to expertise in statistics and epidemiology	Local biostatistician trained, and provides support to KATH researchers Statistician from neighbouring institution also contracted to provide research support
Local research fund to support “seed” and pilot projects	Funding for local start-up projects earmarked in hospital budget and allocated to KATH researchers
Diploma in project design and management course institutionalised sustainably within KATH to maintain a critical mass of research-aware health professionals across all disciplines	Plan developed for local course facilitators to take over complete running of course within three years; funding secured through the Ministry of Health Specialities represented in the course now include all clinical specialities, as well as physiotherapy, nursing, and administration Delivery of the course and marking of assignments completely taken over by KATH, with external QA review from the UK Training workshop to increase the number of course facilitators and project supervisors in KATH completed May 2006
Promote a culture of research across KATH and use local research results to improve patient care	Cross-departmental research meetings established as regular monthly events in KATH to provide peer support for researchers Hospital management has provided a dedicated administrator to support research activities Research activities and publications included in annual assessments of hospital departments Head of KATH QA unit trained in clinical audit and plans developed for incorporation of researcher's results into audit cycles to improve clinical care Plans developed to link departmental funding to research activities and outputs

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recommendations, and the managers incorporated activities to address these recommendations in their annual plans and budgets in 2004/2005 and 2005/2006. Progress was reviewed with the managers and the researchers during the six-month course workshops (Table 3).

What Was Achieved by Using the Tool?

Progress in strengthening the research infrastructure in KATH has been achieved both for individuals and for the institution. For individuals, a course to teach research skills has been established in partnership with the Liverpool School of Tropical Medicine (LSTM). Local facilitators have been trained to run the course and funding has been secured so that within three years the course will be wholly the responsibility of KATH staff, with LSTM providing external quality reviews for the course. At an institutional level, an Internet suite has been refurbished and equipped for use by researchers, research support meetings are now a regular monthly event, and KATH has trained its own clinical biostatistician to support its researchers. Within 18 months of the original recommendations, KATH management and researchers have achieved many of the indicators of progress listed in the evaluation tool, and have developed plans to achieve the remaining indicators within the next two years. Naturally, progress some indicators, particularly those relating to using research results to improve the quality of clinical care and encouraging whole departments to be more proactive about research, will be slow and could take several years to achieve.

Discussion

What have we learned? The evaluation tool has enabled researchers and hospital managers to work together to achieve a common goal of improving the research capacity in KATH. They have monitored their progress against predetermined standards and have identified and filled gaps in research infrastructure.

The evaluation tool should be flexible enough to incorporate changes in the local environment and the needs of KATH, and consequently we plan to re-evaluate and amend it within five

years. Because changing the research culture of an institution is a complex process, some important components that should have been included in the tool might have been overlooked. For example, dialogue between scientists and nonscientists, as well as non-health-sector workers, is important for developing and sustaining health research capacity [3]. Such interactions are not represented in our tool, which has focused instead on building institutional capacity.

The success of the process by which this tool was developed and tested confirms the importance of the generic principles underlying effective capacity building that we extracted from the literature. We used a phased approach to engage stakeholders in identifying strengths and weaknesses, and then to develop, implement, and monitor action plans to address these gaps [6]. Part of this process involved identifying and strengthening existing processes and building up local resources, rather than developing new parallel systems [15]. This strengthening process included formalising the peer-support meetings that researchers had found so helpful, and expanding the existing Internet facilities. The process is a good example of a genuine partnership for problem solving that is built on trust, common interest, long-term commitment, and shared responsibilities and obligations [16,17]. Although funding for the process was initially shared between KATH and LSTM, KATH has maintained ownership and leadership, and is now totally funding the capacity-building process. Each partner had clearly delineated roles, and mechanisms and timescales for transfer of skills from LSTM to KATH staff were agreed on early in the process.

Two important criteria for this project's success were the motivation of the researchers and the strong leadership and commitment of KATH managers. Participation of all stakeholders in the design of evaluation indicators is recognised to promote motivation and commitment (see Chapter 7 [18]). The rate of progress is likely to slow down over the next few years, as the institutional shift towards research begins to involve individuals who might not have the high motivation of the managers and researchers, but the tool nevertheless

provides a means for maintaining focus on achieving some of the more difficult indicators.

How transferable are these lessons and the tool? The generic principles of effective capacity building—phased approach, strengthening existing systems and partnerships for problem solving—were derived from contexts that were not health sector-specific, and yet they have been applied successfully here. However, the evaluation tool was developed for the context of health research at KATH, and its value and transferability in other contexts would need to be assessed.

Although the framework from which the tool was derived incorporated all the elements of a research process, such as problem identification, priority setting, and research use (see page 16 in [2]), the specific components used to produce the operational tool would need to be adapted to suit the specific needs of other institutions. Monitoring and evaluation is the most difficult and neglected component of capacity-building programmes because they can take over 20 years to achieve their objectives [8], and some outcomes, such as organisational culture, are difficult to measure [19]. Different users of evaluations will have different priorities, and the use of an evaluation tool helps to promote agreement on the purpose of the evaluation and the indicators [20]. The major advantages of our tool are that it enables an institution in a developing country to set its own priorities, to have control over local capacity building [21], and to evaluate progress in building capacity from its own perspective rather than from that of an external agency.

Supporting Information

Dataset S1. Further Details of the Literature Review on Capacity Building

Found at DOI: 10.1371/journal.pmed.0030299.sd001 (52 KB DOC).

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