

CLINICAL RESEARCH IN GHANA: ACCURACY AND RELIABILITY OF LABORATORY RESULTS

Kuofie M

Institute of Biomedical Science, U.K.

Introduction

The rising cost of clinical research is driving the current trend of outsourcing to developing countries¹. Many developing countries, such as Ghana, conduct research but face many challenges in ensuring that the trial conduct and results conform to international standards². Such challenges include staff recruitment and retention³ and the reliability of laboratory results.

Ethical aspects of research are governed by international regulations but policing and enforcing such regulations are less well documented. There are challenges to overcome, including reliability of laboratory results and inadequate resources, with over-reliance on those that are adequate. Thus there is a need to develop a research infrastructure that can cope with these challenges.

Research should always have laboratory support and those producing results that support international clinical research needs must be accurate and reliable⁴. Evidence of Good Laboratory Practice (GLP) is a regulatory requirement and efforts to show compliance is required⁵. It also is necessary to assure the quality and integrity of data submitted in support of New Drug Applications (NDA), clinical research and marketing permits⁶.

The regulation of work in developing countries is often limited due to the absence of a regulatory body to define standards, set policies and assess compliance, resulting in a substandard laboratory service, inaccurate results and a waste of health resources⁷. In Ghana and the West African region, there are many challenges to be faced in the provision of laboratory services, but efforts are being made to address them. In light of this, a project has been undertaken to investigate the current state of these services, the perception of results by users of the service, and provide the opportunity to discuss how regulation can help move the service forward⁸. There is also a perception that laboratory testing is underused in diagnosing infectious diseases, resulting in misdiagnosis and an increased level of mortality^{8,9}.

Margaret Kuofie
Institute of Biomedical Science
U.K.
Email: mkuofie@gmail.com

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Exploratory Study

The project was carried out as an exploratory study because no research model was available¹⁰, and a mixed-method strategy was used involving qualitative and quantitative methods. A combination of a literature search, anonymous online survey questionnaires and telephone interviews was used for data collection. The questionnaires were distributed to the physicians on the Ghana Medical and Dental Council (GMDC) database, and the telephone interviews were conducted with eight experienced hospital laboratory personnel via convenience sampling. Interestingly, staff from private laboratories and specialist centres declined the opportunity to be interviewed.

Of the 2212 physicians and dentists registered on the GDMC database, less than 2% responded to the survey. Thus, it was impossible to apply quantitative methods in a way that would prove an accurate reflection of how Ghanaian physicians perceived laboratory services. Despite this, the X^2 test was performed to assess whether the negative response would be equal or greater than 50% in a population with distribution characteristics similar to the physicians who responded.

Perceptions

Approximately 85% of the physicians had a negative perception of the laboratory results they received ($P < 0.0001$), implying that although the survey responses were not an accurate reflection of the entire Ghanaian physician population, the result was statistically significant.

The majority (90.6%) of respondents said they referred patients to different laboratories in order to obtain result they can believe, with 67.9% referring patients to between one and three laboratories, and 25% to four or five laboratories. Two respondents (7%) referred patients to more than five laboratories in order to obtain a diagnosis. Some 84% of respondents noted that they were satisfied with the results that they received, of which two noted they were very satisfied, 19 sometimes satisfied and five were always satisfied (Fig 1).

Furthermore, 83.9% responded that the results do not always support the observed symptoms. Of these, eight out of 26 noted that they strongly agreed. Approximately 77% noted that the results were not always accurate.

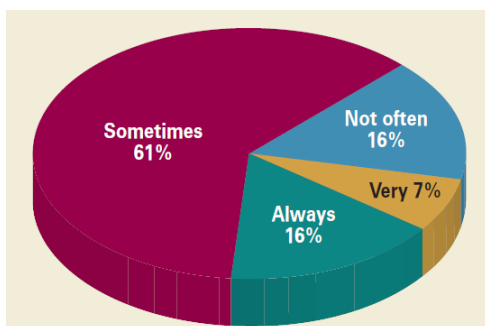


Figure 1: Physician satisfaction rates for laboratory results

Twenty-nine (90.6%) respondents noted that they had experienced erroneous results, such as results not agreeing with clinical presentation or patient history (53.3%) and unrealistic laboratory values for some tests, including some incompatible with life. Clearly, such occurrences result in the negative perceptions of the laboratory service by physicians, although this conflicts with the 100% rating given by respondents for results integrity.

Approximately 90% of physicians suggested that an external quality assessment (EQA) scheme would change their perception of laboratory results. One respondent noted that such a scheme would help to “verify or nullify suspicions about laboratory incompetence”. Approximately 93% noted that they would use the services more frequently if there was laboratory certification and regulation (Figure 2).

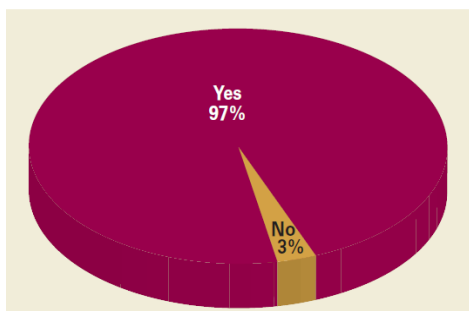


Figure 2: Physician responses when asked if they would use laboratory services more frequently if certification and regulation were in place.

