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Investigating the Facets of Physical Activity Related to Schoolbag Carriage- Highlighting the Lacunae that Exists

By Ruchira Mukherjee, Rajarshi Chanda, Devashish Sen, Subhashis Sahu & Aparna Mukhopadhyay

Presidency University

Abstract- Schoolbag carriage is the most common physical activity performed among school children. The relevant scientific explorations in this regard, has entailed investigation of consequent pain, muscle activity and related fatigue. General fatigue reportedly alters the sensation of thirst and salivary viscosity. Fatigue, thirst and saliva viscosity is also related to neurological performance and alacrity. Moreover, general fatigue is also reflected in eye muscles and visual processing is an integral part of learning in school children. The purpose of this review is to explore these facets of physical activity in relation to schoolbag carriage and in the process extracting the lacunae that exists in exploring the physical activity schoolbag carriage.

Keywords: schoolbag carriage, saliva viscosity, thirst, cognition, fatigue, critical flicker fusion frequency (CFFF).

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Investigating the Facets of Physical Activity Related to Schoolbag Carriage- Highlighting the Lacunae that Exists

Ruchira Mukherjee [α], Rajarshi Chanda [σ], Devashish Sen [ρ], Subhashis Sahu [ω] & Aparna Mukhopadhyay [¥]

Abstract- **Schoolbag carriage is the most common physical activity performed among school children. The relevant scientific explorations in this regard, has entailed investigation of consequent pain, muscle activity and related fatigue. General fatigue reportedly alters the sensation of thirst and salivary viscosity. Fatigue, thirst and saliva viscosity is also related to neurological performance and alacrity. Moreover, general fatigue is also reflected in eye muscles and visual processing is an integral part of learning in school children. The purpose of this review is to explore these facets of physical activity in relation to schoolbag carriage and in the process extracting the lacunae that exists in exploring the physical activity schoolbag carriage.**

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I. Introduction

Every school-going child, irrespective of their social standing and/or how sedentary a lifestyle they lead, has the physical activity of schoolbag carriage in common. In India, absence of lockers and a very demanding school curriculum, not only makes the schoolbags very heavy, but also its carriage mandatory. It is of utmost importance to explore all facets and effects of this physical activity, given that all subsequent activities within the school curriculum begins after at least a single bout of schoolbag carriage required to reach the classrooms from home.

The World Health Organization (WHO) defines physical activity as energy expended in any form by the skeletal muscles. Physical activity not only improve one's overall well-being, but also enhances thinking, learning and judgment skills[1]. Given that these skills are a focal point of school education, this further bolsters the importance of schoolbag carriage. This particular physical activity should therefore be explored not only in terms of skeletal muscle response but also in terms of cognition and motor ability.

The impact of physical activity in its varying intensities have been well documented[2,3]. Schoolbag carriage can be a moderate or high intensity physical activity based on the amount of load being carried [4]. Intense physical activity is generally characterized with fatigue[5] and schoolbag carriage related fatigue has been previously reported[6]. Overall fatigue can be reflected in eye muscles and be quantified using Critical Flicker Fusion Frequency (CFFF)[7]. CFFF is vital for children given that a major portion of school curriculum entails viewing the blackboard or projector screen. Fatigue resultant from schoolbag carriage to reach the school may also interfere with concentration of a child subsequently affecting scholastic performance.

Apart from overall fatigue being reflected in the eye muscles, increased heartbeat, increased thirst and saliva viscosity[8] are also characteristic of physical activity. Increase in sensation of thirst is observed as the intensity of physical activity increases[9]. Increased thirst is delineated to increase saliva viscosity[5]. Reportedly, thirst and physical activity together cause changes in neurological alacrity[10]. Cognitive and motor performance is seen to be impacted due to fatigue and thirst[11,12]. Scrutinizing the physical activity of schoolbag carriage is hence incomplete without exploring its effect on thirst, salivary viscosity and cognition.

The effect of physical activity on all the aforementioned factors-fatigue reflected in CFFF, thirst, cognitive and motor performances are inter-related, co-dependent and modulate each other. Given the importance of fatigue on the ability to focus on academic curriculum and the importance of cognition in children, investigating the influence of the physical activity of schoolbag carriage and its intensity on these parameters can be insightful and is topical.

II. Methodology

Numerous papers were reviewed relevant to the topic in hand and arranged into subheads that are included in the scope of this particular review. Some data were not available or were not apparent and unclear, such studies were excluded.

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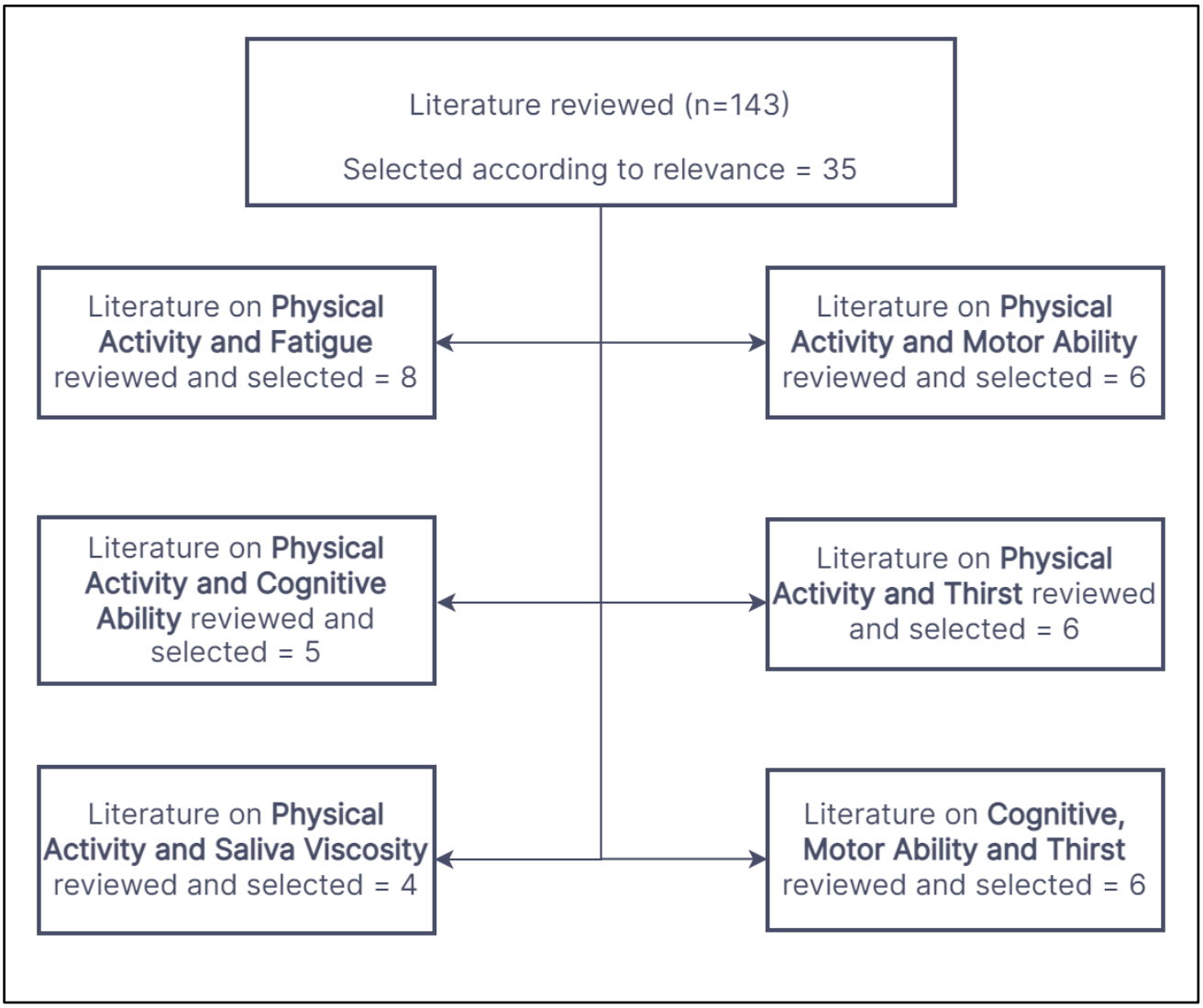

1. Physical Activity Intensity and Fatigue

Physical activity is beneficial to a certain extent but excess causes fatigue, which is detrimental. Fatigue can be considered as a marker for physical activity [5]. A study conducted by Torbjörnet. al in 2002 on 58115 participants show that there is an increase in degree of fatigue as the workload increased [13]. Another 2005 study by Jarrod D Presland et al., validated the finding of the previous study observing considerable central fatigue after prolonged physical activity [14]. A relatively recent study in 2017 by Smith et al., reported strong positive correlation between workload and fatigue in railway workers[15]. When it comes to the workload of schoolbag carriage, a study reported carrying 12% load of bodyweight to be moderate intensity while carrying 16% load of bodyweight to be a high intensity physical activity [4]. So, with increase in bag weight, the resultant fatigue might increase. Heavy backpack carriage among children is reportedly common which is seen in most of the literature associated with physiological effects of school bag carriage.

a. *Fatigue in load bearing muscles*

Heavy backpacks entails the use of load bearing muscles activated during any kind of physical work associated with the upper and lower torso- *Rectus Abdominis and Lumbar Erector*. Rectus Abdominisor abs, works with other abdominal muscles to control the pelvic tilt and plays a significant role in core stability. The erector spinae (lumbar, thoracic, and cervical regions) facilitates head and back extensions by bilateral contraction, controls the thoracic flexion and provides core strength. A multitude of reports about back pain associated with heavy backpack carriage in children [16–19] further bolsters the importance of this muscle.

A study by Mosaad and colleagues explored the effect of load carriage on the trapezius muscle of 30 school going children (mean age -13.66years). Muscle activity was observed in 3 separate instances, one when the children had no load to carry, in the other two the kids were asked to carry an ordinary backpack and an ergonomically designed double sided pack. It was observed that the muscle activation was significantly less when the kids were carrying the ergonomically

designed backpack than the regular backpack[20]. Another study was conducted by Motmans et al., on 19 participants on different modes of bag carriage, as a backpack, front pack, shoulder bag and double pack. Electromyogram (EEG) readings of rectus abdominis and spinae erector were observed during each mode of carriage twice, once with no load and with 15% load of body weight of the individual. The results showed a significant decrease in load carriage as a backpack but increased when it was carried as a shoulder bag and front pack. Rectus abdominis showed increased activation during backpack mode of carriage. There was a significant asymmetry in back and abdominal muscles during shoulder carriage. The study also suggested that asymmetrical load carriage might cause a decrease in trunk stability which might lead to back pain[21].

b. *Fatigue in ocular muscles*

Overall fatigue can also be seen in the ocular muscles[22]. Critical Flicker Fusion Frequency (CFFF) is used to measure the ocular fatigue which representative of overall fatigue[7]. Eye conditions can affect scholastic performance by not only reducing concentration but also by interfering with the ability to read, learn and play[23]. A recent study conducted among school children in Karnataka, India implied higher CFFF thresholds to improve cognition and boost academic performance[24]. Reports regarding schoolbag carriage and its effect on CFFF weren't observed after extensive literature search highlighting the lacunae with respect to exploring this particular physical activity.

