

# **Exploring the Technologies of Laboratory Science for Social Change: an Examination of the Nigerian Healthcare System**

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## **Abstract**

Contemporary healthcare constitutes a critical response to the dilemma of health and disease that is partly instinctual and partly organizational. Although Africa faces a number of daunting health challenges, an essential factor which continues to decelerate the efficacy of her healthcare system is that a larger proportion of diseases is hidden from view in the community (Agharanya, 1987; Park, 2005). Against this background, this paper examines and explores how some of the technologies of medical laboratory science may be used to exact novel changes in the structure of the Nigerian health-care system vis-à-vis a better confrontation of diseases. In other words, we seek feasible means through which relevant diagnostic, prognostic or therapeutic knowledge generated in the laboratory may be transferred from the bench to the patient. While this scheme should facilitate the evolvement of a laboratory that goes beyond traditional means in contributing to outcomes measurement of patients from cradle to grave (Forsman, 1996), it should also reinforce the overall competence of the healthcare system.

**Keywords:** Laboratory, Knowledge, Health, Social change.

## **Introduction and Problem**

Contemporary healthcare constitutes a critical response to the dilemma of health and disease that is partly instinctual and partly organizational. Amongst other reasons, the efficacy of Africa's healthcare system is decelerated by the fact that a larger proportion of disease is hidden from view in the community (Agharanya, 1987; Park, 2005) expressed as carrier status, undiagnosed or subclinical cases. Although the practice of Medical Laboratory Science (MLS) can help establish the presence, extent or absence of such subtle diseases by generating relevant knowledge through appropriate biochemical, serological, histochemical or microbiological markers (Afolabi, 2007); her epistemic resource has been largely under-utilised.

On this note, Schmitt and Elstein (1988) observe that the quantitative principles of test selection and interpretation have been reluctantly integrated into clinical practice, and this reflects an underlying faulty attitude towards the medical laboratory. On the other hand and in the Nigerian context, patients as well as potential patients are only mostly aware of what goes on at the bench of the medical laboratory scientist mainly in the sense in which it yields them practical benefits, and often in the face of overt disease and its associated distress (Afolabi, 2007). Indeed, not much attention has been paid to "the processes of transmission of innovative knowledge from the bench of the laboratory scientist to the bedside of the patient (Bachelor et al, 1996), re-echoing the idea that the vast epistemological resources of the laboratory are being under-utilised relative to the needs of the sick.

Against this background, this paper explores feasible means through which relevant diagnostic, prognostic or therapeutic knowledge generated in the medical laboratory may be readily transferred from the bench to the patient. In other words, it examines and explores how some of the various forms of knowledge purveyed by MLS may be developed and employed as an engine for driving social change in the structure of the Nigerian health-care system vis-à-vis a better confrontation of the perennial issue of disease and infections. And although the business of social change is generally regarded as a slow process, the change we propose is unlikely to take long in coming to the fore since it is to occur in the healthcare system which is the most susceptible to public awareness and sensitivity (Kale, 2004).

## **Methods & Goals**

This paper employs the method of archival research in achieving its aims. Drawing from such fields as medical sociology, medical history and the social sciences, it conceptualizes feasible means through which the professional of MLS can take up novel roles and responsibilities within the stratum of the Nigerian healthcare system. It must be noted that we use the idea of technology in three distinct senses: as artefact, as knowledge and as technique (Howell, 1995) without implying the idea of sophisticated equipment being needed for the accomplishment of the medical tasks. In the light of this, we will explore how the technologies of urinalysis, full blood count and bacterial culture and sensitivity can function as instruments for driving social change within the Nigerian healthcare system. Since many African countries share some similarity in their manner and mode of accessing health-related professional services (Afolabi, 2007), our framework may in fact serve as a prototype.

### **Some Misconceptions about Laboratory Science**

Medical knowledge from the bench of the laboratory scientist has hitherto been largely viewed in light of pragmatic applications (Afolabi, 2007). Such a stance coupled with the brevity that usually typifies laboratory participation in the task of health restoration has tended to blur the distinct boundaries between the theory and praxis of MLS. Surprisingly, even medical sociologists can be culpable in this regard. For instance, Erinosh (1998) claims that the laboratory scientist works under leadership and supervision of physicians. People of such view are obviously blind to or unaware of the notion that expertise in clinical medicine is not an equivalence of expertise in scientific laboratory procedures (Farr, 1984). It should be further noted that within the profession of MLS are cadres of laboratory workers who work under supervision of and are subject to the laboratory scientist: the medical laboratory assistant and the medical laboratory technician (Driver and Feeley, 1974). In addition, examined in light of Higgs' (1993) proposition on a health professional as a qualified health care provider who demonstrates professional autonomy, competence and accountability, the professional status of the laboratory scientist integrates the ability to exercise independence in function (within a teamwork context) combined with responsibility and accountability (Higgs and Jones, 2000). It is therefore obvious that Erinosh's claim veers from the course of truth.

