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Scientific Management Tools and its Relevance in Healthcare Sector in the Present Scenario

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Abstract

Globalization of health and healthcare, opening up of economy, participation of private players in healthcare sector, more developing nations are keen to develop this sector in line with that of developed countries to make a mark on the global healthcare. The need of the hour is to implement scientific techniques in healthcare for better results. In this regard, a study is made on the scientific management theory and techniques developed and adopted by F W Taylor popularly known as “*the father of the scientific management theory*” and its relevance in the present healthcare environment are discussed. The principles laid down by F W Taylor that the relationship between the employer and employee and their functions the goals of the employer, the functions of the employee in healthcare holds good to certain extent. Due to the advancement of technology like Information Technology, Data Base, Cloud Computing more sophisticated equipment doing specialist’s job have changed the nomenclature of Scientific Management Techniques. However, the main principles of selection, training, absorption, functions of each section of the organization are still holds good. A detailed discussion in the article these subjects namely the relevance of Taylor’s Scientific Management Techniques in the present healthcare environment and their applicability/usage are all discussed and suggestions are made wherever it is necessary.

Unlike other organizations, healthcare facility is case

specific and no two procedures are alike and the functions are strictly related to humans by humans. Though the main goal of any organization is profits on the investment made and healthcare is none to second in this regard, the only difference being in healthcare the product is nothing but a service and the provider should give proper service to the satisfaction of the receiver; means since the product is intangible and cannot be produced and stored, while the consumer (patient) comes to the healthcare facility to get a relief from his/her discomfort/ailment to the facility, the provider/professional suggests a procedure if that is accepted by the receiver it will be carried out that means the consumer goes to the providers facility receives the procedure and goes home free from discomfort that means production, consumption and absorption of the service product will take place in providers place and it is case specific. All these aspects in addition to the modifications that are needed without changing the well knitted fabric of the main principle of Taylor that holds good are also discussed. On observation it is found that Taylor’s scientific management techniques are relevant and incorporated in the present healthcare system for optimum results. No method/principle/theory is full proof but they have to be incorporated with modifications and redesigning them to suit a particular environment but the main motive of profit for performance will never change.

Keywords: Scientific Management, Time Study, Motion Study, Method Study, Attribution Theory, Evidence Based Management Theory, Utilization Management Theory, Strategic Planning

1. Introduction

In the late 19th and the earlier 20th century when the rule of thumb is the order of the day in any organization for running any organization to achieve the desired goals and for economic efficiency, a sudden change in the functioning of the organizational structure was introduced by Fedrick W Taylor that has changed the industrial scenario with respect to functions of any organization with the introduction of Scientific Management techniques by Fedrick W Taylor, who has invented the scientific methods in evaluating the performance of a man at work and the time consumed to complete the task etc., were analyzed when he found that there is a vast difference between the time consumed for completion of the task and the time required for the completion of the task, he noticed that by changing the operational environment, functional improvement can be achieved by

reducing waste of time, movement, methods etc., this was followed by the successive managers by applying Time Study, Motion Study, Method Study techniques, they are able to get the success with leafs and bounds. The principles applied by Taylor still holds good in today's environment. In this article an attempt is made to focus, the relevance of Scientific Management techniques in healthcare sector to achieve the managerial goals without any discomfort or ill feeling to the consumers (patients) and healthcare professionals.

Unlike other organizations the functioning of healthcare is entirely different because in a healthcare facility the functions are strictly related to human beings who are not too comfortable in a position and they come to the healthcare facility to get rid of their ailments/discomforts and come to the original situation as before to lead an healthy life. Hence, though the Taylorism in principle will be fit-in-to in healthcare services with little modifications to get economic efficiency and output. F W Taylor the "*father of scientific management*" has created a system for measuring and constituting standards for any function in any organization which is called Taylorism which he believed that,

"The natural instinct and tendency of men is to take it easy. To overcome this lethargyness and maximizing the efficiency of work and organizational capacities, Taylor designed a controlled structure of work of performance which included to ascertain scientific tests with which the capacity of a worker can be calculated and to introduce incentive system to make the worker to attain the goal".

As already mentioned above healthcare sector will function in an entirely different note and is case specific, because the ailment/discomfort of each patient differs, the treatment differs, the procedures are different and are to be treated in different environments, Applications of Scientific Management Theory in healthcare is a bit complicated but not difficult. Depending upon the healthcare facility, meaning its size, number of patients can be accommodated, whether it is a multi speciality or super speciality healthcare facility, number of healthcare professionals working etc., has be taken into consideration while developing the techniques for functional efficiency with economic goals by attaining the desired results of the management. In this article an attempt is made to discuss the above points in a broader sense, like Principles Of Scientific Management and their applicability with healthcare system, Application Of Scientific Management Techniques in eliminating the inefficiencies and to maximize the efficiency, the impact of Scientific Management Techniques after covid 19 pandemic, which has created a situation wherein new developments on health and healthcare have cropped in and the techniques that are to be applied to neutralize these deficiencies/inefficiencies etc., are also discussed. Above all one should keep in mind as the entire organization of healthcare/healthcare facility is knitted around human beings and their healthcare, the techniques that are designed and implemented should not burn out the energy of the healthcare professionals, else, it will have adverse impact on the patients and the co-professionals. The healthcare providers and managers while designing and implementing healthcare design techniques should keep above in mind but

not profit motive only.