The practice of carrying heavy backpacks is common, indicating high intensity physical activity manifesting fatigue which may be reflected in ocular muscles. Vision in children is an important aspect within the school curriculum and CFFF alterations due to schoolbag carriage must be explored. Apart from fatigue, perspiration and thirst are also characteristic of physical activity[25].

2. Physical Activity and Thirst

The relationship between physical activity and hydration is extremely important in our day to day activities as hydration status dictates the overall equilibrium of our body[26]. In 1994, Meyer et al., pointed out that the mild hypo-hydration occurring among children who exercised in the heat had a greater degree of induced thirst and most children drank more fluid than they lost during the exercise session[27]. Mears et al., in 2016 reported the development of thirst sensation after exercise and its persistence until voluntary water intake among young adults[28]. Young adults in hypo-hydrated state were also reported to have consumed more than 55% of total fluid loss that manifested in them during the exercise period[29]. The effect of physical activity on subjective urge to drink water has been heavily documented[30] but thirst alterations and hydration status in schoolchildren due to the physical activity of schoolbag carriage remains unexplored.

Given that thirst induces physiological changes[31] and decreased dehydration bolsters cognition directly affecting academic performance in children[32], this becomes a very important area to delve into. Thirst is primarily accompanied with the change in the saliva concentration. Saliva Viscosity is can be used to measure the physiological thirst[33].

3. Physical Activity and Saliva Viscosity

Dawes et al., studied on the effect of physical activity on saliva viscosity. The results revealed increased viscosity and protein content in the saliva immediately post- physical activity[34]. A similar study was conducted by G.Ljungberget al., on the participants of the Stockholm Marathon in 1990, suggested increased concentration and total protein content in the saliva after running the marathon (Ljungberg et al., 1997). A relatively recent study in 2015 suggested a temporary increase in saliva viscosity right after moderate intensity physical activity[35]. This finding was bolstered by a study in the following year by Ligtenberg et al., validating increased saliva viscosity during and after exercise among the participants[36]. This aspect of physical activity remains unexplored for schoolbag carriage as indicated by a thorough literature search.

Schoolbag carriage being a physical activity, causes alterations in parasympathetic and sympathetic activity, termed as the Central Command[37]. Physical activity stimulates the sympathetic nervous system, which controls salivary protein secretion by the alpha and the beta adrenergic neurons via the Superior Cervical Ganglion[38]. Whereas, parasympathetic activity is seen to decrease with the increase in heart rate[39]. On cessation of physical activity, the heart rate goes back to normal and the parasympathetic system is reactivated[40,41]. As the water flux or the salivary water content is dependent on the parasympathetic nervous system, changes in the salivary flow rate due to schoolbag carriage might be observed and remains to be documented. The consequent change in salivary density, protein concentration change due to the stimulation of the sympathetic and parasympathetic system due to schoolbag carriage also remains to be documented.

The dehydrated state and workload alters the cognitive and motor performance[42]. Saliva viscosity can also influence cognitive and motor performance[43].

4. Physical Activity and Neurological Performance

The main aspects of neurological performance considered in case of children related to the topic are-cognitive and motor ability. While cognitive functions mainly deal with logical reasoning, motor ability deals with physical abilities. Physical activity also influences both cognitive and motor functions.

a. *Physical Activity and Cognitive Performance*

The association between physical activity and cognitive ability has been documented in several studies around the world. A study by Hillman et al., in 2008 demonstrated that both human showed a positive effect of aerobic fitness training on multiple aspects of cognition and brain function[44]. In the following year, Charles et al., explored the association between physical activity and cognitive performance in children. The overall finding of the paper suggested that even a single moderately intense aerobic exercise session was enough to impact the cognitive performance in children[45]. Similar results were observed in the prior studies done by Jonatan R. Ruiz et al., 2010 and 2011 respectively among adolescents. In the study done in 2010 the results suggested, participants who were engaged in any sort of physical activity had significantly better cognitive performance as opposed to those that were not[46]. The study in 2011 done by David Martínez-Gómez et al., in Spanish population also showed similar results, the adolescent girls who actively commuted to school were seen to have a positive effect in cognitive performance[47]. Another comparable study by Erikson et al., in the year 2015, summarized the beneficial effects of physical activity on brain and cognition in growing children. This study conducted in Illinois, portrayed greater duration of physical exercise and higher physical fitness to be associated with better cognitive health and brain functions[48]. Cognitive and motor performances are interlinked.

b. *Influence of Physical Activity and Exercise Intensity on Motor Performance*

Motor response is the voluntary and involuntary movement of the muscles of the body in response to external and internal stimuli. Motor performance is the efficiency of execution of such movements. Ina study conducted by Rikli et al., in 1986 stated that there was a significant difference in reaction time, flexibility and grip strength in people who played golf than older inactive women[11]. Another similar study in Denmark in 2012 showed that here was a strong positive correlation between motor performance and physical activity in boys[49]. Conversely it was also seen that motor difficulties increased as time spent doing any kind of physical activity decreased [50]. Motor ability and cognitive performance can be measured using ruler drop test and letter cancellation. These two techniques are seen to be used to measure the neurological influence of physical activity[51,52].

Extensive literature search revealed a study improving reaction time when carrying low weighing backpacks[4]. Studies were not found when schoolbag carriage was evaluated in the light of cognitive ability. There is a severe dearth of literature on the schoolbag carriage and neurological performance front and must be explored. Moreover, the neurological performance, namely, motor activity and cognitive ability is seen to be linked to the sensation of thirst[53].

5. Neurological Performance and Thirst

Motor and Cognitive ability plays an important role in the learning process of the school children [54]. These two parameters are affected by a plethora of factors, one of them being thirst. Parsons and others conducted a study in 2000 on adults, concluding thirst to have regulatory effects on cognitive operations involving the prefrontal cortex[55]. In 2009, Caroline and colleagues indicated that consuming water benefits cognitive performance in children[42]. Another study done in the same year by D'anci et al., also stated that mild dehydration had a negative influence on mood and cognitive performance in young adults[42]. Similar to prior studies, Edmond et al., suggested water consumption to be positively correlated to both subjective thirst and cognitive/motor performance in mature and young adults[53]. A recent study done in 2020 by Goodman et al., on male participants suggested exacerbation of mental fatigue due to thirst[10]. In a 2018 study by Karthika et al., it was observed that males experiencing increased amounts of stress tend to have increased reaction time which shows the stress delays the processing of neural information[12]. Thus, thirst and exercise together has significant impact in scholastic performance involving cognitive and motor response.

III. Conclusion

Physical activity of schoolbag carriage affects several physiological functions, factors and responses.

Some facets explored in relation to physical activity remain uninvestigated for schoolbag carriage. Some of the factors have been highlighted here-

- Ocular Fatigue
- Thirst
- Saliva Viscosity
- Cognitive Performance
- Motor Performance

The overall fatigue induced by heavy schoolbag carriage may be reflected in ocular muscles. Since vision is very important in following the school curriculum, it is imperative to evaluate the ocular eye fatigue. Physical activity induces higher water utilization, thereby causing dehydration which in turn results in thirst which manifests as increased salivary viscosity. Thirst and physical activity can also modulate certain neurological functions like alacrity, cognitive and motor functions. School students are most vulnerable to this unstructured exposure to excess physical activity. Any physiological damage during developmental or formative years might lead to long term health issues. This field of work should be further explored considering all the parameters at once to get a more accurate representation of the real world scenario and prevent school children from any probable health hazards that

might be caused due to unregulated heavy schoolbag carriage.

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The literature included in the review are tabulated for an easy referral-

Physical Activity and Fatigue

Authors	Year	Location of Study	Key Features	Parameters/Tests Performed
(Dinges, David F. ; Mallis, Malissa M. ; Maislin, 1998)	1998	Washington DC, USA	Fatigue is also reflected in ocular muscles.	EEG , EOG Psychomotor Vigilance Task (PVT) [56,57] A Probed Recall Memory (PRM) test [58] A Digit Symbol Substitution Task (DSST) (speed and accuracy). Performance Evaluation and Effort Rating Scales (PEERS). Stanford Sleepiness Scale (SSS) [59]. Visual Analog Scales (VAS). Activation-Deactivation Checklist (AD-ACL) [60]. Karolinska Sleepiness Scale (KSS) [61]. Profile of Mood States (POMS) Compensatory Tracking Task (CTT) (Makei g & Jung, 1996).
(Aaronson et al., 1999)	1999	-	Fatigue cannot be accurately measured using only one parameter; many other seemingly absent parameters also play a significant role in inducing fatigue.	Visual Analog Scale for Fatigue (VASF) [62]. Multidimensional Assessment of Fatigue (MAF) [63]. Profile of Mood States (POMS). Symptom Distress Scale (SDS) [64].
(Åkerstedt et al., 2002)	2002	Sweden	Work stress, shift work, and physical workload interfere with sleep and are related to fatigue.	Verbal Questionnaire Based.
(Presland et al., 2005)	2005	New Zealand		
(Rosenthal et al., 2008)	2008	Buffalo, New York	One fifth of family medicine patients present with fatigue, and one third of adolescents report having fatigue at least four days per week.	Questionnaire for Sleepiness and Fatigue.
(Lafère et al., 2010)	2010		-	Visual Analog Scale (VAS) and CFFF
(Smith & Smith, 2017)	2017	Cardiff, USA	Workload increased fatigue.	Questionnaire

(Goodman & Marino, 2021)	2021	-	Parameters of mental fatigue are exacerbated by thirst, and offer novel insight into the relationship between hydration and cognition.	Urine Specific Gravity (USG) from digital refreacometery (PAL-10S ATAGO Japan) Cycle Ergometer Questionnaire Continuous Near-Infrared Spec (fNIRS) Visual Analog Scale (VAS) Stroop Task Inverse Efficiency Score (IES)