Perhaps, it may be the case that practitioners of MLS have themselves been too much engrossed in their 'bench' work, teaching and research activities to notice such misguided misconstructions (Afolabi, 2007).

Sir James Spence (1954) has noted that there exists a constant growth of ignorance in medicine. For us, this ignorance extends beyond the validity of existing body of knowledge but encompasses the prevailing application of concepts in relation to health professionals. The term 'medicine' including its adjectival derivative 'medical' has been almost exclusively associated with the clinical medicine profession<sup>1</sup> (i.e. the profession of physicians). This has probably closed the eye and mind to the possibility of any other "medical" profession existing (and, hence, meriting importance) within the health care system. This conceptual misnomer likewise fallaciously attributes the significant tasks of the empire of medicine largely to clinical professionals (Afolabi, 2007). In addition, Agbedana (1999) observes that it has led to a set-back in medical education in Nigeria. In light of these remarks, we shall employ the concept 'medicine' to denote the whole spectrum of what constitutes the health system.

### **The Nature of MLS**

One of the striking developments in twentieth century medicine is the growing involvement of laboratory science in every day medical practice (Sturdy, 1992). To be sure, health laboratory services play as vital a part in the management of patients as any other branch of medicine (Houang, 1984). The validity of these notions would however be better appreciated if we proceed from the medical encounter involving the sick patient and an attending physician, the purpose of which is the restoration of or usually the prospect of a return to health (Gladstone, 1995).

Prior to commencing treatment, it is necessary that physicians *know* the cause of an ailment, a task which is critical to the actual alleviation of the distress of the sick and equally because any attempt at "managing illness without a precise diagnosis is always risky" (Bradley, 1993). Although the process of making a diagnosis may be quite complicated and "constrained by urgency, compassion, cost, and redundancy" (Murphy, 1973); when starved of appropriate diagnosis, the task of alleviating the distress of the sick may well make them worse off. In fact, making a diagnosis is a major aim in hospital

practice when missing a diagnosis can almost be regarded as a crime (Bradley, 1993). However, physicians have viewed diagnosis as an intuitive art, based partly on their knowledge of clinical medicine and partly on experience (Diamond and Forrester, 1983).

For them, diagnosis was predicated upon patient clinical history, signs and symptoms. But MLS exemplifies a different outlook on the diagnostic process, an outlook that sources for disease aetiology based on experimental data obtained from analysis of pathological specimens (Momoh, 1988). In other words, the practitioner of MLS carries out qualitative and quantitative test procedures on biological samples such as blood, sputum or exfoliated cells to generate clinically useful knowledge, which the attending physician/clinician thereafter uses “to treat and manage patients’ disease conditions” (Emeribe, 2005). Because this end is achieved through “the application of natural, physical and biological sciences” (Heinemann, 1963), it is logical to describe MLS as the discipline that has brought about the scientification of the art of medicine.

Let us quickly clarify that we do not hold that before MLS emerged, there was no science involved in medicine. Some science was indeed involved based, for example, on physiological, anatomical and biochemical principles. Indeed, an “appraisal of physicians throughout the first two-thirds of the nineteenth century [showed that] their medicine was already scientific” (Warner, 1992). However, that scientific sort of medicine was turned upon the correlation of systematic clinical observations with pathoanatomical findings made at autopsy (Warner, 1985), and its utility was in elucidating pathophysiological functions. Warner (1991), for instance, notes that the basic sciences could explicate “therapeutic theory, suggest therapeutic possibilities, and explain what was clinically observed, but it could not direct practice”. In other words, the distinctive flavour of the science and *scientia* that MLS injected into medicine was such that bore clinical consequence; one that would shape clinical cognition and “direct clinical practice” (Faden and Sharpe, 1998); that is, positively influence the process of clinical intervention to disease. Our point having been made, we may now resume our conceptual excursion.