2. History of Scientific Management

Way back in the year 1877 Fedrick W Taylor at the age of 22 when he joined as a clark in Midvale steel company in America and became foremen by 1880. During this tenure he noticed that the workers turn out is only a 1/3rd of the total work that ought to be produced. Then he started working on the functions of the organization in each and every stage and calculated the time that should be taken for a given piece of work/function and the minimum time that is consumed and found that much time is being wasted which he called it as idle time, this led to the birth of Scientific Management Technique that can be put in to any operation in a piece of work/function to eliminate the waste. This led to the theory of Scientific Management Techniques that were extended in a more workable manner subsequently by Frank B Gilbreth and Harrington Emerson etc.

The main aim of the Scientific Management techniques are in pursuit of economic efficiency of any organization. The main object being to introduce empirical methods to determine efficient procedures rather than following established traditions and norms. This included Time and Motion Study, Efficiency of Movement, Operations Management, Operations Research, Management of Science, Logistics, Process Management, learning while functioning etc. The other important aspect being the workforce will have their own vested interest in their wellbeing unless they are benefited from working above the rate of defined work, when it is not going to increase their wellbeing by way of promotions/incentives/salaries, there will be a resistance in implementation. Taylor believed that, "*if each employees compensation is linked to their output, their productivity will go up*". However, this concept will work only in certain sectors of the healthcare facility that to those employees who are not healthcare professionals. In this context, the wisdom of Taylor's Principles of Scientific Management Theory will not have any bearing if they are introduced to healthcare professionals like specialists in all departments, surgeons, physicians, paramedics. However, these techniques can be suitably modified so that they are applicable to the above said professionals also without compromising with their efficiency in terms of output. One observation is mandating targets to the professionals and specialists that results in medical negligence, medical malpractices by the professionals in meeting targets.

3. What is Scientific Management?

According to Wikipedia Scientific Management means,

"Is a theory of management that analyzes, synthesizes work force. Its main objective is improving economic efficiency, especially labour productivity. It is one of earliest attempts to apply science to the engineering of processes to management. Scientific Management is sometimes known as Taylorism after its pioneer Fedrick Winslow Taylor".

4. Definition of Scientific Management

"In Scientific Management theory normally the focus is in the goals and productivity. The organization is viewed as a machine to be run efficiently to increase production. Managers must closely supervise to

assure maximum efficiency, workers must have proper tools and equipment. There is a focus on training the workers to work more efficiently and performance incentives are used. Time and Motion studies are the vehicles for determining how to do and organize the work in the most efficient manner”.

The other way of defining Scientific Management in healthcare is,

“Organized way of getting work done with the right information, resources and people at the right time. Work done through others – done properly on time within budget. Process composed of inter related social and technical functions and activities occurring within a formal organizational setting for the purpose of accomplishing predetermined objectives through utilization of human and other resources” (<https://managementinhealthcare.usf.health.in-phc4630>)

5. Principles of Scientific Management

The principal object of Taylor management theory is,

“Maximum prosperity for the employer coupled with maximum prosperity for each employee. Maximum prosperity is used in their broad sense to mean not only large dividends for the company or owner, but the development of every branch of the business to its highest state of excellence, so that the prosperity may be permanent”.

A reading of the Scientific Management principles invented and adopted by F W Taylor and the subsequent developments by the subsequent scientists will show the outcome with respect to productivity, efficiency and quality. In general, they can be classified into six,

1) Development of Science for each part of person’s job, by replacing Rule of Thumb: The principle suggests that the work assigned to any employee should be analyzed, observed with respect to the element of time, motion and method involved. In a way, it is to eliminate the Rule of Thumb, means, the personal view of any manager to be followed is redefined by analyzing the data and reducing the idle movements and methods - thus increasing the output. Under this principle of Scientific Management the decisions are made on the basis of actual facts with the help of application of scientific decisions rather than Rule of Thumb.

2) Selection, training and development of workforce: Means especially in the healthcare facilities selection, training and development, deployment plays an important role. Since each task/each work is well defined in the healthcare, the selection should be scientifically made by pre-determined requirements of each job and selecting the people who are in line with the specified requirements. Not only selection but the training imparted after the selection should be done in a scientific manner to suit to that particular function and to fit into that particular situation/environment in that facility. The healthcare providers/management should provide an opportunity for these healthcare professionals to develop and show their

capabilities so that they can achieve the desired goals of the management. In this regard, the management should encourage them by suitably recognizing and rewarding their merits.

3) Cooperation between management and professionals

/workers: F W Taylor mainly believed that for the success of any organization, cooperation but not individualism is important to achieve the managerial goals. Only with the mutual cooperation of the workforce (especially in the healthcare facility professionals and nonprofessionals) between the providers and professionals the desired goals can be achieved. F W Taylor also believed that the interests of employer and employees should be fully harmonized and environment of mutually understandable relationship should be created for a smooth functioning of an organization. Especially in healthcare facility this cooperation and harmonization but not individualism is important because healthcare is related to human by humans, who are sensitive and there comes instant reaction to any situation it may be good or bad.

4) Division of responsibility: This principle should be carefully applied not in its broader sense but in specific ways at different levels because healthcare facility is a conglomeration of different functions and some are professional some are non-professional and decisions have to be taken in split seconds to avoid abnormal and unhealthy situations, especially by healthcare professionals.