Physical Activity and Motor Ability

Authors	Year	Location of Study	Key Features	Parameters/Tests Performed
(Rikli& Busch, 1986)	1986	Fullerton, California	There were highly significant differences between the golfers and the older inactive women on choice reaction time, sit and reach flexibility, shoulder flexibility, and grip strength. Significant differences beyond the .05 level were found for these same groups on simple reaction time and balance.	Lafayette Company Choice Reaction Time Apparatus Lafayette Hand Dynamometer
(Edmonds &Burford, 2009)	2009	London		Thirst Questionnaire Story Memory Task Letter Cancellation , Spot the Differences Visuomotor Tasks Water Drinking
(Morrison et al., 2012)	2012	Denmark	Physical activity was significantly correlated with motor performance in boys, but not girls	Actigraph Koordinations Test Für Kinder
(Roebers et al., 2014)	2014	-	As the brain develops it allows children to monitor tasks and master them. Healthy body activity has a positive correlation with good development which would allow them to adapt to ongoing information processing by updating information, resisting interference, and flexibly switching between task demands.	Manual Dexterity Scale from the Movement Assessment Battery for Children 2 (M-ABC-2) [65] Fruit-Stroop Task [66,67] Backwards Color Recall Task [67] Academic and Intelligence Questionnaires
(Aprile et al., 2016)	2016	Taiwan	Motor difficulty was significantly correlated with less time spent doing physical activity.	Manual Dexterity Scale from the Movement Assessment Battery for Children 2 (MABC-2)

				Physical Activity Questionnaire
(ÁngelLatorre-Roman et al., 2018)	2018	Chile	Ruler Drop Test performance differed between 4- and 5-year-old boys and girls, with girls exhibiting a poorer performance than boys. There were no significant gender differences between the genders for 3-year-olds.	Ruler Drop Test

Physical Activity and Cognitive Ability

Authors	Year	Location of Study	Key Features	Parameters/Tests Performed
(Charles H. Hillman et al., 2008)	2008	-	The human and non-human animal research discussed above suggests that physical activity, and aerobic fitness training in particular, can have a positive effect on multiple aspects of brain function and cognition.	-
(C. H. Hillman et al., 2009)	2009	Illinois	Overall, the findings revealed that a single, acute bout of moderately-intense aerobic exercise facilitated children's cognitive performance.	Demographics Questionnaire Physical Activity Readiness Questionnaire [68], and Socioeconomic Status (SES) Tanner Staging System , Kaufman Brief Intelligence Test (K-BIT) [69] Edinburgh Handedness Inventory [70] Modified Flanker Task [71–73] EEG ,EOG Wide Range Achievement Test 3rd edition (WRAT3) Computerized Indirect Calorimetry System (ParvoMedics True Max 2400) Balke Protocol (American College of Sports Medicine, 2006
(Ruiz et al., 2010)	2010	Spain	Adolescents engaged in physical sports activities during leisure time had significantly better cognitive performance that those who were not.	SRA-Test of Educational Ability
(Martínez-Gómez et al., 2011)	2011	Spain	The main findings of this study suggest that actively commuting to school is positively associated with cognitive performance in adolescent girls, independent of potential confounders including extracurricular physical activity.	Transport Questionnaire Spanish version of the SRA Test of Educational Ability

(Erickson et al., 2015)	2015	Illinois	Greater PA and higher fitness levels are associated with better brain and cognitive health for children and older adults.	-

Physical Activity and Thirst

Authors	Year	Location of Study	Key Features	Parameters/Tests Performed
(Meyer et al., 1994)	1994	Barrington, Illinois	In conclusion, mild hypohydration in children who exercise in the heat induced an increase in thirst and in the degree of desirability of drinks. During voluntary rehydration, most children drank considerably to overshoot their initial body weight with all drinks.	Thirst and Drink preferences were assessed (analog and category scales).
(Maresh et al., 2004)	2004	Storrs, Connecticut	Primary finding of this study was that the extended period of hypohydration before low-intensity exercise magnified the drive to drink.	Urine Specific Gravity (USG) Blood Sample Motor-Driven Treadmill Thirst Scale
(Kenefick&Cheuvront, 2012)	2012	-	Exposure to exercise and environmental stress causes intercompartmental fluid shifts, loss of body water and extended delay in fluid replacement by drinking (involuntary dehydration), especially when sweating occurs. Sodium-osmotic and volume-depletion stimuli induce thirst and drinking during and after exercise.	-
(Mears et al., 2016)	2016	Loughborough	The main finding was that sensations of thirst remained until satiated by voluntary water intake.	Electrically Braked Cycle Ergometer (Lode Corival; Lode BV, Groningen, Netherlands) Mean Weighted Skin (by Ramanathan) Blood Samples
(Brueck et al., 2018)	2018	Fairfield, Connecticut	Exercise intensity is directly proportional to the amount of sweating.	Polydimethylsiloxane (PDMS) Silicone Elastomer Kit (DowCorning)
(Maresh et al., 2019)	2019	Connecticut, USA	It was observed that within the first 10 min of recovery, participants consumed approximately	Sweat Rate Measurement Nude Body Mass (NBM) (Defender 5000, OHAUS, Parsippany, NJ,

			55% of total fluid losses incurred during exercise.	USA) Motorized Treadmill Thirst [nine-point (1–9) Likert scale] Blood Sample

Physical Activity and Saliva Viscosity

Authors	Year	Location of Study	Key Features	Parameters/Tests Performed
(Dawes, 1981)	1981	-	A striking finding of the present study was the very high protein concentration in the saliva collected from most of the subjects immediately after exercise. The elevated protein concentration after exercise may account for the subjective feeling of increased salivary viscosity which is typically experienced.	Saliva Samples
(Ljungberg et al., 1997)	1997	Stockholm	The increase in concentration of total protein after the race may be one explanation for the subjective feeling of increased salivary viscosity recorded as the index for dry mouth.	Blood and Saliva Samples Water Intake
(A. J. M. Ligtenberg et al., 2015)	2015	Amsterdam	During exercise the viscosity of saliva increases.	Saliva Sample
(A. Ligtenberg et al., 2016)	2016	Canada	In conclusion, this study shows that there is a temporary increase in the viscosity of saliva immediately after moderate exercise, which is probably caused by an increase of the MUC5B secretion rate.	Cycle-Ergometer with Handgrip Heart Rate Monitor (Life Fitness upright lifecycle 95C, T-Fitness, Amsterdam, The Netherlands) Saliva Samples Viscometer (Vilastic 3, Vilastic Scientific Inc., Austin, TX, USA),

Motor/Cognitive Ability and Thirst

Authors	Year	Location of Study	Key Features	Parameters/Tests Performed
(Parsons et al., 2000)	2000	Texas	Cognitive operations may involve the prefrontal cortex acting on ideas and concepts encoded in the parietal and temporal cortices, under regulatory influences from the limbic system, cerebellum, and	Rapid Intravenous Infusion Of Hypertonic 0.51 M NaCl PET scan

			the basal ganglia. In this context, cerebellar involvement in thirst may be related to the intention to drink, inextricably interwoven in the subjective state of thirst, together with a conscious state oriented toward satiation of a desire.	
(Bar-David et al., 2005)	2005	Israel	In young students, and, for the first time, demonstrated a direct correlation between their hydration state and their achievements in five cognitive tests aimed to evaluate concentration ability, visual attention, immediate memory span, semantic flexibility, and automatic application of arithmetic operations.	Urine osmolality Cognitive Tests - Hidden Figures, Auditory Number Span, Making Groups, Verbal Analogies, Number Addition.
(Edmonds &Burford, 2009)	2009	London	Consuming water benefits cognitive performance in children.	Thirst Questionnaire Story Memory Task Letter Cancellation Spot The Differences Visuomotor Tasks Water Drinking
(D'anci et al., 2009)	2009	Somerville, Massachusetts	Taken together, the available empirical evidence for the role of mild dehydration suggests a negative influence of dehydration on mood and cognitive performance.	Cognitive Tests Assessing Vigilance (Continuous Performance Task) [11] Attention, Short-term Memory (Digit Span Forward task) Simple and Choice Reaction Time Map Planning (Kit of Factor-Referenced Cognitive Tests [74] Visual Perception (Mental Rotation task [75] Mathematical Addition Thirst Sensation Scale [76] Profile of Mood States [77]
(Edmonds et al., 2013)	2013	East London	It was seen that there is a positive effects of water consumption on both ratings of subjective thirst and performance on a	Thirst Scale Digit Span Forward And Backward Letter Cancellation

			visual attention task (letter cancellation).	Reaction Time Task Cambridge Neuropsychological Test Automated Battery (CANTAB) Mood - Visual Analog Mood Scales (VAMS)
(Goodman & Marino, 2021)	2021	-	Objective parameters of mental fatigue are exacerbated by thirst, and offer novel insight into the relationship between hydration and cognition.	Urine Specific Gravity (USG) from digital refreacometery (PAL-10S ATAGO Japan) Cycle ergometer Questionnaire Continuous Near-Infrared Spec (fNIRS) Visual Analog Scale (VAS) Stroop task Inverse Efficiency Score (IES)

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Explaining the Influence of the Observer on Quantum Measurements and the Influence of the Sick Patients on the Doctor

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Abstract- The article explains for the first time the influence of the observer on quantum measurements. 1/ In one set of experiments, it was found that the lifetime of decay of radioactive elements is longer in the presence of spinning liquids or solids. This could only be explained if media between them was present, which was influenced by the spinning. 2/ In another set of experiments, it was found that the lifetime of decay of radioactive elements is longer in the presence of people. Since the Russian scientist Shkatov developed equipment allowing him to measure the spinning of the human's aura, the longer lifetime of radioactive elements in the presence of people could be explained with the influence of their spinning aura (but again the influence could only be explained with the presence of media, which was influenced by the spinning).

Keywords: spinning influence on quantum measurements; observers' influence on quantum measurements; observer influence on diffraction patterns; observer influence on radioactive decay.

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Explaining the Influence of the Observer on Quantum Measurements and the Influence of the Sick Patients on the Doctor

Prof Maria Kuman

Abstract- The article explains for the first time the influence of the observer on quantum measurements. 1/ In one set of experiments, it was found that the lifetime of decay of radioactive elements is longer in the presence of spinning liquids or solids. This could only be explained if media between them was present, which was influenced by the spinning. 2/ In another set of experiments, it was found that the lifetime of decay of radioactive elements is longer in the presence of people. Since the Russian scientist Shkatov developed equipment allowing him to measure the spinning of the human's aura, the longer lifetime of radioactive elements in the presence of people could be explained with the influence of their spinning aura (but again the influence could only be explained with the presence of media, which was influenced by the spinning). 3/ In another set of experiments, it was found that without the presence of observer photons and electrons behaved like waves and diffraction pattern was observed when they were passing through two slits. When observer with his spinning aura was present, the photons and electrons behave like particles - diffraction was not observed but only two slits of light. This means that under the influence of observers' spinning aura the photons and electrons behave like particles, which could only be explained if there was a media influenced by the spinning aura of the observer. We can also expect different type of personalities to influence the quantum measurements differently – positive thinkers (with auras spinning clockwise and sucking energy in) are expected to add energy to the measured quantum system, while negative thinkers (with auras spinning counterclockwise and loosing energy) are expected to suck energy from the measured quantum system. Also neurasthenics with their powerful aura with fluctuating intensity (in the presence of which light bulbs blow up and electronic devices and machines stop functioning) are expected to mess up the measured quantum system. Also, the negative influence of the sick patients on the doctor could explain why the American doctors live in average 58.5 years, while the average American lives 75 years.