A professional is someone who possesses a mastery of a skilled service, which is practiced on the basis of accumulated expertise acquired by means of specialist training (Gladstone, 1995). Against this template, it is feasible to conceptualise MLS as the

application and adaptation of the laboratory scientist's professional knowledge and technical skills to patients' varied health demands and needs. In the other broader sense, MLS encapsulates the science of examination of human/biological specimens for the primary purpose of engendering knowledge relevant to efficient patient treatment and management in terms of "monitoring and controlling therapy" (Wertman, et al, 1980). Hence, providing an effective tool with which the dilemma of disease can be combated. The secondary purpose of these tests is that they make useful contributions to enhancing our study and scientific comprehension of disease processes. But it has to be noted that while MLS rightly furnishes diagnostic knowledge, she does not constitute the sole agency through which this is done in health practice. Radiological methods and techniques as well as physical evaluation of patients are also used in diagnosis making. Yet, what must be noted is that the laboratory "leverages 60 –70% of all critical decisions, e.g. admission, discharge, and drug therapy' (Forsman, 1996).

Another radical outlook characteristic of MLS is her redefinition of what disease is. For Engelhardt (1976), disease is physically or psychologically disagreeable, distasteful, and possesses the capacity to exert some form of suffering or pathos due to the malfunctioning of our bodies. Construed this way, the most tenable biological response would involve seeking a window of escape. Hence, when no symptoms manifest, patients are consequently not motivated to seek the assistance which the health system (nor that which the non-Western type of health system) offers. Yet, and perhaps surprisingly, it is possible to be sick without being aware of it (Margolis, 1976; Clauser et al, 1997). That is, disease processes may be ongoing in the body but evade detection be it inside the consultation office or by fiat of individual perception.

This phenomenon runs counter to previously held "common-sense notions, which assume a relationship between feeling well and being well" (Kaufert, 2000). Nevertheless, MLS can help establish the presence, extent or absence of such subtle diseases by generating relevant information or knowledge through appropriate biochemical, serological, histochemical or microbiological markers; with which the disease process may be quantitated (Wertman et al, 1980) as well as what manner of clinical intervention is to be instituted. Hence, by extension, MLS peeps away from the deceptive guise of clinical signs and symptoms to ascertain the nature of diseases ---even

non-apparent ones. Because this has conceptual implications, we shall have to dwell a bit more on it.

While medical diagnosis has been described as the complex art of recognising illnesses whose signs and symptoms constantly differ from case to case (Mornex, 2001), MLS often demonstrates specific aetiological agents of diseases as well as what specific chemotherapeutic intervention may be required; hence, helping to impose order on medical 'realities'. The manner in which MLS imposes order on medical realities may be further emphasised by recourse to the philosophical problem of induction. As have been noted, pre-MLS medical practice, in spite of its own distinct meanings of science, was empirically oriented. In that strand of thinking, if a patient X elaborates a spectrum of symptoms a, d, f and j, and is diagnostically categorised as having a condition L, then patient Y's condition is same as X's *provided the same sort of symptoms are elaborated*. And by implication, a drug therapeutic for X would be assumed therapeutic for Y. This line of reasoning constitutes the central idea of inductive reasoning.

According to Black (1989), inductive reasoning is:

If "some A's (selected in such and such a fashion) are B,  
therefore all A's are B".

But the principle of induction as a form of reasoning is logically invalid (Tomassi, 1995). Applied to medicine, it is also a fallacious means of conceiving reality. For instance, a single clinical disease may ensue from infection from any of several pathogens. Washington (2007) makes a case for influenza virus infection which causes a wide variety of respiratory syndromes that cannot be distinguished clinically from those caused by streptococci, mycoplasmas, or more than 100 other viruses. Obviously, effective patient management, hence, patient survival in instances such as these hangs on the clarificatory knowledge that is derivable from the bench of the laboratory scientist. It is therefore evident that MLS helps minimize the errors of induction inherent in medicine, and ultimately, contributes in no small measure to saving us from the fate that befell the famous Russellian chicken.

It can therefore be rightly asserted that MLS is not only essential to the maintenance of patient health (Fagelson, 1961) but its practice constitutes a never-ending scientific enquiry into the nature of diseases, with a view to unearthing explanatory and predictive knowledge that immensely enriches “our understanding of the biological processes of disease (Harvey, 1976). Indeed, her importance is further underscored by the fact that “erroneous report of laboratory tests is that of poor clinical management of patient and thus worsened progression of diseases and ultimately death of untold number of patients: (Salami, 2006). Having said this, let us briefly examine some of the encumbrances that have decelerated the efficacy of MLS in Nigeria.