5) Mental Revolution: As already mentioned functioning /functions of healthcare facility is, entirely different from other organizations. In any healthcare facility whether it is by professionals or non-professionals the functions are related to the want needs of human beings and their well-being and, unless otherwise the entire workforce is in-tandem and interwoven and interrelated and should be in line with the functioning of the facility and prepare themselves to act instantly in accordance with the situation, it cannot reach the desired goals. It means all the work force in a healthcare facility should have complete outlook towards their mutual relationship, efforts and have the mental ability and understanding in solving the problems that may crop in, instantly without notice. Hence, in a healthcare facility whether he/she is a professional or non-professional, small or big should develop that type of mental ability in understanding and facing the challenges to get the results to its logical conclusion.

6) Maximum prosperity for employers and employees:

Scientific Management principles are closely knitted to see that maximum prosperity to the healthcare providers and healthcare workers and professionals, and satisfying the want needs of its consumers (patients). The providers should give an opportunity to their workforce to attain their highest efficiency in the field of their activity in any healthcare facility in which they are functioning. Though the tendency of the healthcare providers is to, maximum output by utilizing the resources mainly manpower because healthcare facilities are more on manpower. They use to put targets especially on the healthcare professionals. However, this concept in my opinion will not give the desired results and at times gives negative impact on the professionals as well as the consumers (patients). Hence, while applying

Scientific Management principles techniques by the healthcare providers and managers, they should keep in mind the welfare of the workforce mainly healthcare professionals not only the specialists but also the paramedics and other personnel directly connected with the patients. If these workforces is not satisfied and are not looked after properly, by attending their grievances, the results will be negative. There is a saying that, "A word of mouth will make all the difference", which will fit into healthcare sector in its entirety.

6. The other aspects which are important and touched by F W Taylor, and are still relevant in healthcare today:

Taylor emphasizes the importance of *Manpower Planning, Selection, Training and Placement*. For any organization these points mentioned above makes all the difference in the functioning. The same is examined with respect to healthcare sector, which is a conglomeration of many functions and can be mainly divided into professional and non-professional.

1) Non-Professional: Comprises of right from the security till the discharge of the patient and that includes help desk, Administrative Department to look after the admission of the patients etc., pharmacy to support the healthcare facility and patients in arranging not only medicines but also essential consumables like blood, equipment etc., the floor managers looking after the functioning of that particular floor, and such other middle order management who are looking after unrelated healthcare procedures such as admission, billing, discharge, maintenance of health records, privacy, consent, internal environment including looking after daily maintenance of the healthcare facility (Sanitation, Electrical, Mechanical, Environmental Pollution, Ambulance).

Non-professional performance of the manpower is equally important because whatever amount of procedures are adopted to the satisfaction of the patients and their accomplice, if any discomfort or displeasure in the functioning of non-professional aspects that are unrelated to procedures are not properly attended, the facility will not prosper and have negative impact.

2) Professional/Procedural Performance: In the case of procedural management which is the heart of the healthcare facility and also the main function and is closely knitted with healthcare professional's handling of the situation of the patients (consumers) ailments/discomforts, identification and the necessary implementation of time bound procedures to the needy, pre & post procedural functions, especially the functions of duty doctors, para medical staff (nurses) and also pre & post tests and observations and the attitude of the technicians involved, are important. Sometimes it is unfortunate that by unknown or known reasons the healthcare professionals may make diagnostic errors, medical malpractices, intentionally or otherwise neglecting their professional obligations causing partial and permanent disabilities (medical negligence) to the patients in addition to loss of partial/permanent earnings etc., can be minimized if not totally eliminated by applying Scientific Management techniques based on the principles adduced by FW Taylor.

3) Man Power Planning: Before incorporating any healthcare facility it should be noted, the size of the facility

in terms of beds, whether it is a super speciality or multi speciality or a clinical establishment because manpower planning depends upon the nature and size of the facility. In the case of super speciality and multi speciality facilities there are multiple sections and functions and each is unrelated to other and their size (bed capacity) and a list has to be prepared for manpower in the following:

1. Number of professionals required for each section and their qualifications and experience and expertise in the chosen field.
2. Number of specialists required and their qualifications and experience and expertise in that particular speciality field.
3. Number of Operations Theatres (OT), ICUs, CCUs and in case if there is a pediatric segment the number of neo natal beds, and the man power required their qualification and experience to maintain such units.
4. Number of paramedical staff that are required including midwives, nurses and duty doctors and supporting staff to the specialists for conducting procedures – their qualifications and years of experience necessary.
5. Class IV employees such as aayaas, sanitation departments required to keep the facility free from infections and in a healthy environment.

While deciding the manpower a scientific approach is needed to tabulate the entire information before calling for selection. When the people are selected in accordance with their experience and qualification based on the scientific method of selection they should be given in-facility training before assigning the responsibilities/assignments.

4) Training: A well-developed training program method for each professional in accordance with the facility's requirement should be drafted and applied. Training is more important because though the selected professionals may be having required qualification and experience but, he/she needs further pruning before they are assigned with a particular task to get maximum output. However, training of manpower is of two types, i. On job training and ii. Off job training. In On job training the persons giving training while they are working. In Off job training the persons are training before assigning of any work.

5) Placement: After the pruning procedure the above manpower given the appropriate positions and their functions are monitored regularly. The aim of any organization in particular healthcare facility which deals with human beings by human beings with the help of technology and equipment or not to reach the aspirations of the patients to their satisfaction and at the same time to reach the goals of the providers without any monetary loss. Because healthcare facility is also an organization and expects good returns for the investments made because it is not a charitable organization.

