

Current status and potential of South African hospitals to implement research to overcome health challenges, archive international health goals and increase capacity of clinicians and nurses.

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Abstract

South Africa has a significant burden of both communicable and non-communicable diseases are on the rise. Clinical research has been portrayed by Ministry of health in South Africa to improve the health condition of the nation reducing the disease burden. However, the research has not kicked in as planned by the research output and awareness of public regarding the clinical research. Hence, the present study was conducted to assess the hurdles faced by the health care personnel in implementing research in their institutions in South Africa .

Keywords: *Clinical Research, South African hospitals. Clinician's capacity, naïve patients.*

1. Introduction

South Africa (ZA) has health challenges between 1990 to 2005 with mortality rate worsened because all age groups were affected by HIV and AIDS [1, 2]. ZA also hosts burden diseases like Malaria from neighboring countries like Zimbabwe and Mozambique which increase morbidity and mortality [3]. The health ministers have contributed so much to improve the status of most serious epidemics affecting modern society. Government has made some changes to improve this healthcare burden and overcome the shortcoming of the delivery of health and services created the by previous disparity. Despite the changes made, including policies to improve health care in ZA, the disease burden is too much to alleviate this problem in a short space of time [1, 4, 6 and 6]. . The budget was increased to encourage sexually active individuals to test for HIV and distribution of condoms [7]. Life expectancy increased from 54 years in 2005, to 60 years in 2011 [1, 8].ZA launched the National Tuberculosis Control Programme to replace sputum smear microcaps with the Xpert MTB/RIF diagnostic system [1,9]. The national health insurance was also discussed and will bring hope to the existing unequal and racially skewed health system [1, 10].

ZA Non-communicable diseases budget was also increased which helped to reduce health gap amongst the low and the high socio-economic group. [11, 12] ZA burden on non-communicable diseases estimated to be two to three times higher than of developed countries [13]. The increase in burden of non-communicable diseases appeared mainly in the rural parts of ZA and are increasing demand for chronic medical care [14, 15], and violence and trauma [13]. Other determinants of disease burden include a lack of food security, poor access to safe sanitation, prevalence of indoor pollutants and high unemployment [15].

Clinical research was also a change that the government explored. There was decline in clinical research activities in ZA. The Academy of Science (AS) of ZA recommended to the government to revitalize clinical research. [16]. AS has made recommendation; but no plan of engaging with pharmaceutical companies to bring new studies and products in research. Despite all these changes ZA did not achieve their steep objective especially in the outlying public hospitals [1]. It has been proven that low and middle income areas are mostly affected by

disparity and poor health care and research has improved health care in those areas. Clinical research training of clinicians in these low and middle income areas will help to improve health care and increase the declining research activities in ZA [17, 18]. Clinical research implementation has been used to achieve international health care in the past and ZA will also benefit and improve health care in the country [19]. ZA has high potential to implement clinical research in their public hospitals and use academia and pharmaceutical companies available to participate. Most South Africans have not participated in clinical trials and this research will also add to this statement.

Despite all the good work that the government has done, the burden of health care in ZA is still far from over. ZA needs to implement more aggressive strategies to able to correct these health issues. Speeding up the implementation of research in South African public hospitals will help in achieving the objectives of overcoming the health burden and will increase capacity of clinicians. The researcher believes that the implementation of clinical research in ZA is underutilized. Most local and foreign educational institutions offer insufficient research experience and most graduates require on job training in clinical / medical and epidemiological practice and research. The objective of this research is to provide evidence that most of South African patients and clinicians are naïve to research. This was established in public hospitals visited during medical informatics research for a PhD programme conducted in randomly selected South African hospital in the 9 provinces.

2. Methodology

Ethical approval was obtained from the respective institutions where the work was carried out and written informed consent was obtained from all the study participants. The study was conducted between June 2014 to August 2015 and 45 public hospitals in all 9 South African provinces were approached. The clinicians, nurses, pharmacists, radiographers, radiologists, physiotherapists, dentists, hospital information technology personnel and patients were administered questionnaire to assess the above mentioned objective. Descriptive statistics were applied for various categorical variables. As the study is qualitative and hypothesis generating, no attempts were made in calculating sample size for the study.