Keywords: spinning influence on quantum measurements; observers' influence on quantum measurements; observer influence on diffraction patterns; observer influence on radioactive decay.

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I. Explaining why Two-slit Diffraction was not Observed when Observer was Present

As far back as in 1906, G. Taylor first performed the double slit experiment. He found that photons passing through two slits were showing diffraction pattern (alternating light and dark lines), which meant that the photons behaved like waves. However, the photons were not showing the normally observed diffraction pattern when observer was present, which meant that in the presence of observer the photons behaved like particles (only two light lines behind the slits were observed). In 1961, Claus Jonson (from the University of Tubingen) observed the same effect with electrons – when passing through two slits, the electrons were showing diffraction pattern, which meant that the electrons behaved like waves. However, the electrons were not showing the normally observed diffraction pattern when observer was present, which meant that in the presence of observer the electrons behaved like particles [1].

Our science (at the present level) cannot explain this, which means that our science needs to be expanded to be able to explain it. Our science presently claims that we are only material body. Based on my almost 40 years of research on the aura, I claim that we are more than just material body [2] – the aura must always be considered. I found that the aura is weak nonlinear electromagnetic field (NEMF) (1,000 times weaker than the field, which the biocurrents of the material body create), but this weak field rules and regulates everything in the body, not with its strength, but with the information it carries. I found that the NEMF (seen as aura) is emotionally sensitive – the aura shines brighter at positive emotions and is dimmer at negative emotions [3].

Since we say that we are in high spirit when we experience positive emotions and we say we are in low spirit when we experience negative emotions, I concluded that the aura must be our emotional Spirit, which is weak informational NEMF. I rejoiced when I found that the ancient Jewish Cabala was teaching to high priest that the aura is our Spirit [2]. The Russian scientist Shkatov developed equipment that allows him

to measure the spinning of the aura. He found that our aura spins and it spins clockwise at positive emotions and counterclockwise at negative emotions [2]. Since the aura (Spirit) is NEMF and nonlinear physics teaches that vortices spin clockwise and suck energy in, while anti-vortices spin counterclockwise and emit energy, I concluded that at positive emotions our aura (Spirit) is brighter because it spins clockwise and sucks NEMF energy in, while at negative emotions our aura (Spirit) is dimmer because it spins counterclockwise and loses NEMF energy.

However, for this to happen there must be a reservoir of NEMF energy available. Is this reservoir of NEMF energy the Space Matrix (called ether in the past) of which the whole material world was created? I answered this question positively in my article "Explaining the Uneven Earth Growth with Time" [4], which was the only way to explain the observed uneven growth of our Earth with time. So, we are not only a material body – we are a material body and Spirit (seen as aura) and this aura (Spirit) spins [1]. Our aura NEMF has a donut shape (Fig. 1), just like the aura NEMF of our Sun (Fig. 2). While our Sun spins clockwise and sucks NEMF energy from the Space Matrix NEMF to become active every 11 years (in average), our aura NEMF at down starts spinning clockwise and sucking NEMF energy from the Space Matrix NEMF to become active during the day; our aura NEMF at dusk starts spinning counterclockwise and releasing NEMF energy to the Space Matrix NEMF so that we can rest and sleep during the night [1].

Since our donut-shape aura is NEMF and all nonlinear fields have a chain or chains of alternating vortices and anti-vortices, our aura NEMF has a chain of 7 alternating vortices and anti-vortices along the backbone, which can be seen on Fig. 1.

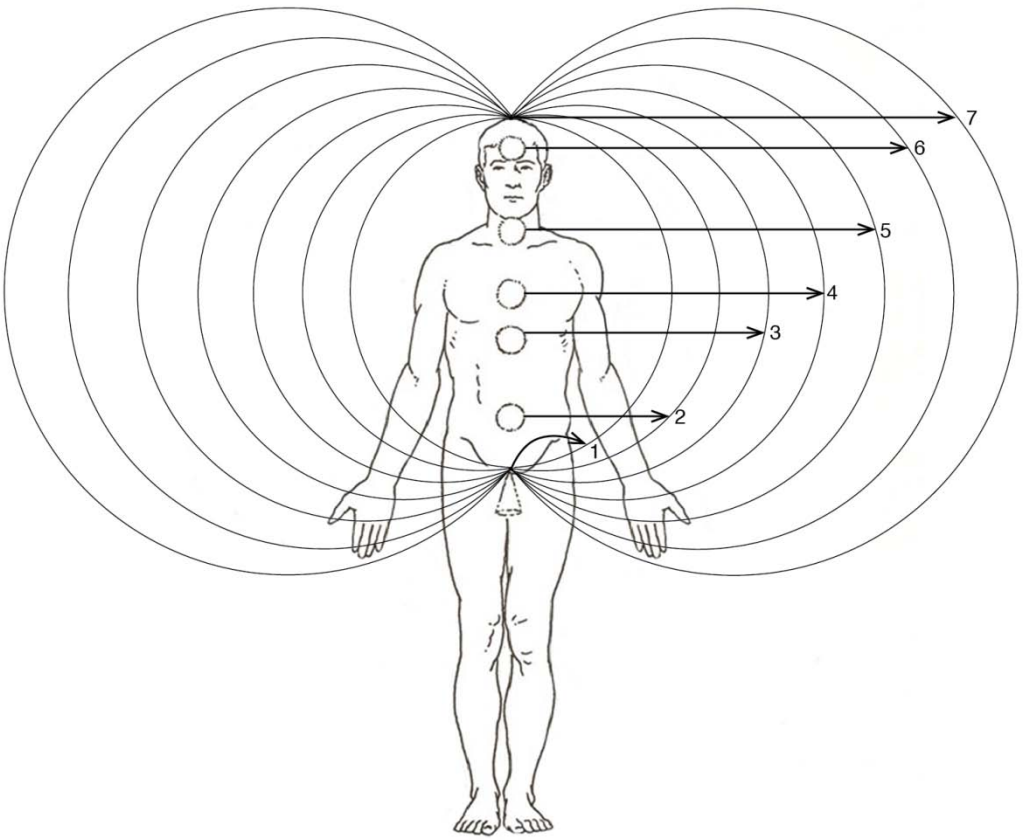

Fig. 1: The chain of alternating vortices and anti-vortices along the backbone of the men's aura NEMF and their corresponding quantum energy levels

These alternating vortices and anti-vortices are numbered with consequent numbers starting with the tailbone and finishing with the top of the head. They are called in ancient Hindu texts "chakras", which mean "spinning wheals" in Sanskrit. To the seven chakras correspond seven discrete (quantum) energy levels of the aura's NEMF (Fig. 1) [2]. Look at the quantum energy levels of our aura (Spirit) NEMF and tell me how the spinning NEMF of the observer with quantum energy levels not to be expected to influence quantum measurements. Of course, it would.

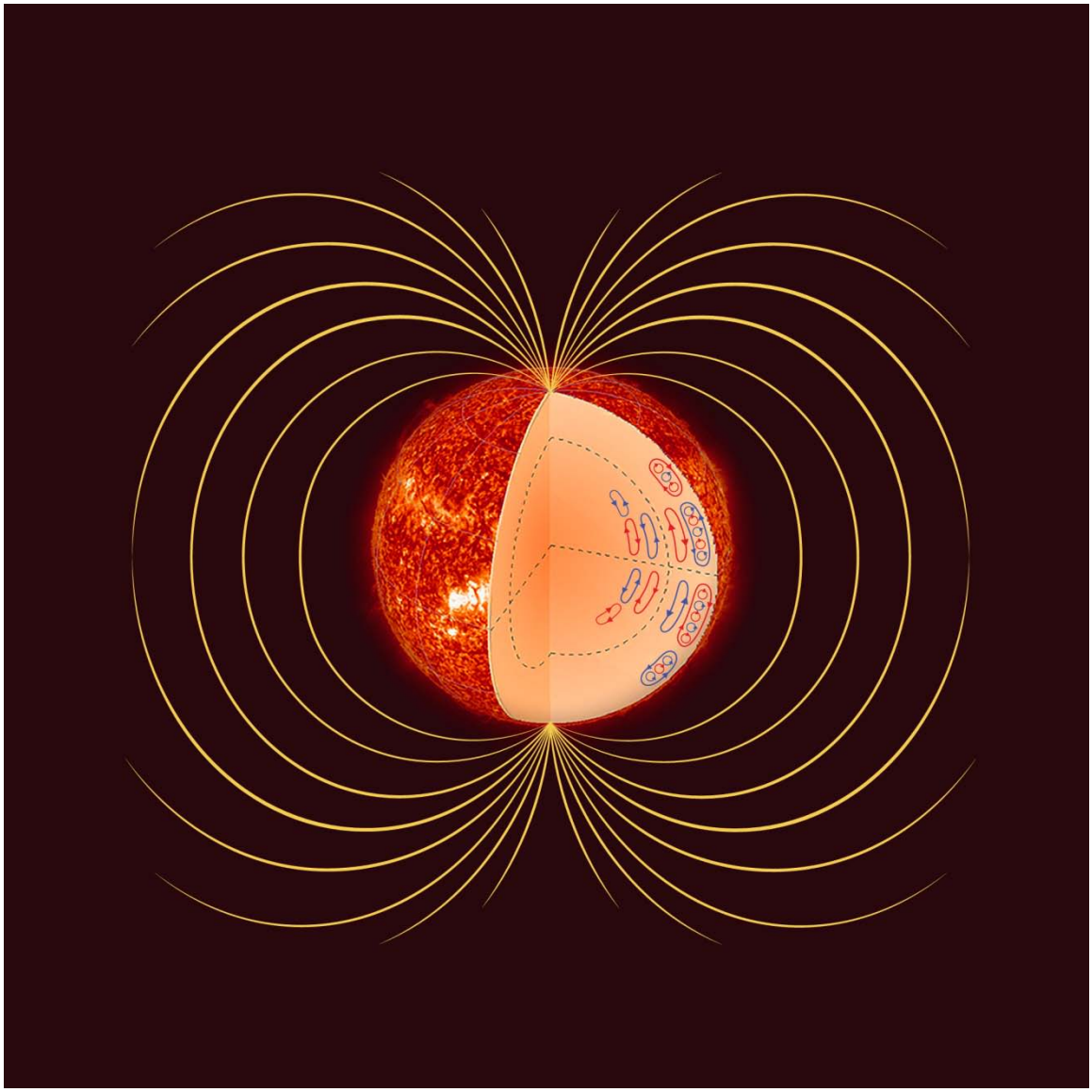

Fig. 2: The Sun has two chains of alternating vortices and anti-vortices running parallel to the equator and the quantum energy levels of the Sun's NEMF

II. Explaining why the Lifetime Decay of Radioactive Elements is Longer when Observer is Present

Wolfgang Ketterle from the Massachusetts Institute of Technology reported that the lifetime of decay of radioactive elements is longer when observer is present. The Russian scientist Igor Melnik (Tomsk) did research with spinning liquids and spinning solids in the proximity of decaying radioactive elements and found that the spinning masses were slowing the radioactive decay even from a distance. His results were reported at the International Conference on Torsion Fields and Informational Interactions, held in Sochi in August 2009 [5]. After he studied the influence of spinning liquids and solids on radioactive decay and he found that spinning of both (liquids and solids) slow down the radioactive decay and thus increase the lifetime of the decaying element, he went and studied the Phantom Effect, which is the imprint left on the space after the object has been removed - it allows detection of ex-presence.

