

Implementing lean thinking paradigm practices in medical set up

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Abstract

This paper refers to the study undertaken to evaluate the possibility of using lean principle as a continuous improvement tool in the medical set up with particular reference to the three major hospitals in the Federal capital Territory, Abuja, Nigeria. Questionnaires were deployed to the antenatal patients and structured interviews were conducted amongst senior management personnel. Findings provided the perception of the quality of services being offered the patients in respect to perceived value as expected under lean thinking. The views of those staff elicited through the personal interview showed that there is a wide gap in knowledge about lean principle in general and more so its application in health. Wastage that lean abhors and seeks to eliminate abounds in surplus in areas of unnecessary movement, waste of time at queues to be attended to. Moreover, findings showed wall of departmentalization within the service points that made the customers not to be the center of attraction rather the interest of each units. To surmount this in order to apply lean as a tool of continuous improvement, rigorous training on the subject of lean is mandatory to all the staff from the highest to the lowest cadre in all of these organizations. This is possible with the zeal demonstrated by those interviewed willing to learn new way of attending to their patients (clients) since they receive complaints daily over long stay in the hospital to access services.

Key words: lean philosophy, continuous improvement, quality management, process mapping, health sector



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INTRODUCTION

In a bid for an organization to remain relevant to its core customers, delivering the perceived value as determined by the customers becomes the necessity and the rule rather than an exception. In many manufacturing industries lean thinking has become the tools of choice (Womack and Jones, 2003). According to Hut (2009), lean thinking started with Toyota on their production line in Japan. The essence of the lean philosophy is captured in five concepts: 1) Specify value in the eyes of the customer, 2) Identify the value stream and eliminate waste, 3) Make value flow at the pull of the customer, 4) Involve and empower employees, and 5) Continuously improve in the pursuit of perfection. The ultimate goal of lean is to eliminate waste. Waste is defined as anything which adds cost without adding any value and is categorized as: Muda (work which absorbs resource but adds no value), Muri (unreasonable work that is imposed on workers and machines), Mura (work coming in dribs and drabs with sudden periods of rush rather than a constant or regular flow, unevenness).

However with the passage of times, lean operation has been contemplated in other internal professional service units that ultimately affect its long term performance (Maleyeff, 2006). Beginning from ordinary inspection to administration of quality check, it has grown in the 21st century to the application of 'business excellence' or 'excellence model' such as the European Foundation for Quality Management (EFQM). The laboratory which is a part of medical set up has also witnessed some adoption of the quality tools from the International Standard Organization (ISO):9000 to the present tool ISO 15189:2007 which is specific to medical laboratory (www.iso.org). Both tools on lean thinking and Total Quality Management (TQM) have one thing in common which is the continuous improvement to deliver superior value to the customers.

In the introduction and application of lean principle, Womack and Jones (2003) advised that a particular aspect of service where if lean principle is applied and the benefits are very obvious, should be the place to begin lean operation in order to spur other areas into action of accepting lean. In other words getting started will require a lever for change especially where crisis already exists or create one if lean must be started. Hurst (1995) cited in Womack and Jones (2003: 250) said that one approach of implementing lean is to take sub-unit of the organization which is already in crisis and focus all energies

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on applying lean remedies to it. The success record here will become undisputable and the culture of lean could now be extended to the next unit. In a bid to replicate this feat, this paper was conceptualized.

This paper refers to the study undertaken to evaluate the possibility of using lean principle as a continuous improvement tool in the medical set up with particular reference to the three major hospitals in the Federal capital Territory, Abuja, Nigeria. Specifically, this research considers the antenatal clinics of the Asokoro District Hospital, Maitama District Hospital and Wuse General Hospital at Abuja, Nigeria as the crisis area that need urgent application of lean operation. No hospital in Abuja is known to practice lean principle as a method of continuous improvement on quality of service offered to the clients. Literature review did not also find any hospital in Nigeria or the entire African countries using this tool but many research papers are available on the utilization of lean principle as a continuous improvement tool across the United States of America and in the United Kingdom.

The specific aims and objectives of this research are turned into five (5) research questions as enumerated below:

1. What are the issues when applying continuous improvement tools in the medical set-up in three hospitals within Abuja metropolis compared to lean operation in other professional service organizations?
2. What are the benefits that will accrue to the customers, that is, the patients and the organization when Continuous Improvement Tools are applied in the medical set up?
3. What are the impediments that would prevent the implementation of continuous improvement tools in the medical set up?
4. Can lean principles be applicable in the medical set up?
5. Which are the value, value stream flow, pull and perfection in medical services?

Analysis of the responses received through the questionnaires will enable the formulation and charting of the roadmap that will be used to checkmate the chaotic situation that characterises the antenatal services provided in these hospitals.

The rest of the paper is organized as follows: in the next section the relative literature regarding the deployment of lean thinking philosophy to the health care is presented. The study undertaken to evaluate the possibility of using lean principle as a continuous improvement tool in the medical set up is the main theme of the third section. Moreover, the discussion and interpretation of the derived results from the data gathered for quantitative analyses are presented. Finally, the conclusions, as well as, the limitations, recommendations, and the scope for further research into research into the effects of lean thinking on business performance within the health care sector industry are presented.

Lean thinking paradigm and health care services

It has been very difficult defining lean thinking in one universal language of definition but one thing that is common among all the people with interest in lean principles is waste elimination and creating value. Thus, at a very high level, lean systems gives people at all levels of the organization the skills and a shared way of thinking to systematically drive out waste through designing and improving work of activities, connections, and flows (Flinchbaugh, n.d). The father of lean thinking is said to be Taiichi Ohno who started the Toyota Production System and was at helms of affairs at Toyota Motor Company in the 1980s. The system has a unique way of approach to manufacturing (Liker, 2004) such that waste within the workplace is an abomination. Waiting and over production has zero tolerance. The way out of waste was to move away from one person specialization to employee that can complete numerous tasks providing flexibility.