3. Results

ZA hospitals visited during this research were found to have very little research happening on the hospitals. Hospital in big cities found to have higher number of research conducted and especially academic hospitals. Very little research was done in the rural areas. Below Table 01 gives list of hospitals visited and results of the research:

Table 01: Participation of South African hospital in participating in Clinical and academic Research.

Province	Hospital Name	Type of Area	Research	Teaching	Pts Participation	Capacity building and service
GP	CMH	High	Pharma / Aca	Teaching	5.0%	Good
GP	Jabulani	Middle	None	None	0.0%	Fair
GP	Natalspruit	Middle	None	None	0.0%	Fair
GP	Steve Biko	High	Pharma / Aca	Teaching	5.0%	Good
GP	Tembisa	Middle	Pharma / Aca	None	0.1%	Good
GP	C .H. Bara	High	Pharma / Aca	Teaching	4.0%	Good

LP	Polokwane	High	Pharma / Aca	Teaching	0.5%	Fair
NW	Moses Kotane	Low	None	None	0.0%	Fair
NW	Rustenburg	High	None	None	0.0%	Fair
NW	Klerksdorp	Middle	Academic	None	0.0%	Fair
NW	Vryburg	Middle	None	None	0.0%	Fair
NW	Gelukspan	Low	None	None	0.0%	Poor
FS	Universitus	High	Pharma / Aca	Teaching	1.5%	Good
FS	Pelonomi	Middle	Academic	Teaching	0.5%	Good
FS	Heilbron	Low	None	None	0.0%	Fair
FS	Bongani	Middle	None	None	0.0%	Fair
MP	Witbank	High	None	None	0.0%	Fair
MP	Evander	Middle	None	None	0.0%	Fair
MP	Ermelo	Middle	None	None	0.0%	Fair
MP	Piet Retief	Middle	None	None	0.0%	Fair
ZN	Newcastle	Middle	None	None	0.0%	Fair
ZN	Eshowe	Middle	None	None	0.0%	Fair
ZN	Addinton	High	Pharma / Aca	Teaching	1.0%	Good
ZN	Inkosi. A. Lethuli	High	Pharma / Aca	Teaching	3.5%	Good
ZN	Umzimkhulu	Low	None	None	0.0%	Poor
NC	Dr Harry Surtie	Middle	None	None	0.0%	Fair
NC	Kimberly	High	Academic	None	0.0%	Fair
NC	Barkly west	Low	None	None	0.0%	Poor
EC	Mtata	High	Academic	Teaching	0.5%	Fair
EC	Livingston	High	Academic	Teaching	0.5%	Good
EC	CeMH	Middle	None	None	0.0%	Good

3.1 Gauteng Province Hospitals

Six hospitals were visited by the researcher in 2015 and Gauteng province is generally a high income province and the smallest amongst the 9 provinces.

Charlotte Maxeke Hospital (CMH) was found to be involved with both academic and pharmaceutical research. This hospital conducts a number of pharmaceutical and academic trials. Wits health consortium is also involved in this hospital to assist in managing clinical trial processes and regulate research in this hospital. The hospital is located in an urban area where there is high income. Most of the research is done in the Wits medical school. The hospital keeps more staff and there are regular capacity building activities for clinicians and nurses and it has a privilege to attract Pharma Companies to involve clinicians in the pharma clinical trial. It is also a teaching hospital and has experienced clinicians to perform all types of trials and involve them in clinical research and mentoring. Approximately, 5 % of patients participated in clinical trials. Health care in this hospital is better and the hospital has resources to perform research. Wits University published 4694 articles between 2004 and 2008 and CMH published articles were not established [18].

Zola Jabulani Hospital (ZJH) is a small and a new hospital located in Soweto. Situated in the urban area serving a middle income community which is also mixed with low income. ZJH is not involved in clinical research and there is also limited staff. The hospital was recently built and it is a state of the art hospital that was earmarked to be piloting electronic health records and

paperless. Most of the complicated patients are sent to Bara Hospital as the infrastructure to handle complicated patients are limited. The status of this hospital is the same as Natal spruit hospital which was recently moved to a complete new location and is also in urban area serving middle to low income community. There are very few doctors in this hospital and majority of doctor were recruited from foreign countries. Both hospitals, none of their patients found to be part of any research.