Taylor's principle of Scientific Management relies upon and relevant today are:

1. Each element of work can have a science to it
2. Employers should select, train and develop employees using scientific approach
3. Employees and employers must collaborate
4. Employers should divide work and responsibilities among employees

By combining Taylor's principles of harmonious collaboration and role of specialization with existing approaches that prioritizes work place satisfaction. Healthcare providers can use Taylor's management style to ensure that the healthcare facilities can operate efficiently.

In any healthcare facility the Healthcare Administrator should keep in mind the business and financial aspects of the healthcare facility efficient and effective use of resources including human resources, financial management, data collection analysis, strategic planning and finally marketing of healthcare. In addition, the administrator should look into the effectiveness of Management Techniques in reaching the goals of the providers and the expectations of the patients in satisfying their want needs without being hurting their feelings. It is also the responsibility of the administrator to always monitor, *"the ratio of the useful work performed with respect to total resources used"*. The administrator is answerable to the stake holders regarding the decisions taken that affect the organization performance to reach the pre-set goals. It is administrator's role in planning so that the result will be high quality of care at a reasonable cost. The administrator's planning should be made in such a way that it should reflect on.

Work satisfaction and compensations of the employees (professionals and non-professionals), customer (patients) satisfaction of providing quality service at a reasonable cost, and the goals should be appropriate and meaningful.

The other way of measuring the ability of the administrator is *"effectiveness vs efficiency"*, of managerial functions at different levels; Such as,

1. effective and efficient
2. effective but inefficient
3. efficient but ineffective
4. ineffective and inefficient

Effective management means the result will be quality procedures with the desired outcomes; disciplined and organized effort against specific tasks.

7. Role of healthcare risk managers:

The main function of healthcare risk manager is to handle and resolve various specific issues that may crop-in, in different situations either with the patients or their accomplice or among the members of the facility itself by using scientific techniques. These risk managers who are selected according to the requirement of the facility that is under view are to be specifically trained in accordance with pre planned Scientific Management Technique/Procedure in which anticipated risks and likely situations that may cause risks and risks may crop-in unnoticedly.

Normally these risk managers will function in the areas in any healthcare facility of any type,

1. financing and insurance claim management,
2. Event and incident management,
3. Clinical research
4. Psychological and human healthcare
5. emergency preparedness
6. Effective patient care
7. Implementation of strategies prepared with the help of scientific techniques for patient care.

If suitable scientific methods are selected and adopted in any healthcare facility these health risk care managers can

identify and evaluate the risks to reduce injuries to the patients (which is most important), because patients will come to the facility to get rid of their discomfort/ailment but not to increase their discomfort by these unforeseen injuries. The other important aspect of risk managers is Center for Disease Control (CDC), Infectious Diseases Control (IDC), Pollution Free Atmosphere (air, water, noise) etc., which are paramount with respect to patient safety, State and Central Governments regulations, potential medical errors, meeting existing and future policies, time to time legislation by the respective authorities. Hence, the risk managers should have a well-developed scientific method of planning in meeting the present and future situations.

8. Strategic planning of patient care:

The other important aspect in healthcare facility is strategic planning and implementation in terms of patient's care and it should be specifically designed in line with the facilities requirement. These are,

1. Good communication techniques between healthcare professionals and patients, in between the professionals, non-professional functionaries and professionals and patients should be adopted; otherwise a bad communication, no communication, partial communication will have adverse impact in the facility and may at times leads to chaos whether it is by mouth, by writing, by speaking or through any communication device (telephone, cell phone, internet, internal communication system like public address system) should be well designed according to the requirement of the facility, and following the accepted norms.
2. A planned system of making appointments to the convenience of the patients with the required professionals to minimize loss of time which is important for the patient which depends upon the severity of the ailment. Hence, a scientific method of uninterrupted planning should be designed and implemented. So that there will not be any harm/displeasure for the patient or their accomplice to reach from help desk to the healthcare professional. If this method is properly implemented there will be 100% success in any healthcare facility because the patient is satisfied (The patient's time and money are as important as that of procedures).
3. It is very important to have a scientific method of planning and approach in tracking missed appointments, failed/rescheduled appointments by rescheduling them to make the patient satisfied. Sometimes, it so happen if the facility is having an international corridor to look after the needs of the international patients who comes from different parts of the globe for their healthcare needs, having no knowledge of other languages except their mother tongue will face the difficulty when they come to the facility because of the communication. In such facilities the healthcare providers should make all the necessary planning so as to get the required Translators, transcribers, Interpreters for which they should have a planning system keeping the relative information; so that at short notice they can be made available.

9. Healthcare facility administration:

Any organization needs a proper administrative mechanism and in particular in healthcare sector it is called Health

Administration or Healthcare Facility Administration. The planning of Healthcare Administration as it encompasses everything from policy making to human resources to departmental management and beyond. This administration is a difficult task in any healthcare facility because multiplicity of functions and departments that are related or unrelated to health and healthcare procedures have to be grouped together. Administration of such conglomeration is one of the toughest task because any misadministration or malfunction in administration leads to and makes more complications and at times irretrievable.