The lean principle according to Womack and Jones (2003) focuses on performance trade-offs reduction while making the value adding processes to flow to maintain the customers' pull. This will further eliminate waste from the value chain of activities in development and delivery of products to customers as workers and teams are empowered through trainings and skill development. In similitude, The American Society for Quality defines continuous improvement as an ongoing effort to improve products, services or processes. These efforts can seek "incremental" improvement over time or "breakthrough" improvement all at once (ASQ, n.d). In other words, quality improvement is a journey rather than a destination. It's an unending cycle that seeks to improve upon what ever height of quality

that has been attained. Before now, it had been pointed out that various tools abound to be used to attempt process improvement, but the most commonly used one is the Deming Cycle or Shewhart Cycle also known as the Plan-do-check-act cycle.

The article by Bowen and Youngdahl (1998), instructs that lean thinking operation should transfer the lessons learnt from manufacturing to service sector too. This submission was supported by Levitt (1972, p.30) cited in the paper above said that *"if customer service is deliberately treated as manufacturing in the field, it will get the similar type of meticulous attention that manufacturing receives, above all, similar kinds of technical, labour saving, and systems approaches that now flourish in manufacturing industries at the same time have the possibility to do well in customer service industries"*.

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Furthermore, as cited to Castle (2007), *"a management system that originated with a Japanese motor manufacturer is having significant benefits in the healthcare setting"*. This is very true as many authors have proved that lean principle is not only working in service industries but with particular references to what is obtained in hospitals and other medical set up, manufacturing industries can now share experiences on the operation of lean within medical set up (Wood, 2009; Zito and Stewart, 2008 and Sherman, 2008).

The example of Shouldice Hospital is classical on how lean operation in the healthcare set up can be of immense benefit to all the stakeholders. The hospital focuses on one areas of operation, that is, hernia repairs. Extensive participation of the customers, the patients, is capitalized upon through the preparatory, delivery and healing process, thus the customer pulls the services (Bowen and Youngdahl, 1998). In this regards, the nurses have free moments to concentrate on counseling activities, the surgeons being encouraged to work as a team while striving for absolute perfection which is the target of lean operation (Womack and Jones, 2003). In a simple experiment observed in a gastroenterology ward; It was discovered that by mere going out to borrow an item that takes about 10 minutes, for 15 days it resulted into the lost of 30 hours to borrow 90 items (Castle, 2007). This was a colossal waste of time that could have been spent qualitatively with the patients by the Nurses if they organization emulates the use of kanban to replenish items as at when needed which is the fundamental focus of lean operation as designed by Taichi Ohno, the father of Toyota Production System (Castle, 2007 and Ieraci et al., 2008). In a nutshell, Castle (2007) discovered that using lean management technique can help the hospital staff to eliminate wasteful activities. This is the thinking of Christiansen in his study 'embracing change' that positioned his view when he said in adopting a Lean process, using a medical programmer/planners must think in a different way and confront the operational assumptions of the client to produce the best value and eradicate waste (Christiansen, 2009). When lean is properly used in the hospital, value would be defined from the patients' perspective to provide the needed services with higher quality and fewer defects.

The study by Bernd, et al (2010) on policy and practice; hospital capacity planning: from measuring stocks to modeling, painted the picture of hospital set up that should be seen as a manufacturing industry. It was arrived at that health care have many features in common with production of goods where the normal lay out and work flow of hospitals resemble the batch and queue organization in the pre-lean era. Thus equipment and activities are arranged in a type and basis rather than in a series needed to deliver the final product. In other words, patients (customers) are processed in batches before being moved on and most of the times wait endlessly on queue burning their times for no added values which translate to long lead time for processing and high cost in terms of space and capacity for the hospital management and the patients bear this at the end of the processes. The reason this is so, according to the authors is that hospitals are seen in figurative expression as 'warehouses' through the bed number approaches in planning.

The solution offered is *"we need to see hospitals as immensely complicated processing plants, with thousands of parallel, often complex and interlocking processes"* (Bernd, et al, 2010). This is why in health care system, waste in terms of time, money, supplies and goodwill is a common problem because the internal customers are driven by the physicians, insurers, governments rather than the primary customers, the patients whom lean principle sees in that light. Little wonder that Cavanagh wondered aloud and said

"Why should the patient have to wait three or four hours and 25 steps into the process before they see a doctor" (Andel, 2007). This can only be seen when process is mapped out.

Supposedly seeing the patients as the centre of all actions would provide the fertile ground for the planting of lean principle rather than designing the hospital to suite the physicians' and governments' desires. Interesting too, it has been found out by the University of Iowa Researchers that lean practices assists in cutting down the exponential increase in health-care cost. The traditional enemy that lean addresses is how to reduce waste to operate more efficiently and provide gains to the stakeholders (Wood, 2009). Going further in explanation, Wood said that "*just as you see in manufacturing, health-care organisations start their lean activities focusing on the six sigma*" (Wood, 2009). These Six Sigma focused on are sort, straighten, scrub, safety, standardise and sustain. This enables a hospital or a medical set up to move from the traditional batch and queue style to a one piece flow in the handling of patients' charts, because just as the manufacturing has processes, hospitals operate using processes too. Even though in manufacturing the process is physical which could be followed but may not be physical in service industries.