### **Ignorance**

Ignorance as regards the true nature of MLS is a critical factor that hinders the effective use of laboratory services, and it has tended to shape the level of social worth adduced to its practice. Indeed, out of the sea of the young who possess the potential to study and practice MLS, only very few know that such a discipline exists. In other words, most do not realize that besides such disciplines as pharmacy, clinical medicine or nursing, there is another without which the collective objective of these three would be seriously hampered. Even at a global level, Sawyer et al (2006) have noted that the profession of MLS is in dire need of increased exposure to the young people. The ignorance also lingers partly because the task of guiding and counselling secondary school students is often pursued with flippancy. While the media ordinarily constitutes a viable means through which the hemlock of ignorance may be expectorated, as they inform and help shape the understanding of their audiences (Kaplan and Goldberg, 1997); they have done quite little in this regard.

### **Manpower**

It is perhaps disturbing to note that few are the laboratory scientists who possess the spectrum of knowledge necessary to drive the social change in the Nigerian health sector. As Osuoha (1988) rightly pointed out, the numerical growth experienced by MLS has often been limited compared to other health professions. The two tables below portray the numerical growth that many of the health professions witnessed within the Nigerian Health system between the years 1962 and 1992.

**Table 1**

	<b>1962</b>	<b>1972</b>	<b>1980</b>
Community Nurses	1/370, 000	1/4, 400	1/3, 000
Dentists	1/931, 000	1/548, 000	1/400, 000
Doctors	1/40, 000	1/22, 000	1/14, 000
*Medical Laboratory Scientists	1/761, 000	1/761, 000	1/100, 000
Pharmacists	1/93, 000	1/68, 000	1/40, 000
Radiographers	1/1, 800000	1/567, 000	1/100, 000
Registered Midwives	1/7, 600	1/4, 200	1/3, 000
Registered Nurses	1/7, 600	1/4, 400	1/3, 000

Note: professional manpower as given here is in a 'per population' format  
Source: Durowoju (1979)

**Table 2**

	<b>1981</b>	<b>1992</b>
Dental Surgeons	379	1,295
Doctors	10,399	21,235
*Medical Laboratory Scientists	6,587	6,134
Midwives	24,112	58,036
Nurses	29962	71,712
Pharmacists	2,609	6,060
Physiotherapists	236	701
Primary Health Care Workers	2,544	39,227
Radiographers	348	600

Source: Erinoshio (1998)

About eight thousand laboratory scientists were estimated to be able to meet the challenges of the Nigerian healthcare sector in 1980 (Durowoju, 1979); however as shown by table 2, even by 1992 the task was yet to be achieved. The dearth of adequate number of laboratory scientists may also be explained in terms of the few universities that operate a degree course in the discipline (Afolabi, 2007).

### **Inter-professional Bickering**

Inter-professional rivalry is yet another constraint with which the practice of MLS is beleaguered. Perhaps, this should be of little surprise if we remind ourselves of the “active, energetic, urgent and committed opposition and attack” (Warner, 1992) to which laboratory science was subjected in its formative years in the strata of American health service; an attack informed and reinforced by “the subordination of clinical judgment to the decrees of the diagnostic laboratory” (Warner, 1985). Agbonlahor (1988) notes that in 1980 the Association of Pathologists of Nigeria wrote to the Nigerian Minister of Health “seeking recognition, and arrogating to themselves the functions of medical laboratory

scientists”. Ironically, the legitimate task of pathologists in the laboratory is to interpret and correlate results obtained by the laboratory scientist for the attending physician (Williams and Lindberg, 1979) in clinical language.

However, even this role is being increasingly performed by laboratory scientists with specialist training. This therefore partly explains the antagonism in light of the growing professional qualification and responsibility of the practitioner (Farr, 1987). Hence, pathologists in Nigeria have to come to the realization that MLS constitutes a distinct and “special knowledge from the experience of most practitioners and their workaday routines at the bedside” (Warner, 1992), which must be used collaboratively to ensure optimum patient outcome; therefore constitutes a critical task deserving of proper execution (Afolabi, 2007). Bearing all these in mind, we shall now explore how the technologies of urinalysis, full blood count as well as bacterial culture and sensitivity can effectively serve diagnostic, prognostic and therapeutic functions in relation to the social change in the Nigerian healthcare system.