Chris Hani Baragwaneth Hospital (CHBH) is one of the largest hospitals in the Southern hemisphere and is located in Soweto which is urban area. It serves high to low income community. It is also an academic hospital working with Wits medical school and has access to pharma and academic clinical trials. Wits health consortium also works with this hospital to assist in managing the clinical trial processes in the hospital. It is a highly specialized hospital and it also attracts number of research companies to setup studies. Clinician's capacity building in this hospital is very good and there are a number of experienced clinicians to participate in research and to provide good health care. About 4% of their patients are involved in clinical research and the hospital also has a separate clinical research unit that specialized in HIV research. CHBH published 142 articles between 2008 and 2014 [18].

Steve Biko Academic Hospital was not visited however it is as established as CHBH and CMH and participated in clinical trial and health care provided is good.

Tembisa Hospital (TH) is located in Tembisa next to OR Tambo airport in the urban area and it serves middle to low income community. The hospital is involved in both pharma and academic research but on a smaller scale compared to CMH and Bara. It is still able to keep a low number of experienced clinicians. Health care provided in this hospital is good but it needs to increase their number of clinicians since there were long queues of patients waiting to see clinicians. Clinician's capacity building is fair but some of the clinicians have move to other hospitals for better practice. There are at least 1% of patients involved in clinical research.

3.2 Limpopo Province Hospitals

Polokwane Hospital (PH) is an academic hospital which recently linked with University of Limpopo Medical School. It serves as a provincial hospital and receives patients from other hospitals for more specialized procedures. It is involved in academic research but very low pharma research. Patients involved in research are about 0.5%. It serve high to low income community. Capacity building of clinicians and nurses is fair. Tshilidzini, Warmbaths and Loius Trichardt hospitals were not visited due to limited time.

3.3 North West Province Hospitals

Moses Kotane Hospital (MKH) is located in the rural area near Sun City. The hospital does not perform any clinical trials and it has beefed up the clinician team with doctors from the foreign neighboring countries. The hospital is new and has state of the art building. Clinicians and nurses are not involved in clinical or academic research.

Job Shimangana Tabane (JST) / Rustenburg Provincial Hospital is located in an urban area and it services communities from high to low income. The hospital is not involved in clinical research and there is also limited staff of clinicians. The hospital also serves as a provincial hospital and none of the patients and healthcare staff has been found to be part of any research.

Klerksdorp Hospital (KH) is located in a semi-urban area and the hospital is involved in both pharma and academic research but on a smaller scale. However there were no patients found to participate in these trials. The researcher estimated that there might be a very small number of research participants. The hospital has number of experienced clinicians, which provides good health care and supports other neighboring hospital with complicated diseases. Clinician's capacity building is fair and needs to be increased.

Joe Morolong Hospital (JMh) located in Vryburg which is rural area and serves majority of low to middle income community. There are no clinical trials carried out in the hospital. There are few experienced Clinicians to carryout research in the hospital.

Gelukspan Psychiatric Hospital (GPH) located on the outskirts of Mafikeng which it in the rural area and serves low income community. There are no clinical trials carried out in this hospital. The hospital was very old and staff was limited.

3.4 Free State Province Hospitals

Universitas Hospital (UH) was found to be involved with both academic and pharmaceutical research. This hospital conducts a number of pharmaceutical trials. It is located in an urban area where there is high income. There is influx of research done in this hospital including academic research since it is linked with a medical school. The hospital keeps more staff and there are regular capacity building activities for clinicians and nurses. This hospital has a privilege to attract Pharma Companies to involve clinicians in the clinical and academic trials. It is also a teaching hospital and has experienced clinicians to perform all types of procedures and trials and involve them in clinical research. About 1.5 % of their patients participated in clinical trials. Health care in this hospital is good. The hospital has published 1127 articles between 2008 to 2014 [18].

Pelonomi Hospital (PeH) is located in urban area and is serves a low to high income community. It is involved in both pharma and academic clinical research. It also shares research activities and expertise with UH as they are located few kilometers from each other. About 0.5% of their patients involved in clinical research and has experiences clinicians to carry-out research.