Furthermore, the majority of respondents (97%) said they would like to see a regulatory body for laboratories and certification for staff, and quality control was the aspect they most wanted to be improved (Figure 3). This was followed by high demand for faster turnaround times and a revision of the hours of operation (71% and 55% of respondents, respectively). Finally, 29% responded that they would like to see more reflex testing.

Other suggestions volunteered included the availability of refresher courses for laboratory personnel, having internal and external quality systems in place, and adding tests not currently offered in Ghana. A comment was also made about many of the

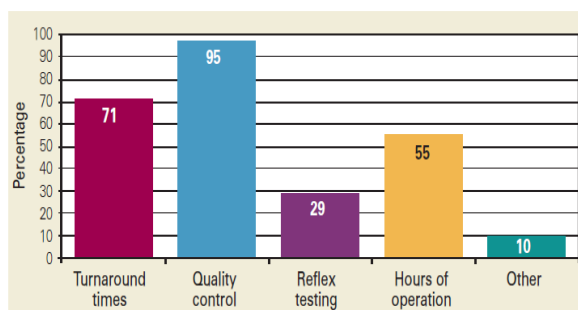


Figure 3: Aspects of the laboratory service physicians would like to see improved

so-called ‘mushroom’ laboratories that have opened, with some being advertised as clinics rather than laboratories. One physician noted that he unconsciously ordered more laboratory tests for patients whose employers covered their health costs, thus any regulation could consider cost/price standardisation.

The laboratory personnel interviews showed that most laboratories performed internal quality control (QC) and kept records. The only EQA schemes in operation cover tuberculosis, human immunodeficiency virus (HIV) and malaria testing. Currently, such schemes are affiliated to laboratories in South Africa. Although most of the interviewees stated that records are kept, they mentioned that record-keeping and maintenance were poor. As record-keeping is very important in clinical research¹¹, this is likely to raise questions about the need for regulatory audit.

A majority of the interviewees mentioned the fact that tests do not have to be requested by a physician, as happens in developed countries; in most laboratories anyone can walk in and request a test. One interviewee suggested that was a result of the ‘Know Your Status’ public campaign to encourage people to get tested for HIV and other communicable diseases. Most noted that nurses and midwives can also request tests for their patients. All interviewees were interested in quality schemes such as UK NEQAS.

All the respondents possessed either a laboratory technician’s diploma or BSc, with some having completed an MSc; however, all were interested in further education. One specifically mentioned interest in workshops and ‘on the job’ training opportunities.

Some interviewees mentioned the existence of a laboratory services policy which is still in draft form. The policy’s goals include improving quality of preventive and curative healthcare, healthcare promotion by guiding the expansion and strength of laboratory services, improving the laboratory service quality and providing support for research. Continuing professional development (CPD) – a key factor in research – was also mentioned.

This research also revealed that Ghana is one of several African countries currently working towards accreditation¹².

Developing Overview

Regulation of laboratories in developing countries such as Ghana is needed in order to address the issues contributing to the perception of unreliable results. In addition to being a means to improve the physicians' perception, it would also boost public confidence in the laboratories and health service.

A regulatory body would be able to establish and implement a quality management system (QMS) which should include QC, QA, accreditation, certification and competences¹³, and also include an EQA scheme. Implementation of EQA strengthens laboratory networks and improves diagnostic quality, and would enable efficient human resource use and reflect common practice in developed countries such as the UK⁹.

Accreditation would assess the ability of laboratories to perform the scope of tests for which they are licensed, thus enabling compliance with ISO15189 standards, and would provide the opportunity and tools to standardise tests, processes, equipment, training and resources. Furthermore, it would also help to address diminishing resources, falling standards and set a quality benchmark¹⁴.

The present survey showed that 90% of physicians would change their perceptions of laboratory results if such a quality system were in place. The scheme could be implemented and monitored by the proposed regulatory body that 97% of the physicians stated they would like to see established. Such a body could coordinate laboratory registration and licensing, laboratory staff qualifications and certification, and would ensure that private laboratories produce credible results ultimately; this would help to demonstrate that clinical research results from workers in Ghana were internationally acceptable.

The issue is not whether a regulatory body is needed but how such a body would be established and what the scope of its remit would be. Several aspects of a QMS have been implemented in Africa and have worked well (see Panel). The World Health Organization (WHO) Regional Office for Africa (WHO AFRO) has established a stepwise approach to the fulfilment of ISO15189. This is not meant to replace ISO15189 but rather to help its implementation in an affordable, sustainable, effective and scalable way¹⁸.

The proposed system could be structured as shown in Fig. 4, with the Regulatory Body being one of the professional associations directly under the Ministry of Health. This body would be responsible for laboratory accreditation, including the establishment of a laboratory QMS.