### **The Need for Social Change Vis-à-vis the Practice of MLS in Nigeria**

Elevitch (1995) notes that the opportunities for laboratory practice are unlimited in pre- and post clinical health care, particularly as health care extends into the community and home. But in an African nation such as Nigeria we have done very little to explore and tap from these possibilities. Social change, in one sense, has been described as change in social norms or rules (Macrae, 1968). That is, it represents and embodies a change in the structure of a social system (Johnson, 1960; Otiite and Ogionwo, 2003). The healthcare system is not an abstract concept but encompasses a body of knowledge used by men and women to meet socially defined ends. In the Newtonian sense a change insinuates that a prevailing *status quo* would remain so long as there is no force to alter the scheme of things. In other words, an appropriate stimulus is a prerequisite for changing a prevailing state of affairs (Afolabi, 2007). Hence, some of the questions that arise at this juncture are: what is the state of healthcare in Nigeria? Is there really a need for a social change in the current scheme of things in the Nigerian healthcare? And if yes, how may the welter of diagnostic, therapeutic or prognostic knowledge be transferred from the bench of the laboratory scientist to the patient and how effective would this process be?

Otite and Ogionwo (2003) note that social structures undergo continuous change. Professional change, as Tabansi (1993) observes, occurs in order not to make a profession static. In other words, professions ought to change and be modified by social realities. Culyer (1978) has opined that a need for healthcare exists when the potential for improvement of health status above the level it would otherwise be exists. In Nigeria, a lot of medical knowledge is presently not reaching the target population. That is, a far larger proportion of disease is hidden from view in the community (Agharanya, 1987; Park, 2005) expressed as carrier status, undiagnosed or subclinical cases. The efficacy of the healthcare system in which our medical knowledge is contained has therefore been generally limited, especially in terms of preventive, control or eradication strategies (Sebitosis, 2006). In this regard, Lucas (2004) contends that there is a much heavier burden of disease. Indeed, granted that there are constrained resources for tackling the burdens of disease, the under-utilization of these or their under-recognition further limits the capacity of our health care system.

To be sure, the medical laboratory generates roughly 70% of the data that guide clinical decisions, hence, the manner of clinical intervention. May it not be said then that by actively exporting more of these epistemic currents into the social space, or pointing attention to their importance vis-a-vis the battle for enduring health, the laboratory will in fact be bracing the efficacy of the healthcare system?. Besides, health professions are entrusted with what is the most precious thing of all: life itself (Donabedian, 1977), hence, it is their responsibility to help preserve it in the face of the inevitable flux that characterizes existence. In embracing this role-shift, professionals of MLS would be fulfilling a pertinent social role which would however occur in such a way that physicians' hitherto exclusive "role as gatekeeper to other specialist services in health and social care" (Gladstone, 1995) may be likewise replicated through a well-guided recourse to the epistemological resources of the medical laboratory.

To understand this better, let us remind ourselves that the birth of MLS brought about an alteration in the structure of and accessibility of patients to the prevailing healthcare system (Afolabi 2007). There was indeed a time when the medical laboratory was a place for just the practice of histopathology and bacteriology. However, as the

twentieth century progressed so were new disciplines developed: parasitology, haematology, chemical pathology, blood group serology, virology, etc (Farr, 1979). With each of such changes came new practices and new patterns of services to patients. Hence, any proposition for change in MLS constitutes a further alteration in the pattern of use of the prevailing health services. It is therefore obvious that for our idea of social change to become effective, there will be a need for appropriate alterations at the levels of social attitude, values; and specifically alterations at the orientational plane of our health use pattern as well as a clear and an objective re-definition and re-allocation of roles played by some members of the healthcare system.

### **Laboratory Science and Some of its Social Change Packages**

In Nigeria, MLS is practised at the public and private spheres. Public laboratory services are carried out at primary, secondary and tertiary healthcare institutions, all of which are owned and financed by the government. Laboratory investigations are carried out upon request or referral from the attending general practitioner/clinician with a view to garnering knowledge that contributes to the over-all process of improving patient outcome. In other words, patronage of the medical laboratory has hitherto been immensely informed by referral from physicians. The private practice of MLS occurs in laboratories licensed to suitably qualify medical laboratory scientists by the medical laboratory science council of Nigeria (MLSCN). Though this follows quite the same pattern of use as does occur in state-owned laboratories, patients are increasingly requesting for tests on their own volition, that is, with an oral request without having been referred by a physician –a pattern similar to that reported by de Souza (1999) in India.