Heilbron Hospital (HH) is a small hospital located in the rural area and serves a low income to middle community. There are no clinical trials carried out in the hospital.

Bongani Hospital (BH) is located in a semi-urban area and the hospital is not involved in both pharma and academic research. The hospital has number of experienced clinicians to provided good health care and supports other neighboring hospital with complicated diseases. Clinician's capacity building is fair.

3.5 Mpumalanga Province Hospitals

Witbank Hospital (WH) is located in urban area and serves a low to high income community. It is not performing any clinical research and the WH has number of experienced clinician but the experience in performing clinical trials was not established.

Evander Hospital (EvH) is located in rural area; it is not involved in clinical research. The hospital is not involved in academic or clinical trials. The hospital has limited staff but still provided fair health care. The experience of clinician to perform clinical trials was not determined.

Ermelo Hospital (EM) is located in a semi-rural area and is involved in very limited clinical research. The percentage of patients involved in clinical research was not established. The hospital has number of experienced clinicians to provide good health care and support to other neighboring hospitals with complicated diseases. Clinician's capacity building is fair.

Piet Retief Hospital (PRH) is located in rural area and is not involved in clinical research. The hospital has number of experienced clinicians to provided good health care and has recruited clinicians from foreign countries to assist in providing service to the hospital community.

3.6 Kwazulu-Natal Province Hospitals

Newcastle Hospital (NH) is located in a semi-urban area and is not involved in clinical research. The hospital has number of experienced clinicians to provided good health care and supports other neighboring hospital. Clinician's capacity building is fair. There are no patients involved in clinical research.

Eshowe Hospital (EwH) is located in rural area and is not involved in clinical research. The hospital has number of experienced clinicians to provided good health care and has recruited clinicians from foreign countries to assist in providing service to the hospital community. No patients were found to be involved in clinical research.

Addinton Hospital (AH) was found to be involved with both academic and pharmaceutical research but the scale of doing research has decreased compared to previous years. AH is located in an urban area where there is high to low income community. It is also linked with University of Natal Medical School. The hospital has more staff, there is regularly capacity building of clinicians and nurses since it has the privilege being involved in research with the medical school and has experienced clinicians to do research and mentor. However the infrastructure of the hospital is very old. The researcher could not estimate the percentage of patients involved in clinical research.

Inkosi Albert Luthuli Hospital (IALH) was found to be involved with both academic and pharmaceutical research. The hospital enjoys a number pharmaceutical trials and academic research conducted in the hospital. The hospital serves the province and has most facilities required for research and other procedures. IALH is located in an urban area and where there is a high to middle income community. There is an influx of research done in this hospital including academic research since it is linked with University of Natal Medical School. The hospital has adequate staff and there are regular capacity building activities for clinicians and nurses since it has a privilege to attract Pharma Company to involve clinicians in the pharma clinical trial and its link to a medical school. The link with University of Natal Medical School increases rate of academic research in this hospital. It is also a teaching hospital and has experienced clinicians to perform all types of trials, mentoring and involving them in clinical research. About 4% of their patients participated in clinical trials. Health care in this hospital is good and has the resources to perform research. Lastly it is one of the hospitals in ZA that uses e-health record and is a so-called paperless hospital. Kwazulu Natal University has published 3563 papers and some of these papers are published works from IALH.

Umzimkhulu Hospital (UmH) is located in the rural area and is a very small psychiatric hospital with only two clinicians. No trials are conducted and it serves a mainly low income community.

3.7 Northern Cape Province Hospitals

Dr. Harry Surtie Hospital (DrHSH) is located in Upinton which is a semi-rural area and serves majority of low to middle income community. There are no clinical trials carried in the hospital. The hospital is new and was earmarked for piloting paperless e-health records. It also has state of the art infrastructure and majority of clinicians in the hospital are from foreign countries and their experience in clinical research was not established.

Kimberly Hospital (KH) is located in a semi-urban area and is not involved clinical research both pharma and academic. The hospital has number of experienced clinicians who provided good health care and it supports other neighboring hospitals. Clinician's capacity building for clinical research is fair.

Prof ZF Mathews Hospital (Prof ZFWH) is a small hospital located in a rural area in Barkly West and serves low income community. There are no clinical trials carried out. The hospital is under staffed and a serious capacity building is required.