However, in the hospital, patients' flow is physical that could be followed where the patient is the centre of attention. In a similar study by Zito and Stewart, application of lean thinking in a medical laboratory came up with a remarkable success as Centrex Clinical Laboratory's staff attendance to Lean/Six Sigma Conference provided them an opportunity to learn about healthcare organizations that had implemented this process improvement strategy and understood what lean thinking is all about: removing waste and variation that does not contribute to the customer's definition of value; standardizing work processes and keeping work flow through the system (Zito and Stewart, 2008). Little surprise that Sherman hammered home this about Lean and Six Sigma that healthcare organizations can achieve significant results using Six Sigma methods where executives need to consider how Six Sigma fits into the overall strategic plan. She noted that Sigma was created to deal with waits, delays and defects whereas Lean methodology was created to solve flow-related bottleneck issues. The combination of lean thinking and Six Sigma methods have the potential to address many of the health-care delivery problems encountered in hospitals (Sherman, 2006). The bottom line of using lean here though may be difficult initially but not surmountable, is the orientation of the operators that need to be changed to imbibe the culture of lean principle.

The primary aim of lean is to identify steps in service or production that do not add value for elimination while the steps that add value are perfected to serve the customers better. In the healthcare set up it would be perfect to line up in a cell format the various units that would attend to the patients to improve the throughput and prevent the patients from moving from one corridor to the other seeking for the service point where to be attended to. Achieving this is a tall order that would be difficult but never impossible to attend. When the value stream mapping is done, attempt at bridging the gap can become positive. As Tapping and Shuker (2002) argued (cited in Lumus, Vokurka and Rodeghiero, 2006) "*Implementing lean thinking often includes value stream mapping; a process for linking together lean and quality improvement initiatives in order to give the greatest overall benefit to an organization*".

The next section examines the implementation of lean thinking tools in medical set up to specific health care institutions.

Examining the implementation of lean thinking tools in medical set up

This research refers to the study undertaken to evaluate the possibility of using lean principle as a continuous improvement tool in the medical set up with particular reference to the three (3) major government owned hospitals in the Federal capital Territory, Abuja: Maitama District Hospital, Asokoro District Hospital and Wuse General Hospital. The reason for choosing these hospitals is that the populations of patients (customers) that attend these hospitals far supersede the number of patients that attend other private hospitals within the capital city of Abuja.

Written authorizaion was obtained from authority of the Hospital Management Board of the Ministry of Federal Capital Territory (MFCT) Health and Human Services Secretariat that supervises these hospital. The Obstretics and Gyneacologist (O&G) doctors in-charge of these clinics, the Nursing Matron in-charge of these clinics and one senior staff of these hospitals interviewed indepthly to answer the research

questions put forward. Questionnaires then administered on 114 patients chosen randomly on clinic days over 4 weeks which provided the means of identifying the value, value stream, the expected flow so that pull and perfection could be determined.

The questionnaire (see Appendix) consists of questions related to the demography of the respondents to establish their competency in answering the questions; questions that relate to their perceived satisfaction and the waiting time at the various service stations within the antenatal clinic set-up. The structured interview questions were also similar, in order to compare the views of the service providers with that of the customers and the observations made by the authors during the clinic sessions.

A pilot study carried out before rolling out the questionnaires in order to determine the practicability of collecting data with the questionnaires. The researchers had at various times had contact with the operations of these three hospitals with the effect of knowing the terrain on what it takes to gather the data required for this study.

Questionnaires were developed as appropriate to generate answers that would proffer insight to answering the research questions mentioned above. The target respondents were the antenatal patients who are supposed to specify the values expected from the medical set up that they visited. Structured interviews were conducted amongst the senior staff of the antenatal clinics of these three hospitals to get their views on the issue of implementing Continuous Improvement tools and the expected hindrances. The interview / cum observation aspect focused on observing the ways processes are carried out to arrived at attending to customers.

The result of the analysis was used as the basis on which conclusion was drawn to know if continuous improvement tools as provided for through lean thinking and TQM tools could be used to create wealth to the customers and banish waste in the medical set up. The way forward as to how these tools could be introduced and deployed to other facilities would be determined from the study. The way of dealing with observed hindrances will also be proffered.

First, the study was focused to a specific and critical business process that refers to the operational processes within the antenatal clinic which constitute the core business of creating the primary value stream. The operational processes in the antenatal clinic begin with the customers' arrival to the clinic to be registered and be attended to in order to have a safe delivery of her baby after the third trimester. The successful implementation of these processes determines if the clinic justifies its existence. The value of service received by the customers also determines if she will return to that clinic for subsequent antenatal services or referring another customer to access antenatal services in that same hospital. These are the main reason why the quality of services delivery must be continually improved to keep the organization in business and the employees continuously retained to provide the service.

The following figure depicts the current value stream mapping to services at the antenatal clinics in order to propose.

Insert figure 1 here

In terms of waiting at the five (5) Waiting Points (WP) which could be considered as wastages to be eliminated, the following charts illustrate the realities during registration to collect hospital card, waiting to be seen by the nurses, waiting to be attended to by the doctors, waiting to be attended to in the laboratory and waiting to collect drugs at the pharmacy.

Insert figure 2-6 here

Based on the findings, when the question was asked on how many hours it took the respondents to be registered and issued hospital cards and folders, 108(94.7%) of the respondents provided answers and the number of hours spent on this element shows that 40(37%) of them spent 2 hours and above while next to that is 36(33.3%) that spent between 30 minutes to 1hour. 13(12%) indicated 0-30 minutes; 11(10.2%) indicated 1to 1^{1/2} hours and the least 8(7.4%) occupies the rear of 1^{1/2} to 2 hours.

The question regarding the number of hours spent waiting to see the nurses elicited responses from 110(96.5%) of the respondents and the hours spent ranged from 30 minutes to 1 hour with the highest score of 38(34.5%) whereas 2 hours and above and 1 hour to 1^{1/2} hours had 26(23.6%) and 27(24.5%) respectively. The least figure was 2(1.8%) respondents for 1^{1/2} to 2 hours.