On this note, we advocate that patients ought to increasingly come to the realization that fruitful laboratory services may be obtained by voluntary requests, an important drive that would facilitate how the laboratory scientist can emerge “from behind the screen of complex science and technology to help the common people understand what they can do to improve their own health” (Rifkin, 1981). We will therefore be pursuing the idea of social change in MLS along the lines of screening biomedical tests, periodic laboratory outreach, and therapeutics amongst others.

## **Screening Tests**

The task of any health system goes beyond its licensed role of curing and preventing disease by functioning at a personal level in reassuring and allaying the anxiety of the individual (Corey et al, 1977). In relation to diseases however, it is often only those persons who perceive the sense of something being wrong that can be said to currently benefit from this allayance of anxiety. But the time has come, and is indeed long overdue, to actively consider approaches that are not directed principally toward people who are already ill but toward the population in general, which for the most part can be considered healthy (LaLonde, 1977). In fulfilling this consideration, MLS has a number of contributions, especially in terms of her screening tests.

A screening test is the search for unrecognised disease by means of rapidly applied tests or procedures in apparently healthy individuals (Park, 2005). Applied to MLS, a screening test constitutes a qualitative analysis carried out on samples derived from supposedly healthy people in order to establish, as early as possible, whether or not they have an underlying disease; the imperative being that quite a number of diseases are subtle and evade clinical detection. That is, unlike ‘conventional’ diseases that evoke a spectrum of signs and symptoms, these diseases lack such cardinal features, especially during the early and infectious phase when their presence could be easily and medically handled; which agrees with the notion that the earlier disease is ‘discovered’, the better are the chances of cure (Kaufert, 2000).

A simple urinalysis, for example, may yield information about underlying pathology of the cardiovascular, renal and gastrointestinal systems as well as help in the detection of inherited, metabolic disorders (Agbedana and Anetor, 2006). On the other hand, the full blood count generally offers biologic insights into the health status of an individual; be it in the context of immunocompetence, infectious states, genetic abnormalities (sickle cell anaemia, for example) as well as malignant states. Since preventive services are advocated because it significantly lowers the cost of illness (Mbanefor, Soyibo and Anyanwu, 2004), and considering the cheapness and ready availability of these technologies; offering patients these services will help fulfill the role of MLS in enhancing health.

### **Periodic Laboratory Outreach**

The task of getting the public to increasingly accept the various services offered by the practice of MLS may be further reinforced by working in conjunction with the National Blood Transfusion Services (NBTS), several of which are already in operation within the geopolitical zones of the country with the goal to seek and recruit voluntary blood donors on the altruistic principle of helping to save a life (Afolabi, 2007).

It may be noted that each NBTS centre periodically tours towns and villages in search of would-be donors. An avenue for reciprocating the moral good may therefore involve conducting screening biomedical tests (urinalysis or the full blood count, for instance) to a limited and randomly selected number of people on each tour. As more people come to associate useful health benefits to the notion of subjecting oneself to periodic laboratory evaluation, they can then be motivated on their own initiative to seek and use these technologies from time to time. The village or community outreach screening-focused project will in fact constitute an approximation of the ‘one good turn deserves another’ maxim to the extent and in the sense that the current NBTS initiative makes up a measure of asking the public to freely *give* blood (an act of moral good) which may then be reciprocated by also *taking to them* an act of moral good –that of making them undergo free screening laboratory evaluation (Afolabi, 2007).

### **The Laboratory as Referring Centre**

It has been suggested that a social change may consist in the introduction of something new or in a shift in the relative importance of patterns already existing (Johnson, 1960); the specific ‘change’ being itself concerned with others rather than its source (Krishan, 1957). Until now, the medical laboratory has served mostly as a centre to which patients are sent for tests, the nature of which is determined by the complaints and the signs and symptoms elaborated by them (Afolabi, 2007). It bears mentioning that patients do use laboratory services on their own without requests for such from physicians. That is, there is a pattern among sick people to use the laboratory as their first port of call in the task of regaining normal health. Although the exact reason for this may not be so clear, it probably includes knowledge of the importance of laboratory tests garnered from previous experiences and suggestions from family members or friends. Therefore, we advance the thesis that as well as serving as a point of reference by the attending

physician, the private laboratory can function as “referrer” to an appropriate clinician or other health-care provider depending on whatever knowledge has been yielded by her tests. Whereas this would *formally* alter the existing pattern of health use, its merit lies in the intended result; what Toffler (1970) terms speedier communication. That is, an accelerated communication between the laboratory scientist and other health professionals as dictated by the nature of each medical encounter.