3.8 Eastern Cape Province Hospitals

Nelson Mandela Academic Hospital (NMAH) is located in Umtata rural area, it is involved in academic research but the status of pharma research is unknown as well as number of patients involved in research. The hospital has number of experienced clinicians that provide good health

care and supports other neighboring hospitals. The hospital is also link with the University of Umtata Medical School. Clinician's capacity building is fair and need to be increased

Livingston Provincial Hospital (LPH) is located in Port Elizabeth which is an urban area. The hospital is involved in academic research and pharma research and there are about 1% of patients involved in research. The hospital has number of experienced clinicians that provide good health care, research and supports other neighboring hospitals. It also has facilities required for clinical research. The X-ray or radiology department is well organized with well experienced radiologist and radiographers.

Cecilia Makiwane Hospital (CeMH) is located in an urban area and the hospital is not involved in clinical research. The hospital services mainly low to medium income community. The hospital has number of experienced clinicians to provided good health care and supports other neighboring hospital. Sometimes the hospital ran out of important medication like the ARVs. Clinician's capacity building is fair but should be increased; they have recruited clinicians from foreign countries to assist in providing service to the hospital community.

3.9 Western Cape Province Hospitals

Western hospitals did not want to participate in this research. Reason being that they were too busy and in the bigger hospitals only internal staff are allowed to perform trials in their hospital or the research should be linked with an internal person from the university or hospital. The experience of the researcher in these provinces hospitals is that; Groote Schuur and Tygerberg hospitals are both big hospitals that are located in Cape Town and both are involved in Pharma and academic research. They are both established; perform some of the big pharma and academic research. This activity helps in the development of good researchers in the hospital. Both hospitals have their independent ethics committees that help to regulate and assist in conducting clinical research in the hospitals. The hospitals are both located in urban areas and serve medium to high income communities. Both are academic hospitals linked with University of Cape Town Medical School and Stellenbosch University Medical School respectfully. They both have experienced clinicians and nurses to give good health care and to perform clinical trials. The number of patients involved in clinical research was not established but according to Michael Kahn these hospitals and the universities are producing quite a number of publications. UCT was rated first and Stellenbosch was rated fourth in ZA. Groote Schuur alone published 419 and Tygerberg 156 publications [18]. Other hospitals in the rural or urban areas are very similar to the other provinces.

4. Discussions

The key finding of this research is that South African Hospitals are not participating in research which includes Clinical, Epidemiological and Academic research. Despite the increase of publications in ZA, the level of research is still very low. Most of the publications are from the high income areas compared to the low income or rural [12] and publications come from those that are linked with medical schools. Most of the medical publications reviewed were from high Scio-economic hospital and medical schools. South African Hospitals have greater potential to provide good health and build capacity to clinicians and nurses by implementing clinical research in the hospitals. This will also increase number of publications in ZA. According to Sanders and Haines, implementation of research is needed to achieve international health goals; this will include health system research where promotion and successful implementation of evidence-based intervention that have been identified through systemic reviews and clinical research [19]. Clinical research plays an important role in capacity building for researchers and clinicians, it helps in resolving the health care gaps [20]. In ZA there are policies in place to improve health care; important changes have occurred which has improved health care in ZA with a result of diseases that have decreased substantially. But there are still a number of

challenges that need to be addressed like lifestyle risks such as consumption of salt and alcohol; racial disparity in social determinates of health which provides real potential for change [1].

The researcher believes that implementation of clinical research and academic research in the hospitals will help to elevate the pending health care burden in South Africa. Most South African hospitals are not involved in research and South African patients are naïve to research which leaves a huge potential for ZA to attract research to be conducted in the country. Research will build capacity in South African hospitals and will also able to educate out patients in health care matters and improve state of disparity created by the previous regime. Research projects will create employment for the healthcare workers including the community. Communities will be employed as caregivers, fieldworkers, receptionist and study coordinators.