The next question addressed the issue of waiting time to see the doctor after the nurses had performed their duties. 104(91.2%) responded to this question with a total number of 10(9.8%) respondents skipping the question. Most patients, 42(40.2%) spent about 30 minutes to 1 hour waiting to

see the doctors. 23(22.1%) less than 30 minutes waiting, yet 17(16.3%) had to wait for more than 2 hours in order to be able to see the doctor. Those that spent between 1^{1/2} to 2 hours waiting were 5(4.8%).

Second, regarding the research questions, the following findings arose:

First question: "What are the issues when applying continuous improvement tools in the medical set-up in three hospitals within Abuja metropolis compared to lean operation in other professional service organizations?"

The first issue that jumped into prominence is the lack of knowledge of lean principle. Lo and behold all the interviewees that were encountered claimed outright ignorance of the meaning of lean concept. On the whole every one of them is knowledgeable in their areas of core profession which are nursing for the nurses and obstetrics and gynecology for the doctors. But in terms of deploying the lean in health principle, they are yet to come across who will teach them on this topic. Of course the lean principle can never be operated by those who are novice in its application as regards the merits and demerits. It said that much of what we can learn about lean comes from the Toyota Production System (Flinchbaugh, (n.d)) This implies that lean must be learned by whosoever what to apply it the knowledge entails that there should be a systematic elimination of waste so that a system that makes their learning to adapt to better way of doing things becomes their tradition rather than exception. It is a common dictum that knowledge is power. This saying is more relevant here than elsewhere since everyone in the organization must focused real-time on solving problems to chase waste out of the organization. The knowledge that must be learned if lean must be applied is the standardized way of thinking at Toyota as spelt out by Steven and Bowen (1999) that:

1. All works must be clearly specified as regards the content, processing, timing and the expected outcome, in order words, the activities must structured.
2. All customers must be clearly connected without ambiguity with a 'yes' or 'no' responses to receive or send request.
3. Every step of activities must be specified and simplified too.
4. Improvement must be implemented from the lowest simple step with scientific method under a supervisor.

This is buttressed by the statement that there are number of key lean principles, without their understandings; implementation of lean becomes a mirage in any organization desiring to go lean. The knowledge with commitment is all that count to make lean successful (lean-manufacturing- junction.com, n.d). Herein lays one of the issues in using lean principle as a continuous implementation tool in these three hospitals. By extension and applicability, if the best of the hospitals in the Nigeria's federal capital, Abuja have senior management staff that are ignorant of lean principle, it is only imaginable the level of knowledge of lean principle amongst the health care professional in Nigeria. There is a huge gap of knowledge that should be covered in operating lean principle in the health care set-up.

Prominent amongst the key finding is also the fact that it is obvious that there is a lot of waste in the value stream of accessing services in these hospitals. In mapping out the value stream, it was noted that there are 4 places of waiting (Figure 1) that hardly add any value to the process. Majority of the respondents to the questionnaires agreed that the spent about 5 hours on their first visit. The interviewees also collaborated this when 4 out of the 6 interviewees said the average number of hours patients spend on their first visit is 5 hours. Waiting in these 4 places provides an estimated time of 3^{1/2} to 4 hours on waiting alone thus the value added time spent in the hospital is between 1 to 1^{1/2} hours. This muda must therefore be eliminated if the patients were to receive value for their time and money.

Another issue that was clearly demonstrated was that the inadequate number of staff would hamper the lean method of operation. Responses from majority pointed out the need to recruit more staff. In the same vein, the interviewees opined that they are grossly inadequate hence the batching of all patients to reduce the stress of attending the patients singly. The building pattern of the hospitals is a typical issue that has to be dealt with if lean operation could be instituted. Lean demand that departmental wall must be broken down in such a way that cells are created that should cater for the needs of all it take to produce a product or provide a service. In this case, the hospitals are departmentalized such that the Medical record unit is different from laboratory department and more so, the pharmacy has its own department separate from the nursing department. With this the product which is the patient is not seen as one piece flow but they need t have their professional support staff by

their side and everyone working on the product or service needs to be able to see the status of the entire production system (Womack and Jones, 2003). The best thing therefore is a concept of antenatal clinic that will have the services of the medical records, laboratory services and the pharmacy enclosed under one roof or within the same vicinity in such that patients will not be wandering about looking for one department or another to access other services after being attended to by the nurses or and doctor. The study also brought out one vital factor that is required for the operation of lean principle; commitment of the staff. Those interviewed are all in one accord willing to accept any better way of attending to the patients. Already, the interviewees all acknowledge the feedback from patients on spending more than expected number of hours to receive services. If the benefits of lean principle can be demonstrated, it is expected that the commitment of the senior management staff would be secure to blaze the trails of operating lean in these hospitals.

Second question: What are the benefits that will accrue to the customers, that is, the patients and the organization when CIT are applied in the medical set up?

In addressing this point, gathered from the study is the fact that there are so many waiting time that could be eliminated because it was deduced and observed that many of the waiting areas do not add any value to looking through the route map to services delivery. Therefore the first major breakthrough applying the lean principle is the cutting down drastically the waiting time. This will translate to quick service to the patients and a reduced turnaround time will create time for the staff to innovate and improve their services to the patients (clients). Innovation and improved services is the hall mark of continuous improvement tool which lean seeks to achieve. Quality of service will be improved such that patients spend more time with the service provider rather than spending the time waiting to access services. It is observed by the authors that the service value stream mapping will benefit the organization such that a reorganized value stream will cut down the unnecessary waiting time.

Third question: What are the impediments that would prevent the implementation of continuous improvement tools in the medical set up?

During the course of this study, some issues were discovered as the major impediments to the deployment of lean principle in any of these three hospitals despite that during the literature review, it was obvious that lean application in health is a possibility. First is lack of knowledge. The personnel will need lots of advocacy and training to be able to imbibe the culture of lean principle. Learning from the example of Wipro Technologies, what is to be done is to teach and distil the relevant aspects of lean manufacturing so that managers can see how these tools were applied successfully in a service environment similar to their own and to prove that improvements can be brought to services through some of these lean concepts (Hanna, 2007).