Healthcare Facility Administration involves,

1. An entire healthcare system facility administration
2. Specific facilities required to the healthcare professionals in accordance with the approved regulations of the respective authorities.
3. Administration of specific departments such as OTs, CCU, ICU, Neo natal, 24/7 emergency admissions etc., attending emergency situations like Covid-19 pandemic etc.
4. Specific clinical areas such as nursing, physiotherapy, cardiology, infectious diseases (special administration is required), and trauma care centres etc.
5. Specific facilities such as separate consulting rooms for the healthcare professionals in particular to specialists with all specified infrastructure including basic equipment and supporting staff.
6. not but the least specific areas are earmarked for staffing, administrative departments, admissions, finance, lounges for the visitors etc., places to represent the religious sentiments of the patients and their accomplice.
7. Unlike other organizations in healthcare facility, a skilled healthcare administrator who has specific knowledge and expertise in the administration of healthcare facilities will make all the difference (explained in manpower planning).

Depending on the size and type of healthcare facility (Super Speciality, Multi Speciality, and Clinical Establishment): Healthcare administration will have number of sections with different functions working in unison to manage the system at every level to reach the patient satisfaction and managerial goals.

Finally, as the healthcare facilities are changing every day with the new inventions, technological developments, medical advances to increase efficiency of the specialists with the help of these developments to minimize the time and hospital stay and get fast relief to the patient, lot of changes took place in administration of health facilities. Hence it is prerogative of the healthcare providers to come with the terms with these latest developments and advancements by introducing innovative and new techniques and scientific planning for administration.

With the advent and participation of private industrial and financial houses entering into healthcare sector there is a sea change in the private health care sector. Healthcare facilities are now-a-days becoming larger and larger with a minimum of 500 beds at a place and every healthcare provider is making chain of facilities in different parts of the country on their own brand, the healthcare facility planning has become scientific in nature rather than running a single

unit. The primary role of today's professionals (non-procedural) in healthcare administration includes,

1. Human resource management,
2. Financial management
3. Costs accounting
4. Strategic planning
5. Maintenance of different functions of organization
6. Marketing
7. Data collection and analysis
8. Providing the basic necessities such as the care of dependent people at the most vulnerable points in their lives.
9. Maintaining the moral and social order of the healthcare organizations that are under their belt.
10. The policy of service to the patient
11. Acting as arbitrators in situations where it is required
12. Acting as intermediaries for the various professional groups and also equally non-professional groups within the organization

10. The present-day challenges faced by the professional healthcare - administrators:

1. Effective and efficient healthcare services for communities
2. Shortage of Paramedics mainly nurses and healthcare workers
3. Due to high competition, concern of safety and quality of the healthcare services provided
4. Raising healthcare procedural costs due to adoption of technology
5. Ageing problem

The present way of functioning of healthcare facilities as they are establishing a chain in different parts of the country where the local bodies regulations are different, health being a state and central subject different regulations in different states and the local bodies, unless a proper scientific approach is necessary, the administrators of the healthcare facilities cannot make the ends to meet unless they make uniform flexible (not rigid) policies keeping in mind the local regulations where the facilities are functioning so that the plan may be modified, changed without disturbing the federal fabric of the motto of the hospital which is more important.

11. Scientific Management techniques/theory and the inefficiency in healthcare:

There is no Scientific Management Theory including F W Taylor's that is full proof and beyond questionable. Every theory/technique will have their efficiencies, deficiencies and inefficiencies, based on these it is being examined what are the inefficiencies that can be identified in any healthcare system which is adopting Scientific Management theory techniques. F W Taylor the father of the Scientific Management Theory who believed that any task/function could be optimized scientifically and that Scientific Management could design a better rational way of functioning/performing the task and the result is to enhance productivity/functional ability and finally financial gains/profitability. Unfortunately, this profit motive with the optimization of function or task scientifically leads to sometimes unfavorable conditions for example fixing targets to the professionals linked to earnings.

12. Theories of Healthcare Management:

When Taylor introduced Scientific Management Theory, healthcare is under the control of respective governments except few private healthcare facilities. With the opening up of economy, globalization of healthcare, participation of private players in healthcare sector in a big way, the necessity of administering a healthcare facility with scientific techniques has become an order of the day. Unlike other organizations where a product manufactured can be rejected if it is not up to the mark but the same cannot be applied in healthcare.

Healthcare is a service-oriented industry and case specific; the customer will go to the provider/facility to satisfy the want needs (to get rid of ailments/discomfort) and the service product is intangible, different types of Scientific Management techniques are needed. In healthcare, this service product cannot be produced before and stored but the production, application and absorption will take instantly and to make it in a broader sense, when a patient goes to the healthcare facility, the healthcare professional identifies the problem/discomfort/ailment of the consumer (patient) decides the required medication/procedure etc., and it will be offered by the provider/professional to the consumer (patient) and if the patient is satisfied with the same can receive the same. Hence, in principle F W Taylor's Scientific Management techniques can be applied to certain extent or with some modifications or with additions or deletions because the Taylor's theory emphasized more on product, procedure etc., which is an objective in nature. Whereas in healthcare facility the service product offered by the provider/professional is not visible and seen but can only felt by the consumer who receives it. It means production, consumption will take place within the limits of the provider/professional to the consumer who accept the same.

13. Following are the few selected theories in Care Management which the healthcare managers should follow and apply to suit to their particular healthcare facility requirements.