In ZA, hospitals that are located in urban areas with high income are mostly the privileged ones that have most of the facilities, especially those that were previously privileged because the previous regime. Previously privileged hospitals still maintained the good health care and are still supported. The previously disadvantage hospitals and rural or low to middle income hospitals are still struggling and need to be helped. There is also a shortage of Clinicians in South African hospitals in general but rural areas are worse off. The government has implemented changes but these are not enough to change the state of hospitals in ZA especially the rural and low income areas or communities. There is a broad consensus that building research capacity in low to middle income areas can make fundamental improvement in health care [17, 21]. All rural hospital none of them found to participate in any research and also the clinicians and nurses has no experience in clinical research. And majority of hospitals that are not linked to any medical school were not participating in any research regardless of being in rural or urban areas. There are very few South African patients that have participated in the research even in established or privileged hospitals; the percentages of participation are very low.

This leaves, ZA with great potential to participate in or implement research to improved health care and build capacity in healthcare.

- a. South African hospitals infrastructure are capable of conducting research.
- b. ZA has an enabling environment for research and . has state of the art hospitals that can attract international investors to invest in research especially pharmaceutical companies.
- c. South African government can seek assistance from pharmaceutical companies, tertiary institutions, established hospitals, private hospitals and private companies to assist in funding research in South Africa.
- d. ZA can also request help from the grants and collaborative projects, charitable organization and scholarships to fund researchers to study Masters Degrees and PhDs to promote research in ZA [12].

This will also increase number of clinical research papers published in ZA and will also strengthen research with foreign partners [18]. Funding will be needed to train healthcare workers to participate in research and to assist low income areas to create jobs and alleviate disparity and poverty. The difference is large between races as, with white people being the most privileged and black people worst off [1, 22, 23, and 24]. And looking at unemployment during 2011 blacks were still leading with 29.0%, Mixed race 22.6%, Indians 11.7% and 5.9% of whites [24] Even in the medical scheme coverage the black are still the lowest with 10.3% cover as compared to their white counterpart with 71 %. And that it is the same in the household expenditure [25].

Clinical research brought billions of Rands into ZA in the past years and has potential to bring more which will help to provide employment, alleviate illnesses, poverty and provide education and training to health workers, patients and communities [1, 22 & 24]. Enhancing implementation of clinical research in South African hospitals especially in rural areas will help

to reduce the high race disparity, reduce poverty, and provide better healthcare and capacity building of both health workers and communities. Medicines Control Council (MCC) and Ethics committees can promote and attract research by streamlining approval of clinical research within the estimated time. Medical Research council of South Africa can interact with other internationals and promote research in South Africa. Pharmaceutical and other private companies can subsidize research and provide funding and research of new compounds and devices. Academic Hospitals and universities will help to train and provide expertise to healthcare workers and encourages research in the hospitals and universities. Clinical research organizations can subsidize and provide more studies, employment and train health workers and communities in clinical research.

Ekeroma and et al identified four broad types of interventions and component strategies reported by clinicians in research skills. The identified interventions were training workshops, postgraduate training, supportive collaboration and environment enhancers [17]. These are nearly similar to the suggestions mention above. They also showed that postgraduate training, mentoring, research collaboration and a maturing health research system are critical in training clinical research teams [17]

5. Conclusion

Implementation and increase in research activities in ZA will help to resolve some of the healthcare challenges faced by ZA. It will also help to resolve other socio-economic challenges associated which increases the healthcare burden. Department of health and the government need to prioritize the implementation of clinical, epidemiological and academic research in ZA especially long-term studies that will be able to sustain and help to elevate the healthcare burden. This research also supports the review of Ekeroma and et al. Training of health workers on research and promotion of health postgraduate degrees will help to increase publications and they are preferred because they are believed to have higher research output which will attract interest to support research in ZA. The experienced researcher or clinician will give support by mentoring, support clinicians performing research, partnership with other experienced clinicians, universities and international agencies to support research. Funding will help to put policies in place, support infrastructure requirements; support health workers, patients and research field workers which will be employed by the projects of research. ZA needs to invest in good infrastructure and increase capacity in the departments processing research. It has been proven that rural, low and middle income areas are the mostly affected by disparity and poor healthcare and research has improved healthcare in those areas. Clinical research training of clinician in these low and middle income areas will help to improved healthcare and help to increase the declining research activities in South Africa [17, 18]. Clinical research implementation has been used to achieve international health care in the past and South Africa will also benefit and improve healthcare in the country [19].

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