Followed closely to the above point is the impediment created by departmentalization which forms barrier wall to the flow of services processes. The set up in these hospitals is such that departmental wall are so visible in such that each department is silo or an island to itself with the tendency to protect their so called 'professional territory' and not minding the reason for their existence which is the patients. There is an in-fight between the departments for supremacy hence each department waits for the patient to come to them and to prove what their worth is in the medical sector. The nurses feel that without them the patient can not get their desired services, the doctors feel they have the most important skill to care for the patient, the laboratory department feels without them no diagnosis or monitoring of the patient health could be possible and the pharmacy sees their department as the ultimate such that without getting the drugs, every activities engaged in throughout the whole day is of no effect. It is in these scenarios that the patients find themselves rather than being at the centre of care, the rightful thing, but unfortunately have to bear the brunt by spending the whole day in the hospital to receive the service that the entire value stream should not be more than 3 hours. The designers and hospital administrators must realize the need to collapse the departments but create the service cells that comprise of the various professionals that should provide the services in a seamless flow based on the needs of the patients.

Fourth question: Can lean principles be applicable in the medical set up?

This has been addressed by the various literatures that were reviewed in the course of this study. The following healthcare facilities, Shouldice Hospital, Centrex Clinical Laboratory, Children Hospital/Regional Medical Centre Seattle, USA, Flinders Medical Centre in Bedford Park, Australia, amongst other healthcare centre across the globe have implemented lean principle and have come up with positive results (Lumus, Vokurka and Rodegheiro, 2006; King, et al, 2006; Ben-Tovim, 2007; Tsisis and Bruce-Barret, 2008). These notwithstanding, there is no single hospital in Nigeria or other Africa countries that have a documented use of lean principle as a tool for continuous improvement program. All the searches to find this evidence yielded none to indicate the use of lean tool in healthcare set up. It is still to be seen whether what is being practiced as regards lean principle in health could be replicated in the Nigeria's healthcare set up, is a matter that needs more than just a mere wish but rather a pragmatic efforts to bring it to fruition.

Fifth question: What are the value, value stream flow, pull and perfection in medical services?

The observation strategy employed as part of the research methodology affords the authors to map out the value stream of the antenatal services in these three hospitals. The present value stream pathways are similar in the three of them as depicted in Figure 1. The places where valuable services are offered are the card room where patient folders are collected. Health talk session where the nurses speak to all the patients as regards health related topics especially how to keep themselves hygienically healthy while under pregnancy; Signs of true and false labor, what to eat in order to remain healthy; child spacing strategies and the available options; how to take care of their new born babies and other similar topics. Examination by the nurses or doctors to determine the necessary laboratory investigation to order, take the patients history as to the number of previous pregnancies, immunization schedules, number children alive and any other hereditary condition to be careful about. The laboratory department is where all the investigated requests will be carried and finally, the pharmacy unit that make available all prescribed drugs and counseling them on the use of the drugs. All of these steps are the vital stream maps that all the patients undertake. Some of the waiting points could be eliminated while others are necessary but works towards elimination.

The patients do not need to wait three to four hours with 25 steps within the process of seeing the doctors (Andel, 2007). The future value stream mapping (Figure 6) to receive services in these hospitals is such that the unnecessary waiting points should be eliminated in order to create flow for perfection. The authors' major aim of value stream mapping is to develop linkages between lean and quality improvement initiatives that will give the greatest overall benefit to the patients and thereafter the hospitals (Tapping and Shuker, 2002 cited in Lumus, Vokurka & Rodeghiero (2006)). The envisaged future value stream is such that all the unnecessary waiting time that could immediately be removed are done away if a restructure of the way services are delivered are carried out with the patient being the focus of every department and having the departmental wall broken down. The waiting time between the card collection and the time the nurses give the health talk is however tolerated now and should be worked towards elimination. The value added services points identified in Figure 1 could be streamed line to flow seamlessly so that bottle necks between the service points are further smoothed in such a way that no unnecessary movement between them are created. Service cell that would provide all the necessary antenatal care are provided under the same roof. All that needed to be done is to have all the providers of these services focus on the patients.

The following figure (Figure 7) presents the new / proposed process that reduces the waiting time to the lowest minimum. It is deducted from the route map redesigned to eliminate the unnecessary waiting time.

Insert figure 7 here

In the above figure, the patient (customer) collects the standard lecture notes on health talk and only waits if she does not understand any point; else she reads and proceeds to see the nurses or doctor for examination. There would not be any need to wait for specimen collection as a dedicated laboratory is located within the same vicinity to collect the samples. Finally, as soon as the patient is done with in the laboratory, she moves to the pharmacy store within the same unit to collect her drugs and off, she goes and the visit to the antenatal clinic is over. The difference therefore is that 4 waiting points are eliminated.

In lean principle, apart from the value stream mapping that was used to arrived at the workflow, other lean techniques for continuous improvement that could be employed are: good management technique, operational planning, 5 'S' system, visual factory management techniques, quality function deployment, and process definition and redesign. Similarly other continuous improvement tools apart from lean manufacturing which has been adopted in service sectors like healthcare are: Lean and Sigma, Total Quality Management, Agile manufacturing, Six Sigma, Toyota Production System and even Theory of Constraints. Looking at all of these, Katz (2007) in his study with 745 respondents discovered that those that use lean principle for continuous improvement program records a 40.5% followed by Lean & Six Sigma with 12.4% while others scored below 10%.