However, after all these valuable experiments, Dr. Melnik still couldn't see the presence (existence) of the Space Matrix (called ether in the past) and its role in the observed experiments. He continued to think and to claim that the spinning objects create fields that are not electromagnetic [5], simply because he lacked knowledge in nonlinear physics and could not see that the involved field is nonlinear electromagnetic field (NEMF). In article [6], I showed that everything material is a material body and NEMF – it comes from the way the material world was created. If so, spinning liquid and solid masses would have spinning NEMF. If this spinning NEMF slower the decay of radioactive

materials, the spinning torus-shape aura NEMF of the observer (Fig. 1) would do the same.

The phantom experiments of Dr. Melnik definitely pointed out that Space Matrix (ether) do exists. Since we said in Section 1 that we are a material body and emotional Spirit seen as aura (which is spinning weak informational NEMF), we can expect the spinning aura of the observer to slow down the decay of radioactive elements just like the spinning NEMF of spinning liquids and solids do. The spinning torus-shape aura NEMF of all living beings is a result of two fields – the NEMF1 of the material body (which Kundalini Yoga presents as an energy spiral running upward along the backbone and the NEMF2 of the Spirit (which Kundalini Yoga presents as an energy spiral running downward along the backbone [7]).

This means that the two fields (NEMF1 of the material body and NEMF2 of the Spirit seen as aura) of all living beings have opposite polarity and they are attracted to each other, as two magnets with opposite polarity would do. In the way the spinning NEMF of spinning liquids (or solids) slower the decay of radioactive elements, so would the spinning aura (Spirit) NEMF of humans. And this is true for all living beings, whose spinning aura NEMF consist of magnetically coupled NEMF1 (body) + NEMF2 (Spirit).

Not only will the spinning aura of the observer influence quantum measurements, we can expect the quantum measurements to be influenced differently by: 1/ positive thinkers, whose bright clockwise spinning aura will bring NEMF energy to the quantum measurements; 2/ negative thinkers, whose dim counterclockwise spinning aura loose NEMF energy to the Space Matrix NEMF - they are expected to suck energy from what they observe and measure; and 3/ by neurasthenic people, whose strong aura (Spirit) NEMF with fluctuating intensity is expected to mess up the energy of the quantum experiments they observe, in the way they burst light bulbs and disable electronic devices and machines [8].

III. Explaining the Shorter Lifespan of Doctors Living in the Presence of the Spinning NEMF of their Sick Patients

It is a fact that the average lifespan of medical doctors is 58.5 years when the lifespan of the average American is 75 years. This fact can be explained only with negative influence of the aura NEMF of the sick patients on the doctors' aura NEMF. My measurements showed that negative thinking leads to a disease of genetically inherited weak organ [9]. If so, the sick people are either negative thinkers or people with dominantly negative life experiences, who have dim aura NEMF, which spins counterclockwise and looses NEMF energy to the Space Matrix NEMF. Such sick people, when trying to survive, would suck life energy from the quantum experiments they observe, as well as from the doctors they go to. The fact that sick people suck energy explains the saying: "You don't look well – are you sick or taking care of a sick person".

IV. Only Preventive Medicine can Prolong the Lifespan of the Medical Doctors to Normal

The only way to make the medical doctors live as long as the rest of the people (75 years) is to embrace preventive medicine. Then the medical doctors will deal all the time with healthy people trying to keep them healthy. This will make the doctors healthy and allow them to live as long as the rest of the people. Therefore, it is in the interest of all medical doctors to do their best to introduce preventive medicine. Ancient China had preventive medicine. Everybody was going to a doctor-acupuncturist 4 times a year for regular check up with pulse diagnostics. If the pulse diagnosis were detecting a minor deviation from norm, usually only one acupuncture treatment was enough to restore the balance and bring back the health [10]. If the person was getting sick, the acupuncture doctor was obligated to treat him with a series of acupuncture treatments for free because he didn't do his preventive job properly. Thus, the doctors were paid to keep the people healthy.

V. Conclusion

Everything material is a material body and NEMF. It comes from the way the material world was created [6], and automatically explains the dualism wave particle. Since the experiments of Dr. Melnik proved that spinning liquids or solids (which have spinning NEMF) slow down the decay of radioactive elements, this article explained that the slowed down decay of radioactive elements in the presence of observer is a result of the influence of the spinning torus-shape aura NEMF of the observer. The influence of the observer on any quantum measurement is influence of his spinning torus-shape aura NEMF with discrete quantum energy levels (Fig. 1) on the quantum measurements. If the medical doctors live in average only 58.5 years, it is because they are dealing with sick people, whose dim aura (Spirit) NEMF sucks some of doctors' energy in attempts to survive.

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Evaluation of 'Referral for Treatment' System under RNTCP in a Hospital at Kolkata, India

By Dr. Sampa Mitra

Abstract- To handle the problem of tuberculosis (TB), Government of India started the Revised National TB Control Programme (RNTCP) in 1993, whereby Directly Observed Treatment, Short-course (DOTS) was officially adopted as the strategy in 1997. The medical colleges, involved in the RNTCP programme, refer the patients to the DOTS centres near their homes, after assigning the treatment categories. This study attempts to evaluate this 'referral for treatment' system during the second phase of RNTCP (RNTCP-II). To achieve this objective, pertinent data regarding 758 patients referred from RG Kar Medical College, Kolkata, to various DOTS centres in West Bengal, between 01.10.2006 and 30.09.2007, were collected from the said medical college, the relevant DOTS centres, the patients themselves, using a suitable questionnaire, and also the family members and the neighbours of some patients. Chi-square test at 5% level of significance was used as an analysis tool.

Keywords: referral, DOTS, RNTCP, RG Kar Medical College, chi-square test.

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Abstract- To handle the problem of tuberculosis (TB), Government of India started the Revised National TB Control Programme (RNTCP) in 1993, whereby Directly Observed Treatment, Short-course (DOTS) was officially adopted as the strategy in 1997. The medical colleges, involved in the RNTCP programme, refer the patients to the DOTS centres near their homes, after assigning the treatment categories. This study attempts to evaluate this 'referral for treatment' system during the second phase of RNTCP (RNTCP-II). To achieve this objective, pertinent data regarding 758 patients referred from RG Kar Medical College, Kolkata, to various DOTS centres in West Bengal, between 01.10.2006 and 30.09.2007, were collected from the said medical college, the relevant DOTS centres, the patients themselves, using a suitable questionnaire, and also the family members and the neighbours of some patients. Chi-square test at 5% level of significance was used as an analysis tool. The study displays some serious drawbacks in the system of 'referral for treatment' in West Bengal viz., non-registration at the DOTS centre after referral, inadequacy of previous TB treatment method (indicating the shortcomings in the referral system going on since 2003), regarding which, the urban-rural divide is significant, low conversion rate from sputum positive to sputum negative patients after 2-3 months of treatment, and possibility of unfavourable outcome (which includes death) following treatment, which is significantly dependent on the type of patient, i.e., whether seriously ill or not. Besides, this work shows a high prevalence of TB in the productive age group i.e., 15-44 years.

Keywords: referral, DOTS, RNTCP, RG Kar Medical College, chi-square test.

I. Introduction

To tackle the heavy burden of tuberculosis (TB) and improve the quality of treatment, Government of India, in 1993, revitalized its National TB Programme (NTP) as Revised National TB Control Programme (RNTCP). In 1997, Directly Observed Treatment, Short-course (DOTS) was officially adopted as the strategy of RNTCP. By the end of 2005, the whole of India was covered under this programme (i.e., RNTCP). During the second phase of RNTCP i.e., RNTCP-II, which was started in 2006, there was an improvement in the quality and reach of service.

Since 2003, the medical colleges have been involved in the RNTCP programme. Here, the treatment categories are assigned to the patients, after diagnosis. Next, they are referred to DOTS centres situated within short distances from their residences. There, the actual treatment is done. This is the system of 'referral for treatment'.

The objective of this paper is to judge how the technique of 'referral for treatment' worked under RNTCP-II.

To achieve this objective, this study was conducted between 01.09.2007 and 31.08.2008, on the TB patients referred from RG Kar Medical College to various DOTS centres in West Bengal (India).

Before undertaking the study, a brief literature survey was performed, but no work dealing with the appraisal of the system of 'referral for treatment' in West Bengal, was found.

II. Methodology

In this work, the details regarding the 758 patients (the study population), referred from this college between 01.10.2006 and 30.09.2007, were recorded. The referrals had been classified into two categories viz., inside district (i.e., DOTS centres inside the Kolkata (metropolis) district), and outside district (i.e., DOTS centres outside Kolkata). The data regarding the fate of patients, after their referrals, were also collected. To understand whether there is a significant association between the area of referral and the registration status (at the DOTS centre), between the area of referral and the disease status, between the area of referral and the conversion status of new sputum positive cases, and between the type of patient and the outcome of the treatment after referral, the chi-square tests were done at 5% level of significance, in all the cases. The formula for chi-square (χ^2) is given by equation (1):

$$\chi^2 = \sum \frac{(O-E)^2}{E} \qquad (1)$$

where,

O = each observed value in any one of tables- 2 to 5,

E = each expected value in the same table = (row total X column total / grand total) corresponding to each value in that table,

p = p-value (calculated using relevant software system) corresponding to the chi-square value with 1 degree of freedom.

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If $p < 0.05$, then it can be concluded that the relevant association is significant; otherwise, it (i.e., the pertinent association) is not significant.