At least, one important question merits clarification as regards this proposition. What do patients who present for tests on their own referral do with the results of such tests? Presently most, on the premise of the knowledge yielded by the laboratory test, visit chemist/pharmacy stores for the purchase of drugs without further consultation with health professionals. It is our belief, however, that the MLS professional has an active role to play in stemming this pattern of self-prescription. Self-prescription, we must quickly add, goes in tandem with irrational drug use, which is a predisposing factor to the occurrence of drug-resistant to infectious microbes and parasites (Fehintola, 2005). The importance of this is even more trenchant considering the economic implications that fighting drug-resistant microbes has in a developing nation such as ours. On completion of a test, the *Widal* test for instance, the laboratory scientist can on the basis of the results refer the patient to a pharmacy store where the resident pharmacist can then give the appropriate drug in applicable dosage.

In a similar vein, the result of the test may be such that necessitates the attention of a physician. In that sense, the laboratory scientist should be expected to refer the patient to a certified physician within the environs. In rising above and beyond its traditional role in conducting various kinds of tests to acquiring a referring capacity, a new stimulus would spread to other actors in the health system. Consequently, such overt actors as the general practitioner, pharmacists and nurses would increasingly have to learn and understand some of the jargon of the laboratory in order to be able to respond in a professional-specific manner.

### **Therapeutics**

In Nigeria, drug costs are the largest part in the total cost of treatment in the healthcare delivery system (Mbanefor, Soyibo and Anyanwu, 2004). In spite of this, the medical laboratory has hitherto

participated little in the selection and evaluation of chemotherapeutic agents. Besides, drug purchase outside the auspices of the healthcare system is very common. In fulfilling its task of social change in this context, the laboratory has the critical responsibility of ensuring that the choice of antimicrobial agents is selectively tailored to the specific causative agent. In this vein, Warner (1991) notes that the therapeutics of today rejects dogmas and those of the future will accept nothing that cannot be demonstrated by the tests of science. The surge in the phenomenon of drug resistance further underscores how important this task is. Indeed, drug resistance has made it difficult to treat successfully some infectious diseases, and once acquired, resistance can be transferred between strains, species and genera (Ochei and Kolhatkar, 2003). Against the backdrop of this, it is clear that the medical laboratory scientist has much to contribute to the efficacy of therapeutics.

### **Agents of Change**

In elaborating on possible changes that may occur within the structure of the Nigerian health system, we need state carefully but lucidly what role and responsibilities befit actors and audience in the massive auditorium in which the change is to occur. Some of these and their expected roles make up the next aspect of our discourse.

#### **The University**

Wernicke (2006) describes the university as a specialized institution for the production, reproduction and dissemination of intellectual capital. Since MLS concerns itself mainly with the business of knowledge creation, the university obviously has a role in catalyzing the social change we advocate for the health-care system vis-à-vis MLS. But how may this be? We have earlier said that one of the obstacles in the path of MLS has been shortage of professional manpower, and this, we further noted, bears close relation to the fact that very few universities has hitherto run degree courses in MLS. As more universities rise up to this challenge and come to establish the discipline, constrains of manpower shortage as well as that due to its underpopularization will be greatly abated. The increased academisation of MLS, as Jones (1987) sums up, will lead to a highly intelligent, creative and articulate work-force, whose members will be able to provide a better service to the patients and to biomedical sciences, and who will fully justify their increased public approbation.

## **The Laboratory Scientist**

We have been exploring possible ways and means through which viable changes can occur in the health use pattern of Nigerians, driven by the knowledge base of MLS. However, to borrow the phraseology of Alvin Toffler, the laboratory scientist will not be immune to this shock of change. Indeed, in acclimatising to the changes that would be experienced in the ambit of MLS, the scientist that “can adapt will; those who can’t will either go on surviving somehow at a lower level of development or will perish” (Toffler, 1970). For, as Krishan (1957) contends, realization of the value or values at which the process of social change is aimed will be determined by the attitude that the group that seeks the change has towards that value or cluster of values.

For example, while there is presently an array of laboratory tests for evaluating the presence or absence of disease, or even quantifying the disease process itself, there is room yet for improvement in terms of their degree of reproducibility and sensitivity. In the same vein, the diagnostic laboratory has a need for a method of detection when an infecting agent is present in low numbers in a clinical sample (Chessum, 1991). And it should be safe to aver that, in future, new diseases may be uncovered; and then pose newer challenges to the health professions. Indeed, it is reasonable to expect that even more species and sub-species will be recognised as the sensitivity of investigative tools increase (Allison and Rawle, 1987). In the event of these occurrences, the practitioner of MLS will be expected to fabricate and use new diagnostic tools and tests with reliable results for proper identification and characterization of the aetiological agents of such diseases (be it of bacterial, viral; fungal or biochemical origin), and where appropriate provide accurate information on the best choice of therapeutic agent as well as contribute towards monitoring of the therapeutic response.