DISCUSSIONS AND CONCLUSIONS

This research fills the yawning gap of studying the use of lean principles as a tool for continuous implementing tools in a medical set up, narrowed down to the antenatal clinics of the three major hospitals in the Abuja metropolis, the federal capital of Nigeria. The patients who are the clients receiving the services provided by the hospital provided the data that were used to evaluate the factors they consider as values sort after in the hospitals. The top management staff provided insights into the working of the operations within the set up through structured interviews. The author's observations summary completes the triangulation factor needed to conclude the study. The study is just the genesis of exploring the use of lean principle to implement continuous improvement as a means of total quality management and to provide the clients value for their money and time in accessing healthcare services.

The summary of the questionnaires showed that there are many areas of wastages especially waiting time, unnecessary movements from one point of service to another. The interviewees agreed that their clients complains of spending many hours in the hospital either as a first timer or on follow up visits to the clinics. Major impediment to operate lean in these hospitals is inferred to be lack of knowledge of lean principle. None of the staff interviewed had ever read or been taught lean principle either in school or in seminar. It will therefore require a major work to teach from the top management staff to the lower cadre of staff what lean is all about and how it could be applied in the healthcare set up. However, the good thing about the top management staff interviewed was the fact they are willing to learn new way of attending to their patients which will be better than what they presently do. Identifying the change agents with appropriate knowledge of lean that could champion this course becomes the way forward.

All the hospitals under studied do have continue medical education program that takes place twice a month which could be a good avenue to start the campaign of disseminating lean knowledge. When the staffs are properly schooled in lean principles, starting might be easier even though resistance can not be ruled out from certain quarters.

The second point of impediment is the structure on ground. The building plan of the hospitals are so departmentalized that workers do not have the patients as the centre of their activities but what their department stands to gain within the set up. The service point of the nursing station is far located from the laboratory and the pharmacy where the patients need to receive services too. The ideal thing is to have the laboratory that specifically carries out the investigations requested for antenatal patients located within the premises of the nursing station. There should be a mini-pharmacy located within this antenatal clinic too. All of these will require the administrative willingness and commitment to achieve.

The city of Abuja is portioned into districts. It will be a good idea when another hospital is to be built in the newly districts under construction, the hospital building should be structured into services cells rather than departments. Patients that come to the hospital for antenatal care will have all needed services located in a particular section of the hospital; patients that come for dental care should have the required services located in another section; patients that come for ophthalmology should have all required services within a cell. With this arrangement, unnecessary movement would be minimized to the barest minimum which translates to faster access to services with the resultant spending of less time within the hospital complex.

Summarized in the table below are the expected benefits and corresponding challenges in deploying lean tools.

Insert table 1 here

This study could be further carried out by using this base line knowledge to actually start up lean operation in one service sector of the hospital to see how it translates the services offered to the clients, compared the quality and the value of services offered the clients to what is presently obtainable without lean implementation. In the further research, the author could take the advantage of the challenges spelt out in Table 1 above to be able to devise mean of overcoming the obstacles.

The limitation and difficulties experienced during the survey and interview section could be become handy for further researchers to gain from. This study entails spending of money to fund the survey. It is time consuming. The management staff too busy to engage at will. Their working weeks are fully booked. The doctors are always on the move with little time to be engaged in a long dialogue. This research is however an eye-opener to the fact that there is muda in the present way of attending to patient in most Nigerians hospital. There is little or no knowledge of lean amongst the healthcare professional in most of our hospitals in this country. On a final note, Progressive Health Care located in several places in the USA uses Lean Thinking to involve both the clinical and the non-clinical staff to spot the value added and non-value added steps within the services process. The patients' points of view gathered through surveys were also considered so that they have time with authority and flexibility to look for waste and remove them. The result of this is a higher commitment to change with a strong team spirit from the employees that gives the patients the value for their money and time (Bushell, Mobley and Shelest, 2002). This too is possible in the three hospitals studied which could be replicated in other hospitals across the country when the enabling environment is created.

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Appendix

Appendix I: Survey Questionnaire

	Questions	Answer (please tick \surd 1 answer)				
1	How old are you now?	15-20 yrs	21-25 yrs	26-30 yrs	31-35 yrs	36 yrs +
2	My level of education is (Please tick \surd as appropriate)	Primary		Secondary		Tertiary
3	How many times have you delivered in this hospital?	0	1	2	3	4+
4	How many hours did you wait for you to be registered?	0-30min	30min-1hr	1hr-1 1/2hr	1 1/2hrs-2hrs	2hrs and above
5	How many hours did you wait to be attended to by the Nurses?	0-30min	30min-1hr	1hr-1 1/2hr	1 1/2hrs-2hrs	2hrs and above