The outline of the method, used in this study, is depicted in figure-1.

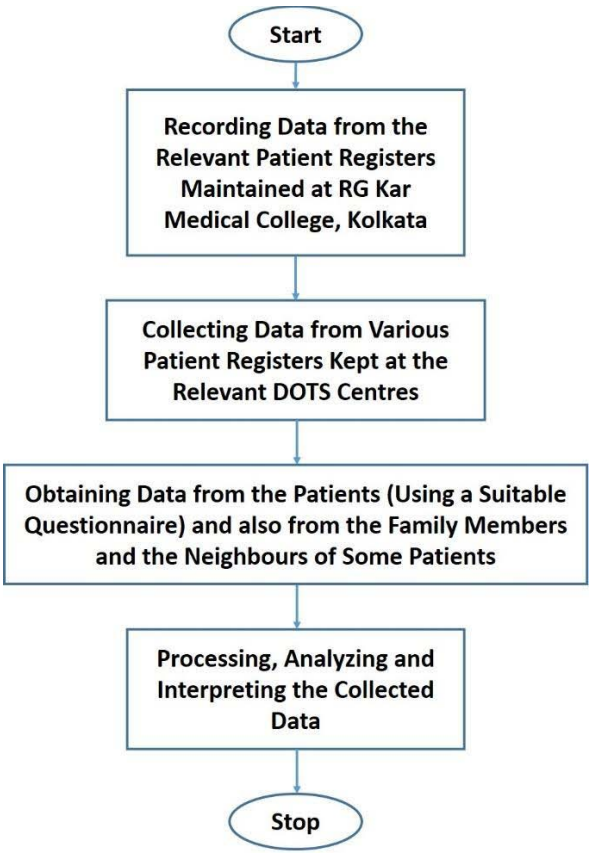

Fig.-1: Pictorial representation of the outline of the method

III. Results and Discussions

Table-1 gives a preliminary idea about the study population (i.e., the referred patients) on the basis of age and gender.

Table-1: Distribution of the study population according to age and gender

Age (years)	Referrals inside district		Referrals outside district		Total
	Male	Female	Male	Female	
15-44	73	100	184	135	492
Other	48	36	126	56	266
Total	121	136	310	191	758

It may be noted here that 15-44 years pertains to the productive age group; hence, it has been highlighted in table-1. It is really a matter of concern that the total number of referrals was much higher for this age group, than for the other groups (as per table-1). Also, table-1 shows that the number of females, referred to DOTS centres inside the district, was more than that of the males, whereas higher number of males, as compared to females, were referred to DOTS centres outside the district.

Table-2 shows how many of the referred patients actually registered in the DOTS centres after referral.

Table-2: Distribution of the study population according to the registration status

Registration status	Area of referral		Total
	Inside district	Outside district	
Registered	224	439	663
Not registered	33	62	95
Total	257	501	758

It can be seen from table-2 that a considerable number of patients (95 among 758 i.e., nearly 13%) did not register in the DOTS centre for treatment after referral; this is a cause of worry. Also, it may be noted that the number of non-registered patients at DOTS centres located outside district (i.e., outside the metropolis of Kolkata) is nearly double that for DOTS centres located inside district (i.e., within Kolkata). However, the chi-square test shows that the association between the area of referral and the registration status is not significant at 5% level (p-value=0.85286>0.05; degree of freedom=1). Thus, though there is no significant urban-rural divide in case of registration at the DOTS centres, the relevant authorities should urgently devise ways to urge all the referred patients to register at the DOTS centres; otherwise the problem of TB cannot be handled efficiently.

Table-3 displays how many of the referred patients were newly infected with TB, and how many were infected with TB before, but had come for treatment again, as the previous treatment was unsuccessful.

Table-3: Distribution of the study population according to disease status

Area of referral	Disease status		Total
	New case	Retreatment case	
Inside district	204	53	257
Outside district	435	66	501
Total	639	119	758

It is clear from table-3 that quite a large number of patients (119 among 758 i.e., nearly 16%) had come for retreatment due to inadequacy of previous treatment method. This is really a cause of concern. Also, this fact indicates the shortcomings of the 'referral for treatment' system going on since 2003. Further, the chi-square test shows that the association between the area of referral and the disease status is significant at 5% level (p-value=0.00738<0.05; degree of freedom=1). It shows that there is a significant urban-rural divide with respect to the adequacy/success of previous TB treatment technique. The pertinent authorities should see that new TB patients get adequate treatment so that, in future, there will be no need for retreating previously treated TB patients. Also, they should ascertain that there is no urban-rural divide with regard to adequacy of TB treatment.

Table-4 depicts how many of the new sputum positive TB patients (who registered in the DOTS centres after referral) were converted into sputum negative patients after 2-3 months of treatment.

Table-4: Distribution of the new sputum positive registered patients according to conversion status

Area of referral	Conversion status			
	Conversion of new sputum +ve cases after 2-3 months (A)	No conversion of new sputum +ve cases after 2-3 months	Total new sputum +ve cases (B)	Conversion rate (%) [AX100/B]
Inside district	60	34	94	64
Outside district	78	28	106	74
Total	138	62	200	69

It is evident from table-4 that the number of sputum positive patients who were not converted into sputum negative ones in 2-3 months, is substantial (62 among 200 i.e., 31%). The reason for this should be investigated. However, the chi-square test shows that the association between the area of referral and the conversion status is not significant at 5% level (p-value=0.13333>0.05; degree of freedom=1). Thus, there is no significant urban-rural divide in case of conversion of sputum positive patients; rather the conversion rate is better for patients attending DOTS centres outside Kolkata, than for the ones attached to DOTS centres within Kolkata. Anyway, competent authorities should find out ways to ensure 100% or near 100% conversion rate after 2-3 months of treatment, instead of 69%, as shown in table-4.

Table-5 presents how many of the patients who registered at the DOTS centres, got positive/favourable result after treatment. In this table, (i.e., table-5), "favourable outcome" implies any one of the following:

- the patient was cured, and
- the patient's treatment was completed, but it was not ascertained whether the patient was ultimately cured or not (i.e., -ve sputum was found at the end of initial phase of treatment, but sputum was not tested at the end of the final phase),

and "unfavourable outcome" indicates any one of the following:

- the patient died during treatment, irrespective of the cause,
- the patient defaulted (i.e., at any time after registration, the patient did not continue the treatment for 2 months or more consecutively),
- the patient was transferred to another area, and
- the patient's treatment failed (i.e., +ve sputum was found after ≥5 months of treatment), but the patient was not dead (when the data were collected).

Table-5: Distribution of registered patients according to outcome of treatment

Type of patient	Outcome of treatment		Total
	Favourable outcome	Unfavourable outcome	
Seriously ill (categories- I and II)	416	76	492
Not seriously ill (category-III)	167	3	170
Total	583	79	662

Table-5 indicates that the number of patients for whom the outcome of the treatment was unfavourable (unfavourable outcome includes death, as already indicated), is considerable (79 among 662 i.e., nearly 12%). This matter needs urgent attention of the pertinent authorities. Moreover, the chi-square test shows that the association between the type of patient (seriously ill/not seriously ill) and the outcome of treatment is significant at 5% level (p-value=0.00001<0.05; degree of freedom=1). This is also a cause of worry.

It may be mentioned here that in table-5, patients with category-I treatment regimen are the new sputum positive pulmonary TB cases, the new sputum negative pulmonary TB cases, who are seriously ill, the new cases of extra-pulmonary tuberculosis, who are seriously ill, and all the new TB cases with known HIV positive status (Central TB Division (under Directorate General of Health Services of Government of India) 2005). Patients with category-II treatment regimen, in table-5, are the sputum positive relapse cases, the sputum positive failure cases, the sputum positive default cases currently under treatment, and the others i.e., extrapulmonary relapse or failure cases (Central TB Division (under Directorate General of Health Services of Government of India) 2005). And, in the same table, i.e., table-5, the patients with category-III treatment regimen are the new sputum negative pulmonary TB cases, who are not seriously ill, and the new extra-pulmonary TB cases, who are not seriously ill (Central TB Division (under Directorate General of Health Services of Government of India) 2005).

Further, in table-5, the total number of registered patients is shown as 662, while it is mentioned as 663 in table-2. Actually, for one of these 663 registered patients, the mode of treatment was other than DOTS; hence, the outcome of treatment he/she received is not relevant to this study, and his/her case has not been included in table-5.

Thus, this study shows that there are certain serious lacunae in the system of 'referral for treatment' in West Bengal, which should be urgently looked into. These are:

- the problem of not registering at the DOTS centre after referral,
- the problem of inadequacy of previous TB treatment method (indicating the drawbacks of the 'referral for treatment' system (which includes the drug treatment) going on since 2003), and the urban-rural divide with regard to this,
- the problem of low rate of conversion from sputum positive to sputum negative patients after 2-3 months of treatment, and

- the problem of unfavourable outcome (which includes death) following treatment, and its dependence on the type of patient (i.e., whether he is seriously ill or not).

Further, this study indicates a high prevalence of TB among the patients of productive age group viz., 15-44 years; this matter also needs urgent attention.

Before concluding this section, it will be prudent to have a quick look at the findings of some of the other researchers working in this field.

Kondapaka et al. found that among the patients admitted to Government General and Chest Hospital, Hyderabad (India), between 1st January, 2010 and 30th June, 2010, for treatment of TB, 921 were ultimately referred to peripheral centres, but formal feedback was received for only 682 of them, indicating deficiencies in the system of referral for treatment and feedback (Kondapaka et al. 2012). Bharaswadkar et al. studied the role of Private Practitioners (PPs) in RNTCP in Pune (India) in 2010, and observed that though many PPs worked as referral centres, a considerable number of them were not adhering to the standard international guidelines for the treatment of TB (Bharaswadkar et al. 2014). Jayabal et al. noted that for a considerable number of TB patients, referred within and outside the Chennai district (India) by some Tuberculosis Units of Chennai Municipal Corporation, between January 1, 2014 and June 30, 2014, either no further information was available or treatment was not initiated (Jayabal et al. 2017). Thomas et al. conducted research, in 2015-16, on some TB patients of Chennai (India) who stopped following up the treatment process either during diagnosis, or at the time of referral/hospital admission, or when the official RNTCP registration process was to be done, and discussed various possible reasons for this behaviour of the patients (Thomas et al. 2020). Stalin et al. devised an intervention package to reduce the number of those TB patients of the Puducherry district (India), who were referred for treatment by four medical colleges in the district, but for whom no feedback was available (Stalin et al. 2020). They (i.e., Stalin and his group) observed that before using the package, the percentage of such patients was 54 (in the 3rd and the 4th quarters of 2016), and after applying the package, it became 34 (in the 2nd quarter of 2017) (Stalin et al. 2020). Arora et al. found that among the 4395 TB patients, handled by Maulana Azad Medical College, Delhi (India), and its associated hospitals, between July 2018 and March 2019, 3315 were referred out, but feedback was received for only 797 of them (Arora et al. 2021).