In the words of Palmeiri & Peterson (2009) the healthcare management theories stated are,

1) Attribution theory:

Attribution theory is applied to healthcare facility management to assess the success and failures of healthcare system or program of any healthcare facility. This theory can be used to create a safer environment for patients but this theory has its drawbacks. Hence, applying the principle the manager has to redesign the technique to suit the environment of that particular healthcare facility. The theory is based on the assumption that errors in healthcare do occur sometimes and that creates feelings of cynicism and organization inertia. The healthcare manager has to understand such feelings and make changes in the system to make it a positive work environment that improves the employee's response to errors and to recognize these mistakes as human errors can focus on corrective measures to provide a positive environment on patient's recovery.

2) Evidence based management theory:

The other theory adduced by Palmeiri and Peterson (2009) is called "*Evidence based management theory*". It means the healthcare professionals, paramedical staff, doctors etc., are supposed to make decisions on the best available evidence of the situation. However, some researchers suggest that in

this method of management theory there needs to be imposition of some standards on the decision-making process by the healthcare managers. If standards are prescribed and decisions are taken accordingly level of uniformity in decisions can be created which will benefit both the professionals and the patient. However, this theory cannot make it in particular incidences where time constraints and deadlines and split-second decisions are some of the difficulties.

3) Utilization management theory:

Palmeiri and Peterson (2009) also advanced another theory in healthcare management and stated that, "*Utilization management is a third healthcare management theory, one that has received wider application in the healthcare sector than the other two, theoretical attribution and evidence-based theories*". Utilization management theory is proactive approach in managing healthcare in a preset guideline. For an effective Utilization management theory, it is essential to determine the healthcare facility's priorities and followed by research and determination of the major beneficiary from the decisions in accordance with the theory. In this theory the healthcare managers determine the said goals and how to implement the theory to achieve such goals. This can only be achieved by collecting data required and any errors/commissions/omissions in data collection becomes, the theory will become unviable.

14. The trends that can shape the future healthcare delivery system

The present information technology development including Artificial Intelligence, Cloud Computing, Preservation of data base which has become the order of the day, the digital healthcare landscape is fast changing, coupled with raising consumer (patients) demands, rapid advancement in technology and complexity in healthcare needs. Following are the trends,

1) Raising data volumes create complexity:

A study revealed that a decade ago the world's total data storage capacity was around 487 exabytes. Now it is estimated by 2025 this same volume is being created in just under two days. Compared to other sectors healthcare sector is one of the largest and biggest contributor of this data explosion accounting around 30% of the world's data volume. This is due to increased use of med tech devices, apps and monitoring technologies, means more data points flooding into healthcare facilities than before. This flooding of data is making the situation very difficult in healthcare sector to manage it, to integrate and harmonize that voluminous data to make it a meaningful connection for actionable incites.

According to Gartner, "*a way to continuously identify and connect data from desperate applications to discover unique business, relevant relationships between the available data points*"

2) Adoption of Artificial Intelligence (AI) in healthcare sector:

Artificial Intelligence has the potential to accelerate the situation in healthcare and has the potential to make better care, faster and accessible to all. However, the drawback in this trend is about patient's safety and a shadow is cast on the quality of the data are the stumbling blocks in the

application of Artificial Intelligence in healthcare. McKinsey's analysis into *"the state of AI in 2020, found that healthcare organizations are one of the leaders in AI investments because Artificial Intelligence is a better solution in each function of the healthcare, as the functions are unrelated to each other and specific to each facility"*.

15. Interoperability solutions unlock true power of data:

Sage Growth partner's report mentions that 51% of healthcare managers/executives mention that, data integration and interoperability are most significant in achieving strategic priorities related to data analytics. This is because the amount of data created through different sources such as medical devices, patient records (EHR), Healthcare facility databases and such other crucial data within the healthcare system are not properly connected, and accessing real time data will become uphill task. To overcome this, use of, Fast Healthcare Interoperability Resources (FHIR) and tools such as application programming interfaces and closing the gap in the explosion of data and making data more accessible, computable and usable are necessary. This makes synthesizing the data from multiple sources more achievable, thus providing the information needed in improving decision making for better outcomes in the healthcare.

Tele health delivery moves to virtual care models: The recent global pandemic impact of covid-19 and subsequent variants, this Tele Health Delivery System that has proven its accessibility to the consumers to meet their expectations has made a permanent place in the healthcare landscape. This Tele Health Delivery System is fast catching the trend and has become a valuable opportunity to maximize the accessibility to healthcare. The HIMS 2021 and APAC Health CIO report found that, 88% of participants could continue to leverage connected health technologies following the pandemic. Tele Health is shifting from an isolated mechanism to deliver care outside the facility to a more holistic, integrated model of virtual care. As healthcare professional's embrace this hybrid of delivering care, challenge becomes how to seamlessly blend remote and in person care.

The rise of the internet of medical care for the past decade the development of healthcare technology and the advancement made therein and the increasing number of connectivity of medical devices that can generate, collect, analyze and transmit data, normally refer to as the, *"Internet Of Medical Things (IOMT)"*, these devices are revolutionizing in delivering healthcare needs. As an example, from connected glucose and heart monitors to patients with chronic diseases to ingestible sensors, it is a revolution of diagnosing the diseases and monitoring; the IOMT trend enables more efficient, accurate and cost-effective healthcare delivery system, instead of patients coming to the healthcare facility. However, the drawback being proliferation of devices and data espionage and the serious implications because of unavailability of strict implementation of privacy laws.