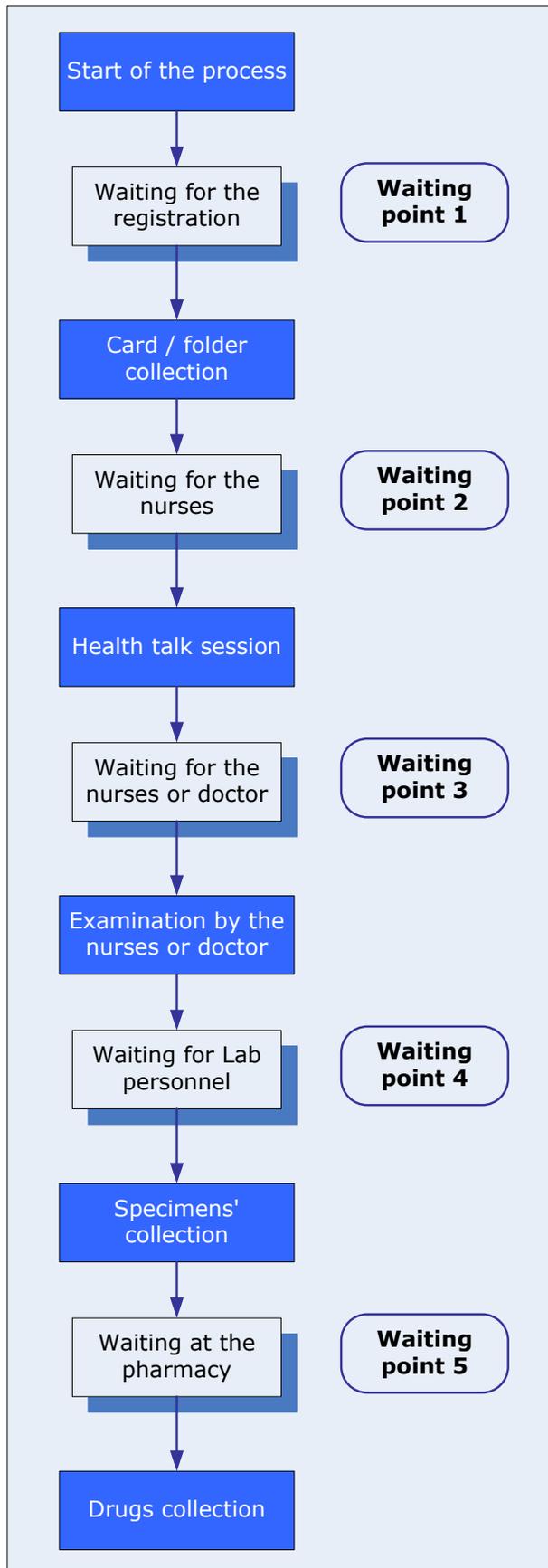
6	How many minutes did you spend with the nurses on the first visit?	10-15 min	15-20 min	20-25 min	25-30 min	30 min +
7	How many hours did you wait to see the doctors after seeing the nurses?	0-30 min	30-1hr	1-1 1/2 hrs	1 1/2-2 hrs	2 hrs +
8	How many hours did you spend with the doctors on the first visit?	10-15 min	15-20 min	20-25 min	25-30 min	30 min +
9	How many hours did you spend in the Laboratory to be attended to?	0-30 min	30-1hr	1-1 1/2 hrs	1 1/2-2 hrs	2 hrs +
10	On the average, how many hours did you spend in the entire hospital the first day you registered for the Antenatal Clinic (ANC)?	1 hour	2 hours	3 hours	4 hours	5 hours +
11	How many hours did you spend on follow up ANC visits?	1 hour	2 hours	3 hours	4 hours	5 hours +
12	How many hours will you considered best to be spent on the first day of ANC registration?	1 hour	2 hours	3 hours	4 hours	5 hours +
13	How many hours will you consider best to be spent on subsequent follow up ANC days?	1 hour	2 hours	3 hours	4 hours	5 hours +

	Please tick 1 box as appropriate	Strongly Agree		Not Sure	Strongly Disagree	
		1	2	3	4	5
14	The time spent waiting to collect registration card is too long					
15	The time spent waiting to see the nurses is too long					
16	The time spent waiting to see the doctors is too long					
17	The time spent waiting to be attended to in the lab is too long					
18	The time spent while Nurses attend to me is too long					
19	The time spent while Doctors attend to me is too long					
<p>20. Which area of waiting do you think patients spent more time?</p> <ul style="list-style-type: none"> a) Waiting to see the nurse b) Waiting to see the doctors c) Waiting to be attended to in the Lab <p>21. Which area of service do you think patients spent more time?</p> <ul style="list-style-type: none"> a) Collection of card b) Seeing the Nurses c) Seeing the doctors d) Being attended to in the laboratory <p>22. What do you like most in coming to this hospital for ANC services.....</p> <p>23. Please in what way(s) do you think this hospital can better serve the ANC patients</p>						

Appendix II: Structured Interview questions for management staff

1. How long have you work in the antenatal clinic of this hospital?
2. What are the routine practices in the antenatal clinic as regards route mapping?
3. Do you think the patients get value for their money and time for coming here?
4. What is your estimation of the average number of hours a patient spent on her first visit?
5. What is your estimation of the average number of hours a patient spent on subsequent follow-up visits?
6. What do you see as the reason for spending this amount of hours accessing antenatal services?
7. Do you think there could be a better way of serving these clients?
8. Have you ever had any feedback from any patient of spending time more than expected in accessing antenatal clinics?
9. If better ways of attending to patients are available do you think it is practicable?
10. Have you read or heard about 'lean' principle application as a way of continuous improvement tools?
11. Any other comments?