In the study conducted by Bates *et al.*⁷, it was noted that "there is no comprehensive nationwide system for monitoring the accuracy of malaria-related laboratory tests...currently operational in any sub-Saharan country". This comment can be extrapolated to most laboratory tests, as the general consensus from the

interview results obtained in the present study was that the only tests which had such monitoring in place were for TB and HIV. However, some form of malaria quality control scheme has since been established.

In establishing EQA, it is worth noting that the systems used in laboratories in developed countries such as the UK and Canada are not appropriate for use

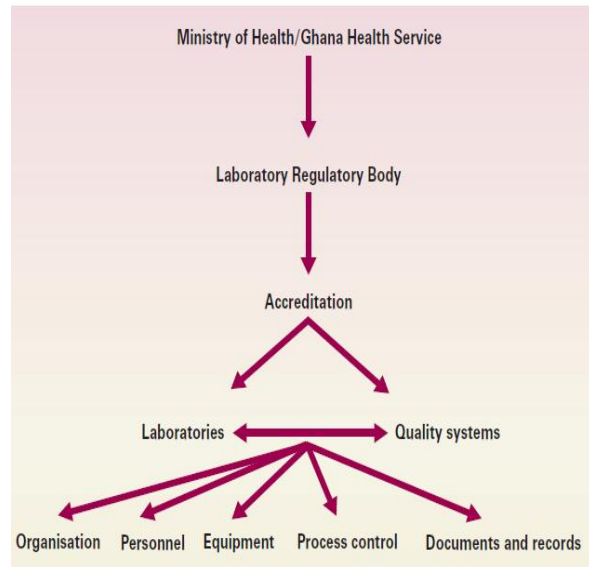


Figure 4: Proposed quality management system based on the model operating in Ontario, Canada.

in Ghana and other developing countries. This is because the workforce consists primarily of laboratory personnel who are not certified; however, lack of professional qualifications should not be an obstacle⁷ to the implementation of a simple QMS. Also, such systems depend on automated methods and reliable transport networks, which are not available in Ghana. Unreliable communication was mentioned by Bates *et al.*⁷ as one of the factors that could affect the implementation of a QMS system; however, the system in operation in Ghana is currently one of the best on the continent. The success or failure of such a QMS would depend on, for example, staff qualification, skills, morale, commitment and motivation. Most of these depend on remuneration and hence on the investment in laboratories as a whole. Attention can be given to improving training for laboratory technicians and technologists, with more focus on competences in special sections (eg. haemoglobinopathies).

Lack of training for managers and senior staff is a major deficiency that could be addressed by training in QMS. This would be a step towards achieving international recognition and assist in making clinical trial results from developing countries internationally acceptable. New mentoring and training schemes could also be implemented to incorporate new technologies. In the developed world, proficiency testing is a requirement for clinical laboratories¹⁹, and this could be implemented as part of the proposed QMS.

Compliance with regulations is normally assessed by inspection⁵; however, such regulations cannot be put in place if there is no regulatory body to police them. Such a body would regulate processes and personnel, thus ensuring that the analyses are conducted with precision and accuracy, and that personnel are suitably qualified and certified. To ensure accuracy and reliability of results, training and CPD would be of major importance, and these could be accessed via competences and audit²⁰.

Final Perception

The study discussed here demonstrated that physicians had a negative perception of laboratory results in Ghana, and that a regulatory body would

need to be established to address issues of lack of facilities, investment, regulation, standards, EQA, training, human resources and maintenance of certification²¹, all of which contribute to the unreliability of laboratory results.

The establishment of a regulatory body would be a positive step towards ensuring successful laboratory support of clinical research, as it would enable the production of qualified, trained and motivated staff, a QMS, and a safe working environment.

The introduction of accreditation and a regulatory body involves commitment of extensive resources. However, it should be possible to establish such a system, and this could then be extended or adopted by other countries across the pan-African region²².

Examples of aspects of a QMS that have been implemented in Africa

- A QMS (Quality Management Program-Laboratory Services [QMP-LS]) is in operation in Ontario, Canada. This ensures that established processes meet quality standards and proficiency testing is performed on all licensed medical laboratories in Ontario, accrediting them to a standard based on ISO15189¹⁴. This model has recently been implemented by the laboratory in Mnazi Mmoja Hospital in Tanzania (with mentorship from staff using the Ontario model) to help it prepare for ISO15189 accreditation. The hospital's readiness was assessed and found to have achieved 70% compliance within a year – a process which normally would take a laboratory five years to achieve¹⁵.
- Strengthening Laboratory Management toward Accreditation (SLMTA)¹⁷ is a programme developed to promote improvement in laboratories in developing countries. It empowers laboratory staff to improve their own laboratories using existing resources and to communicate with physicians and hospital management. The programme was piloted in Uganda and it yielded measurable results, including improved patient flow and turnaround time¹⁶.
- Real-time access to laboratory results has been implemented in a hospital in Kenya¹⁷, giving clinicians immediate access to test results and this has proved helpful in making lifesaving decisions during emergencies. This tool, already in use in developed countries, can be implemented at minimal cost as it may only require an internet connection and web browser – no sophisticated software is required apart from the normal laboratory information system.

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