16. Relevance of Taylors Scientific Management theory with respect to healthcare in 21st Century in the present situation:

Taylor's Scientific Management theory is mainly based on the principles of Time study, Motion study, Method study

and functional foremanship and use of manpower and equipment to obtain the desired goals. In a sense use of standard acts of workmen, use of such functions that are planned scientifically to get maximum output. Taylor's aim is also to ensure employer employee prosperity to its maximum level, and the outcome should be revenue to the employer and at the same time not to displease the employee and to develop the organization to its high state of excellence. He also emphasized the need of selection of workforce scientifically and trained to make them person par excellence in their chosen field then the result will be quality production, quality service, and satisfaction to the consumer (patient) and profits to the organization (provider/facility).

The relevance of Scientific Management theory in the present context with respect to healthcare sector is having its own bearing. Though Taylor applied the principles in a manufacturing unit keeping in mind a cooperative relationship between employer and employee to get better revenues to the organization.

However, healthcare sector unlike other manufacturing organizations or service organizations is different because healthcare is service oriented facility by the humans to the humans; in addition, healthcare sector is a conglomeration of various functions with different concepts and is case specific but with single motto that, relief to the patient with maximum safety by providing quality procedure. Taylor believed that the role of the management is how a certain task in an organization is to be performed and the methods that are used. With the present situation this Scientific Management theory is most relevant in the sense *"it helps in meeting the objectives of stake holders. In his analysis Taylor focused on time and motion used in the achievement of organizational goals. The operations/functions in the work place are well analyzed and the most effective and efficient way of performance of a job/operation is discovered and that will be implemented to get maximum performance efficiency"*.

17. Application of Scientific Management in the functions of the healthcare, increases the overall efficiency of the healthcare facility, thus giving maximum satisfaction to the patients and better opportunities to compete in global healthcare:

Scientific Management has developed offshore markets. The present situation of opening up of economy, globalization of healthcare participation of private players in a big way and healthcare has become universal, this sector is getting maximum inputs by applying these methods. The ailments/discomforts of any patient for a specific ailment in any country globally is same but only the healing process or management of the ailment/discomfort may differ depending upon the availability of resources, application of latest technology, improvement of procedures and professional skills. That is why, **Taylor emphasized on the need of proper selection, proper training, proper placement.** Hence these important aspects of functions are very important to be applied in its entirety in healthcare. As already mentioned, the present structure of healthcare facilities are wide changing in their nomenclature due to case specific in nature and multiplication of diseases and organ and tissue transplantation to give a new lease of life by replacing the non-functional organs. This type of transplantation of human organs/parts from a donor to donee

by following the necessary procedures has revolutionized the healthcare; means selection of particular professional who have specialized in particular field and giving them additional training and make use of their performance to the optimum by giving encouragement either monetarily or otherwise for their performance are all the principles of Scientific Management theory as originally laid down by Taylor.

Scientific Management theory has also specified in the division of labour/workforce in accordance with their performance to get high standards and better results.

Ritzer (2010, p.22) noted that, *“the advanced technology that came up with Scientific Management had social effects. This is because Taylor’s aim of division of labour was to dislike the employees making them specialize in one task. This had anormous effect on the social aspect of life of the employees as it increased the discipline in the working area (Harris, 2002, p.377)”*

18. The importance of Scientific Management in the present situation in relation to healthcare:

As mentioned above scientific application of Time Study, Motion Study and Method Study of a given task will reduce the idle time of men and material by incorporating effective and useful functions in completing the task that will enhance the ability of the workforce to get maximum output. As an example, if the layout and design of the healthcare facility is sequentially designed such as movement of professionals, movement of patients from the waiting hall to the procedural rooms are scientifically designed the results will be highly fruitful. In this context, the waiting period of a patient can be brought to bearest minimum and their interaction with the healthcare professionals, time taken for the procedures and finally discharge of the patient. If these functions are scientifically arranged the patient will be satisfied because the task can be completed in a minimum possible time, more time for the healthcare professionals to look after more number of patients, the paramedical staff etc. who are attending the patients will have more time to attend more number of patients, all the functions together will enhance the productivity and thus more revenue to the facility.

19. The limitations of Scientific Management theory:

1. Taylor’s idea of diskilling the employees demotivates them and denies the highly advanced and skilled employees their rights this creates dissatisfaction among the workforce.
2. It is also asserted by Taylor that; money is basic need for employees and that all social factors are considered to motivate them.
3. Another difficulty to implement Scientific Management is, with specialization of employees in tasks, businesses cannot create competition in the market.
4. Another drawback is employees are unable to reach managerial levels because employee’s skills are ignored by application of specialization.

To conclude healthcare sector is ever changing due to the fact, specialization of different fields in healthcare, technological advancement, introduction of automation reducing the efficiency of a healthcare professional, dependency of the healthcare professionals more on the technology than their own ability are some of the limitations wherein Scientific Management principles are becoming

less important in healthcare in specified fields. In case of surgical procedures, it is difficult to standardize the efficiency of a surgeon because every surgeon has got his/her own way of performing in accordance with their skills and approach. Only the procedure can be standardized but the implementation part it depends upon the skill of each and every professional. However, a judicious selection of the principles without disturbing the basic structure and functioning of the facility, one can safely say that the principles of Taylor’s Scientific Management can be well knitted without disturbing the total fabric structure of the functions of the healthcare.