Figure 1. The current value stream mapping to services at the antenatal clinics



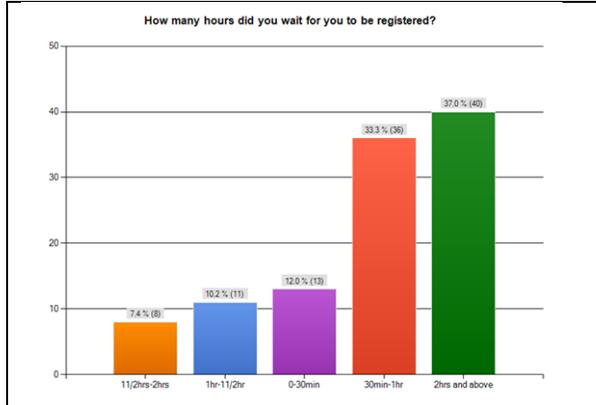


Figure 2. WP1: Period waiting to be registered

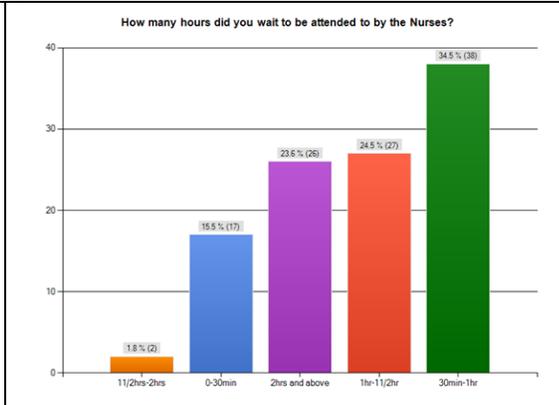


Figure 3. WP2: Period waiting to be attended to by the nurses

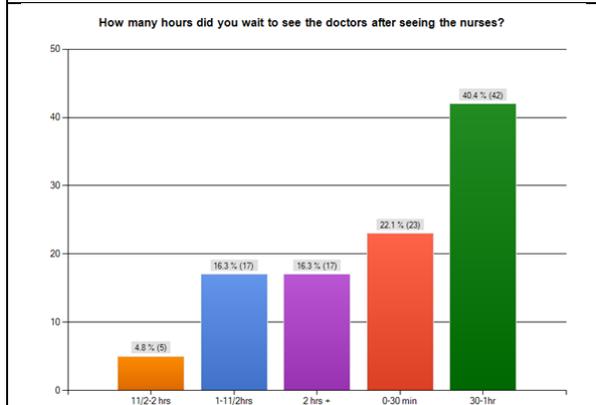


Figure 4. WP3: Period waiting to see the doctors

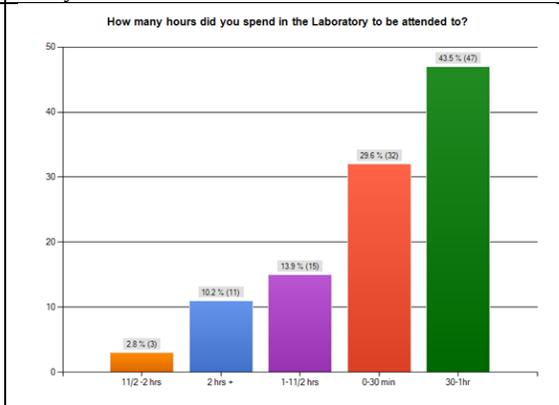


Figure 5. WP4: Period of attendance in the lab

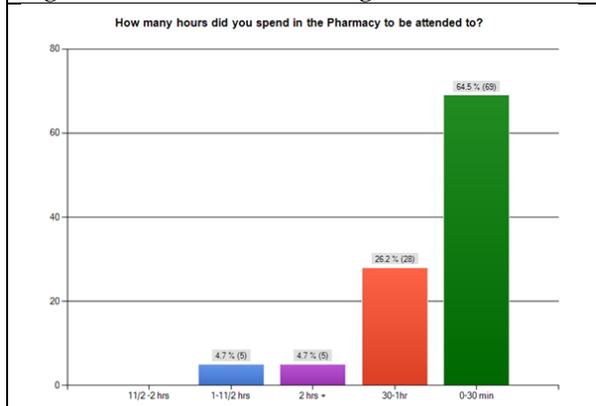


Figure 6. WP5: Period of attendance in the pharmacy

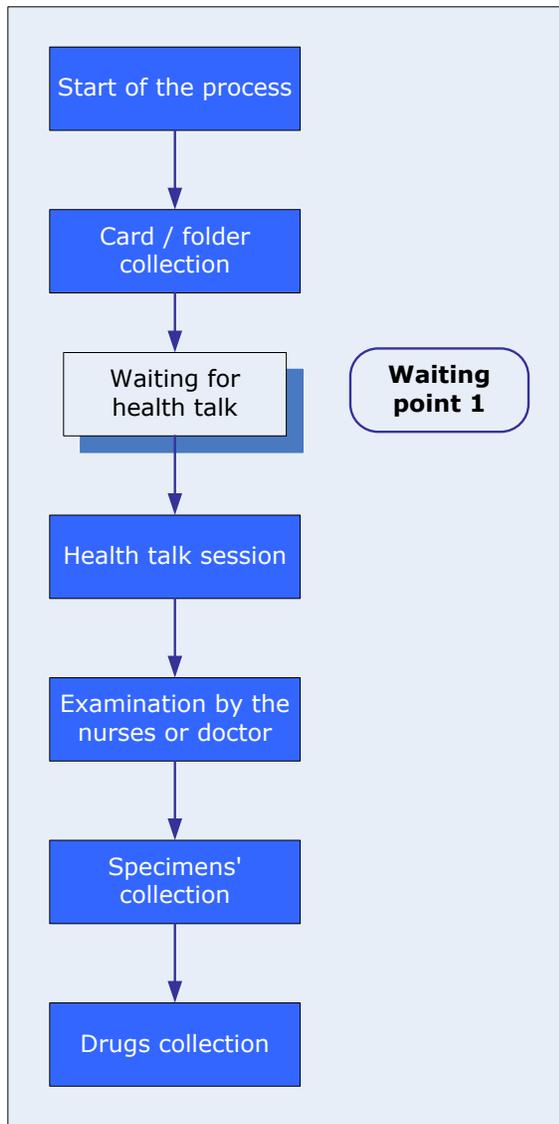


Figure 7. The proposed value stream mapping to services at the antenatal clinics

<u>S/N</u>	<u>Benefit</u>	<u>Challenge</u>
1	Stoppage of unnecessary movement within the hospital	Difficulty in locating all needed services in one cell
2	Spending less time waiting	Need to gather all the patients for a health talk at once
3	Satisfying the customer (patient) becomes the focus	Departmental barrier created by various healthcare professional
4	Reduction of cost of providing services by creating cells of services	The need to redesign the hospital set up

5	Striving to perfection for flow of service by eliminating wastes	Seeing the wastes that exist within the pathway of service points.
6	Knowledge acquisition on lean	Scarcity of 'change agents'

Table1. Benefits and challenges of operating lean.