Thus, these studies point out the drawbacks in the system of 'referral for treatment', in various parts of India, other than West Bengal.

IV. Conclusions

This study evaluated the system of 'referral for treatment' in West Bengal, in 2007-08, and found certain serious shortcomings in this technique, with regard to percentage of registration at DOTS centre, adequacy of previous TB treatment method (which gives an idea about the performance of the 'referral for treatment' system going on since 2003), rate of conversion from sputum positive to sputum negative patients after 2-3 months of treatment, and chance of overall positive result following treatment.

Also, this work shows a high occurrence of TB among the patients of productive age group i.e., 15-44 years.

A more comprehensive study needs to be done to judge the strengths and the weaknesses of not only the system of 'referral for treatment' but also the RNTCP programme, considering the fact that the problem of TB in India should be handled effectively and urgently. This task may be taken up in future, if possible.

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Hospital Quality Management: Steps to Implement Quality in Health Care Facilities

By Sahar Moukhafi
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Abstract- In the healthsector, systems are oftenunder pressure, as they must control heavyexpenses, adapt to the imperatives of theirconstrainingcontexts and satisfy the evolvingneeds of patients throughquality services and care. As a result, managing the quality of hospital care has become a major economic, sociological and political issue,

The aim of this article is to identify the main steps in the implementation of quality of care practices in a health care institution.

Keywords: *hospital quality management, quality of care, health care institutions.*

GJMR-K Classification: *DDC Code: 362.10947 LCC Code: RA395.E852*

Strictly as per the compliance and regulations of:

Hospital Quality Management: Steps to Implement Quality in Health Care Facilities

Management De La Qualité Hospitalière: Étapes D'application De La Qualité En Établissements De Santé

Sahar Moukhafi

Abstract- In the healthsector, systems are oftenunder pressure, as they must control heavyexpenses, adapt to the imperatives of theirconstrainingcontexts and satisfy the evolvingneeds of patients throughquality services and care. As a result, managing the quality of hospital care has become a major economic, sociological and political issue,

The aim of this article is to identify the main steps in the implementation of quality of care practices in a health care institution.

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Résumé- Dans le secteur de la santé, les systèmes sont souvent sous pression, car ils doivent maîtriser les lourdes dépenses, s'adapter aux impératifs de leurs contextes contraignants et satisfaire les besoins évolutifs des patients à travers des services et des soins de qualité. De ce fait, la gestion de la qualité des soins hospitaliers est devenue un enjeu majeur sur le plan économique, sociologique et politique,

L'objectif de cet article est d'identifier les étapes principales d'application des pratiques de la qualité des soins dans un établissement de santé.

Motsclé: management de la qualité hospitalière, qualité des soins, établissements de santé.

Introduction

Le monde hospitalier se caractérise d'une grande complexité, en effet l'hôpital, qui a pour mission principale la production de soin, est un terrain d'interaction entre les savoirs médicaux, soignants et la gestion administrative, le management de la qualité hospitalière se propose comme l'ultime moyen d'assurer la réussite de cette mission en assurant l'amélioration continue de la qualité des soins.

En effet le management de la qualité hospitalièreest le résultat d'un ensemble de pratiques, méthodes et concepts développés à partir de données collectées au sein de l'établissement de santé, et définis par les écrits de plusieurs auteurs.

L'instauration des principes du management hospitalier au sein de la structure de soin reste un défit à relever par tut les acteurs de soins.

Une question principale se pose:

- Quelles sont les étapes clé de l'application d'un système de management hospitalier?

Plusieurs questions en découlent:

- Quelles sont les dimensions de la qualité des soins?
- Quelles sont les méthodes et les outils essentiels pour l'application deces étapes?
- Quel est le rôle que joue l'audit clinique dans cette démarche?
- Quelle place occupe l'accréditation dans ce système?

I. Qualité et Satisfaction Des Besoins

a) *Le concept de conformité*

La conformité du service rendu se définit par la réponse adéquate aux besoins et préférences du client (celui qui reçoit la prestation) d'une part, et au niveau de qualité de la prestation d'autre part, qui doit être supérieur à ce qui appelé non qualité, il s'agit, donc, de deux notions qui engendrent la non qualité:

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Par conséquent, il est important de définir et connaître les besoins du client pour assurer la conformité, et donc la qualité.L'identification des besoins s'effectue à partir d'un accord mutuel entre fournisseur et client, en ce qui concerne l'expression et l'acceptation de leurs besoins.

En effet, pour une définition correcte du besoin, il faut savoir qu'il existe trois niveaux de satisfaction:

- Niveau de besoin latent: le plus qui fera la différence entre un service et un autre
- Niveau de besoin explicite: la conformité aux exigences
- Niveau de besoin implicite: le dû car évident est essentiel.

b) Le concept deprévention

A partir des trois niveaux de satisfaction cités au paravent, l'entité a la possibilité d'apporter trois types de réponses lorsqu'il y'a insatisfaction:

- La réparation: des moyens curatifs sont mis en œuvre pour traiter les défauts constatés. Le processus n'est pas remis en cause pour éviter de reproduire le dysfonctionnement.
- Le contrôle: l'objectif est d'éviter que le client constate le défaut.
- La prévention: des moyens préventifs sont mis en place pour que le défaut ne puisse plus se reproduire. L'effort consenti à la prévention pourra réduire très significativement la réparation. Dans ce cas, il s'agira de tendre à donner une réponse conforme dès le premier coup et toutes les fois suivantes.

II. Les Différentes Typologies de Laqualité

Il existe quatre types de qualité dans la relation client-fournisseur qui diffèrent selon la perception de chaque acteur de soins

- La qualité voulue: c'est celle qui est exprimée sous forme de critères explicites qui permettent, par la suite, de mesurer la conformité. La qualité voulue est généralement définie par les professionnels et le législateur sur la base de références légales ou réglementaires et de consensus professionnel.
- La qualité attendue est celle que le patient construit à partir de son vécu, son expérience antérieure, l'environnement du système de soins dans lequel il se trouve.
- La qualité vécue: elle dépend à la fois de la qualité attendue et de la qualité délivrée. C'est celle qu'expérimente le patient.
- La qualité délivrée est celle que reçoit réellement le patient.

L'écoute des clients a pour objectif de réduire les écarts mesurés entre les différents types de qualité.

a) Les dimensions de la qualité des soins

Selon S.M. SHORTELL[1] (SHORTELL S.M., 1998), il existe quatre dimensions fondamentales au développement de la démarche qualité:

- La dimension stratégique

Elle a comme but d'apporter une vision prospective de la démarche qualité au sein de l'établissement de santé par le choix des processus clefs et des objectifs que l'on veut atteindre. Cette dimension aide à mobiliser les acteurs de soin autour d'objectifs qualité précis et légitimer la démarche qualité dans le fonctionnement quotidien de la structure.

- La dimension technique

Cette dimension regroupe trois éléments principaux liés au savoir-faire des acteurs:

- La gestion de projet: c'est l'ensemble des composantes du management de la qualité mis en œuvre dans la structure pour atteindre les objectifs fixés
- L'organisation du système qualité: elle regroupe la formalisation de la démarche globale
- La maîtrise des outils et méthodes: ils servent à mettre en œuvre les différents projets qualité et sont adoptés en fonction des processus analysés. Il est souhaitable que ces outils et méthodes soient

[1] Shortell S.M., Bennet C.L., Byck G.R:"Accessing the impact of continuous quality improvement on clinical practice". MILBANK Q., 1998. 76 – pp. 593-624.

harmonisés afin de limiter les coûts d'implantation et de formation des personnels.

- La dimension structurelle

Cette dimension s'intéresse à la mise en place des structures d'organisation qui sont importants pour la démarche.

La coordination efficace est nécessaire pour apporter les actions d'amélioration liées à la démarche, elle représente une base fondamentale pour sa réussite. C'est la structure de coordination qui se charge d'assurer cet aspect et de donner du sens et de la cohérence au projet qualité. C'est le rôle que joue le comité de pilotage ou la cellule qualité.

- La dimension culturelle

Cette dimension rassemble toutes les représentations, croyances, valeurs ou comportements des acteurs qui aide à la mise en place de la démarche qualité et le développement d'uneculture de la qualité dans l'établissement.

Shortell précise les conséquences de la prise en compte insuffisante de chacune des dimensions:

Tableau 04: Dimensions de la qualité des soins

STRATEGIQUE	CULTURELLE	TECHNIQUE	STRUCTURELLE	RESULTATS
0	1	1	1	Pas de résultat significatif sur les sujets essentiels
1	0	1	1	Petits résultats temporaires. Pas de pérennisation
1	1	0	1	Frustration des acteurs. Faux départs.
1	1	1	0	Pas de capitalisation ni d'extension des apprentissages
1	1	1	1	Pérennisation de la démarche au sein de l'organisation

b) Le concept du niveau dequalité

Le qualiticien américain P. Crosby (CROSBY, 1996)affirme que les politiques qualité mises en place sur le terrain sont hétérogènes et se caractérisent par des niveaux de maturité très différents[2]. Il existe cinq étapes chronologiques dans le management de la qualité allant du plus simple au plus élaboré sont énoncées par Crosby: l'incertitude, l'éveil, la prise de conscience, la sagesse, la certitude. Chacun de cette étape réfère à un niveau de qualité déterminé .il faut savoir que la plut part des établissements de santé mettant en place une démarche qualité se placent entre le premier et le deuxième niveau.

Niveau 1= l'incertitude: l'établissement dispose d'un personnel compétent. Ce niveau de qualité se réfère à disposer d'un personnel qualifié, placé au bon endroit susceptible d'intervenir au bon moment.

Niveau 2 = l'éveil: l'établissement entreprend des contrôles a posteriori. A ce niveau, l'effort est surtout concentré sur la réparation du dysfonctionnement ; la durée des suivis est souvent peu prolongée. L'objectif n'est pas de maîtriser a priori les facteurs pouvant engendrer des dysfonctionnements. Il n'y a pas d'organisation généralisée.

Niveau 3 = la prise de conscience: l'établissement a structuré la gestion de la qualité par projets. C'est le mode de gestion le plus utilisé. L'établissement se préoccupe de traiter les dysfonctionnements principaux, à prendre en charge certains processus clés et à répondre aux exigences réglementaires conjoncturelles. Il n'y a pas d'approche systémique de la qualité.