## **The Physician/Pathologist**

The birth of MLS, as have been noted, transferred and subjugated clinical authority to the diagnostic decrees of the laboratory. It also threatened the physician with a vision of the laboratory rather than the bedside as the hub about which scientific medicine would revolve (Warner, 1985). On the Nigerian scene, Agbonlahor (1988) notes the objection with which pathologists met the establishment of private medical laboratories solely by duly licensed laboratory scientists. Indeed, the Act of the MLSCN, as we earlier noted,

was also met with objection. On grounds of these observations, it may be rightly conjectured that at least some of the changes we are urging are likely to be met with resistance by the physician who ordinarily conceives the task of attending to patients an exclusive privilege. Closer examination of the facts, however, reveals the contrary.

The physician's task, it must be noted, is fundamentally couched in the framework of healing. Indeed, Hart (1985) insists that the power of the clinical profession<sup>2</sup> lies in its success of having secured by political means a legal monopoly over the practice of healing in contemporary society. Obviously, we are not asking the laboratory to heal in whatever new roles she must play; what we advance is that she performs pertinent roles that would contribute to *accelerating the task of healing*. The contention over headship of the medical laboratory also merits some mention, since its persistence has implications on productivity and efficiency, for it is the case that optimum patient care depends upon close collaboration between ward and laboratory (Farr, 1984). Ultimately, since no individual or organisation can be protected from change (Lundberg, 1985), laboratory scientists on the one hand should learn to rise above their accustomed traditional roles; physicians/pathologists, on the other hand, need relinquish their monopolistic hold on the discourse of health. We believe that such a cognitive re-orientation would facilitate the integration of our ideas of change within the Nigerian health system.

### **The Individual**

The process of change is clearly not a static phenomenon. In other words, if the aim of our ideas of change vis-à-vis MLS is to be accomplished, there is need for people to come to a certain level of knowing and then respond in an adequate and commensurate manner. Indeed, without enough individual participation, the best health program can be enfeebled (Kogan, 1974). Ojesina (2002) echoes this in saying that the most valuable resource for the health of the people is the people themselves. To put this in perspective, the epistemic resources of the medical laboratory that has been much confined to the bench of the laboratory scientist, may stay the same way until the individual (when apparently healthy or otherwise) sees the diagnostic invitation, periodic laboratory evaluation and each of the other measure of change we have advocated as existing for him/her; after all the health-care delivery system, hence, all that it offers exists for the benefits of the population that it serves.

## Conclusions

MLS plays pivotal roles; knowledge derived from laboratory tests serve explanatory, prognostic, curative, preventive and assurative functions in the sphere of health. For more of these kinds of knowledge to be transmitted from the bench of the laboratory scientist to the populace, an attitude of change is however essential; Mass education (as regards the benefits of forming the habit of going for routine biomedical screening tests) is one necessary ingredient. Warring professionals must also be ready to let down their cudgels, and embrace an approach that is holistic and that is founded on the platform of dialogue. Indeed, an entirely objective appreciation of the history of laboratory participation in medicine is one means through which fruitful dialogue may be begun and, subsequently, achieved (Afolabi, 2007).

The social change we advocate concerns “its beneficial effect on pre-clinical prevention, clinical intervention and post-clinical monitoring over the lifetimes of members of the community” (Elevitch, 1995). Our thesis should therefore go some way in achieving how “a laboratory that goes beyond traditional means in contributing to outcomes measurement of patients from cradle to grave” (Forsman, 1996) can emerge. And if the future role of MLS will require all laboratory professionals to provide a good service for as many people as need it at low cost (Bennett, 1987); then universities need train medical laboratory scientists whose heads brim over with ample knowledge, and whose hands are well-skilled and steady (Afolabi, 2007). The Government must also actively provide an aura enabling for practice and supportive to the task of creative imagination as well as formulating appropriate and “relevant policies, legislations, human resource management and physical resource management” (Ihimekpen, 2006). Because each kind of change brings with it a need for new learning (Toffler, 1970), practitioners of MLS would often need to improve their knowledge and skills as well as how best to adapt these; having always at the back of their minds the good of those without whom no health system would exist —patients (Afolabi, 2007).

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