20. Conclusion

Various aspects of Scientific Management theory as advocated by F W Taylor and the pros and cons are discussed threadbare in its entirety and the relevance in the present healthcare sector. When the Scientific Management theory was introduced by F W Taylor, Taylor kept in mind about the productivity, managerial goals, employee employer relationship, performance efficiency etc., as the main features. During those days healthcare is predominantly under the government, in majority of the countries and very few facilities in private sector that to in developed countries. However, the basic principles of Scientific Management advanced by F W Taylor are still have relevance and position in the present context of healthcare. Though lots of changes have cropped-in in the healthcare sector, due to Technological Advancement, Introduction Of Robotic, Minimum Invasive, Laproscopic Surgeries where the human skill is minimized, still Taylor’s main principles of selection, training, placement in addition to Time Study, Motion Study, and Method Study and functions of each and every division of every healthcare facility holds good with minor variations. It is only the administrative managers or the healthcare providers who are involved in the application of managerial theories have to keep in mind how the main principles of Taylor’s Scientific Management can be incorporated in the healthcare facility in question for better results. No method/principle/theory is full proof but they have to be incorporated with modifications and redesigning them to suit a particular environment but the main motive of profit for performance will never change.

Application of Scientific Management Techniques in the disposal of medical waste due to Pandemic Covid-19 (bio medical waste) and unforeseen circumstances that has come as unwarranted guest in all the countries in the form of Covid-19 epidemic and the subsequent variants, including monkey pox that has shaken the entire universe economically, socially. This Pandemic sudden explosion like a Volcano has done innumerable ways of loss of human life, earnings, economical slow down and not but not the least movement of men and material has come to a standstill.

One way this is lack of pre-determined managerial techniques that are forgotten by healthcare sector, including governments, private and public, resulting loss of life for want of healthcare, unavailability of emergency medicines, equipment and manpower to fight the pandemic. However, we can say with authority that the Andhra Pradesh Government in India and nascent State that has lived upto the expectation by making emergency technical planning in terms of supply of medicines, equipment and logistics.

This Pandemic exposed the lethargy of ignoring certain aspects of healthcare facilities that are not giving priority, like non-availability of oxygen cylinders, non-availability of medical oxygen, non-availability of PPT kits necessary for the safety of healthcare professionals, paramedical staff, gloves and masks to protect this people from contamination, insufficient production of medical oxygen, non-availability of ambulances in getting the patients to healthcare facilities and for the lost rites of the departed souls in an honourable manner according to their religious beliefs but giving maximum environmental protection. Containing the spread of Pandemic with special drive on a calculated and planned manner at short notice by all the healthcare personnel who are involved (private and government), sanitation, supply of essential commodities etc.

However many of the healthcare facilities have taken advantage of the situation by creating artificial vacuum with a motive of earning more at the cost of human lives. Pandemics will not come by giving a caution but will explode like Volcanoes. This we have seen right from the days of plague in 1950 and then chickenpox, malaria, TB, chicken Gunia, etc., till the present pandemic of Covid-19. But the healthcare sector did not give any importance to deal with a pandemic situation and have not planned or given provision to deal with either by the private or public till the pandemic reached its pinnacle.

In addition to this, this pandemic has left biomedical waste in the form of wet, dry and sanitary waste that needs a planned destruction/elimination in a proper manner without effecting the environment surrounding it. It means no healthcare facility is having incinerators for burning of this waste without polluting the environment. Hence, it is more important to dispose of medical waste (bio medical waste) properly else improper and inadequate bio medical waste management especially during pandemics exposes the community, healthcare workers and sanitation workers and the healthcare professionals to infections like toxic effects and injuries. Many people with infectious diseases coming to the facilities for treatment are known for spreading the infections through aerosols, surfaces, needle-stick injuries, non-isolation of Paramedical staff who are attached these people, isolation of beds and wards are all unless properly planned in a scientific manner and separated from the rest of the health facility, the pandemic will spread like a wild fire. In a study it is estimated that a 250 bedded hospital normally 50 to 20 kgs of waste per day (bio-medical waste) is generated and at the molecular laboratory the waste generation is to the tune of 2 to 3 kgs per day. For this there should be a scientifically planning procedure and technique for this disposal of bio-medical waste not only from the healthcare facilities but also from the homecare where the covid patients are under treatment. It is a recognized practice this bio-medical waste is to be collected and stored in a separately dedicated bins and trolleys with a label on them showing Covid-19 and usually colored with Yellow and non-chlorinated plastic bags that are pre-treated with Sodium Hypo chloride and finally incinerated. Sanitation workers collecting waste from quarantine homes face health risk due to the infectious waste generated and if not handled properly this infection will spread alarmingly. An interesting point that is being raised by many is *“how should you deal with the solid waste? And should you segregate the waste? And whom should you hand it over to?”* All types of bio-

medical waste generated must be treated as mentioned by the regulatory authorities and must be disposed of in yellow colored non-chlorinated plastic bags. If each healthcare facility is not having such incineration system, they can hand it over to the health workers who are regularly collecting the bio-medical waste and send it to the Common Bio-Medical Waste Treatment and Disposal Facility (CBWTF). This Pandemic Covid-19 has exposed the drawbacks regarding the disposal of bio-medical waste in the facilities with least or no provision. Hence, in my considered opinion the regulatory authorities should bring in proper legislation to make it compulsory for such bio-medical waste disposal whether there is pandemic

“Invention, Exploration leads to Innovation”

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