Niveau 4 = la sagesse: l'établissement maîtrise ses principaux processus. Le terme de maîtrise se traduit comme la définition des points d'organisation nécessaires (qualification, moyens, temps alloué, procédures…) et formalisés, destinés à minimiser les risques de dysfonctionnement.

Niveau 5 = la certitude: l'établissement applique une gestion globale de la qualité, la qualité est pilotée et couvre l'ensemble des activités de l'établissement.

III. Les Niveaux D'exigence et Leurs Spécificitésd' Obligations

Il faut savoir que chaque niveau de qualité correspond à un niveau d'exigences précis, et en fonction de ses deux éléments, l'établissement choisit le système qualité approprié.

- Exigence de moyens: l'établissement doit acquérir les moyens appropriés. C'est le niveau minimal qui permet à l'entité de s'engager pour garantir des standards plus ou moins élevés en fonction de sa nature de l'activité.

[2] P. Crosby :« La qualité, c'est gratuit », Paris : Economica, 1996.

Mettre en œuvre uneorganisation	Exigence de moyenset d'organisation des moyens
Identifierdesbesoins	Exigence de moyenset d'organisation des moyens
Coordonner desservices	Exigenced'amélioration
Améliorer defaçoncontinue	Exigenced'amélioration
Maîtriser lerisqueinfectieux	Exigence demaîtrise

- Exigence d'efficacité des moyens: l'établissement doit s'assurer que les moyens nécessaires soient disponibles au bon moment, au bon endroit et en quantité suffisante. La mauvaise organisation représente une des causes principales de dysfonctionnement.
- Exigence d'amélioration: l'établissement doit analyser les processus afin de les améliorer d'une manière continue. Cette exigence se préoccupe du côté préventif et correctif. L'amélioration continue se base sur les efforts fournis par les groupes de travail.
- Exigence de maîtrise: l'établissement doit s'occuper de la configuration des processus afin d'assurer de façon systématique un résultat conforme et que les résultats non conformes soient supprimés, si possible avant d'être produits.
- Exigence de preuve: l'établissement doit fournir des preuves qui montrent que l'on fait, ce que l'on dit, à l'aide des enregistrements.

C'est selon l'activité et la stratégie de développement de la qualité de l'établissement, et aussi selon ses objectifs qualité, que se détermine ces différents niveaux d'exigence.

Si la qualité accréditrice mélange les différents niveaux d'exigence, la majorité des référentiels fait appel à des exigences de moyens ou d'organisation des moyens.

IV. Les Outils et Méthodes

a) Les méthodes utiles aupilotage

Les professionnels de santé réussissent, généralement, à trouver des moyens et méthodes pour améliorer les organisations et s'adapter à l'évolutivitédes pratiques. Ceci dit quand il s'agit de mettre en place de des démarches d'envergure avec des résultats important, il est primordial de sélectionner et adopter les outils nécessaires pour. Leur réussite. Ces méthodes et outils aident l'organisation à structurer la démarche qualité d'une part, et d'obtenir des améliorations significatives et mesurables dans le temps d'autre part.
La littérature présente un ensemble de techniques de la qualité, qui se caractérisent par un langage spécifique et des logiques propres ce qui rend difficile leurs appropriations par les acteurs du secteur de santé.

Nous présentons les techniques qui sont apparues les plus appropriées pour s'appliquer à la démarche qualité en hôpital.

A. L'approche processus

L'A.N.A.E.S. définit le processus *« comme un ensemble plus ou moins complexe de taches élémentaires, accomplies par un professionnel ou un groupe de professionnels, faisant appel à des ressources (équipement, matériel, information, compétences), destinées à obtenir un résultat donné »*[3]. (A.N.A.E.S, 2002)

Pour l'A.F.N.O.R., *« l'approche processus vise à adapter les différentes entités de l'organisme pour former une série de chaînes d'activités homogènes et maîtrisables, regroupées en fonction de leur contribution aux différents flux de création de valeur pour le client »* [4].

L'approche processus sert à identifier et analyser la contribution de chaque secteur concerné par la réalisation d'un produit ou d'une prestation.

Il faut savoir que la spécialisation des secteurs et des acteurs qui les composent, ne cesse de progresser en domaine de santé, et c'est l'approche processus qui aide à améliorer la coordination des interfaces en décloisonnant l'organisation verticale traditionnelle. La transversalité est un élément important du processus.(Stéphane Mathieu, 2003)

Au-delà de la qualité technique de chaque étape du processus concerné, l'objectif est de prendre en considération la qualité du système organisationnel mis en place.

- L'identification des processus

C'est une étape essentielle qui a comme objectif de définir les responsabilités des différents acteurs dans le cadre du travail et de mettre en place une gestion de projet. Il est souhaitable de préciser les processus clés. Ce sont ceux qui sont permanents et opérationnels et qui ont le plus d'importance dans la production du produit au service. C'est aussi ceux qui sont à l'origine des dysfonctionnements les plus importants et qui ont le plus d'impact sur la satisfaction des usagers de soins.

Les processus clés sont ceux qui sont en lien direct avec la prise en charge du patient (processus d'accueil, de sortie, etc.), ceux en lien avec le soutien logistique (maintenance, approvisionnement, etc.) et ceux liés au management de l'institution (élaboration du

[3] A.N.A.E.S.,« Principes de mise en œuvre d'une démarche qualité en établissement de santé », Paris : Avril 2002. 77 p., p. 54.
[4] Stéphane Mathieu :« Réussir l'approche processus », Paris : A.F.N.O.R., 2003.

projet d'établissement, processus de recrutement des personnels, suivi des budgets par exemple).

- La description du processus

Cela consiste à décrire concrètement comment les activités se déroulent au sein du processus concerné puis de les analyser afin de détecter les dysfonctionnements et leurs causes. Comprendre les différentes étapes du processus aide à le modifier pour que les résultats attendus soient fiables et se pérennisent.

- L'amélioration du processus

L'analyse du processus se base sur l'utilisation de plusieurs outils qui structurent la démarche[5] (A.N.A.E.S, 2000). Ce sont des méthodes qui ont comme but la détection et résolution de problèmes et l'analyse des processus. Ces méthodes sont complémentaires et souvent utilisées simultanément.

- La maîtrise des processus

Ce niveau de maîtrise se base essentiellement sur:

- Établir des procédures claires qui décrivent la façon de réaliser l'action,
- Organiser la formation du personnel,
- Renforcer l'encadrement de proximité qui doit s'assurer du suivi,
- Assurer la mesure et le suivi d'indicateurs,
- Utiliser les méthodes d'audit.

B. La méthode P.A.Q – A.N.A.E.S.

C'est une méthode qui vise l'amélioration de la qualité, testée dans 64 établissements français entre 1995 et 1997 et fondée sur l'étude des processus. Elle s'occupe des processus qui ont une relation avec la prise en charge du patient au sein d'un établissement de santé. Les objectifs de la méthode sont les suivants:

a. Décrire de façon structurée les processus étudiés
b. Identifier les points de dysfonctionnement
c. Définir les actions d'amélioration puis les mettre en œuvre
d. Mesurer les améliorations obtenues.

Cette méthode s'applique au niveau des processusstables et bien délimités, tels que la préparation de la sortie du patient. Elle prend en considération la relation « client-fournisseur ».

Au sein d'un même processus, la méthode P.A.Q. peut être utilisée sur certains segments et combinée à d'autres méthodes.

La méthode se base sur 4 étapes:

- Identifier le processus
- Décrire le processus
- Construire un nouveau processus
- Améliorer le processus.

C. L'audit clinique

Développée en France par l'A.N.D.E.M., cette méthode a pour objectif l'évaluation, elle permet de comparer les pratiques de soins à des références admises, à travers l'utilisation de critères pré définis. Elle a comme buts:

- Mesurer l'écart entre la pratique et laréférence.
- Définir et mettre en œuvre des actions d'amélioration.
- S'assurer de l'efficacité des actions d'amélioration.

Elle est souvent utilisée pour mesurer et améliorer une pratique professionnelle bien définie comme, par exemple, la tenue du dossier de soins. Elle est plus efficace quand l'établissement cible les pratiques professionnelles qu'il souhaite évaluer.

Elle comprend six étapes:

- Le choix du thème en fonction de la fréquence de la pratique et du risque encouru par le patient
- Le choix des critères
- Le choix de la méthode de mesure
- Le recueil de données
- L'analyse des résultats
- La mise en œuvre de plan d'actions d'amélioration.

D. La méthode P.D.C.A. : Plan Do Check Act :la roue de Deming

C'estuneméthode de conduite et d'amélioration de projet qui a pour objectif l'exécution d'une tache de façon efficace et séquentielle, elle est conçue par le qualitologue américain Deming, et peut s'appliquer à tous les processus, qu'il s'agisse de l'élaborationd'un projet d'établissement par exemple ou d'une action trèsciblée.

Elle se caractérise par 4 objectifs:

- Plan: établir un plan, prévoir. C'est définir le but et l'objectif de l'action en fixant des objectifs mesurables et les méthodes à utiliser pour les atteindre. A cette phase, il s'agit également de définir les moyens nécessaires à mettre en œuvre pour atteindre les objectifs définis.
- Do: exécuter le plan. La mise en œuvre du plan nécessite à ce stade la formation suffisante des personnels concernés. Le détail de l'action et sa finalité doivent être explicites en amont de l'exécution de la tâche.
- Check: vérifier les résultats. C'est au cours de l'action que va se vérifier l'hypothèse de départ. Il est important que les facteurs de l'action et leurs causes aient bien été identifiées.Ensuite, il s'agit de vérifier si les résultats obtenus sont conformes aux méthodes prédéfinies dans le plan et aux résultats attendus.
- Act: prendre des mesures correctives ou maîtriser les résultats obtenus. C'est à ce stade que l'on trouve la notion de roue de Deming: les écarts

[5] Pour en savoir plus : A.N.A.E.S.,« Méthodes et outils des démarches qualité dans les établissements de santé », Paris : Juillet 2000. 67 p.

observés doivent être suivis d'une analyse des causes et d'un nouveau plan d'actions.

b) Les outils deconstruction

A. Le diagramme de GANTT

L'établissement de santé peut être amené à piloter un certain nombre de projets simultanés pour lesquels se déclinent des actions à réaliser dans des délais impartis.

Le diagramme de Gantt est un outil qui sert à planifier ces actions et de visualiser plus facilement le déroulement du projet. Concrètement, le diagramme de Gantt est un planning représentant en abscisse l'échelle du temps et, en ordonnée, la liste des actions. Cela suppose que:

- Les actions soient identifiées
- Les actions soient priorisées et quantifiées en termes de délais, de charge et de ressources
- Qu'il y ait une cohérence d'ensemble dans l'enchaînement des actions.

B. Le logigramme

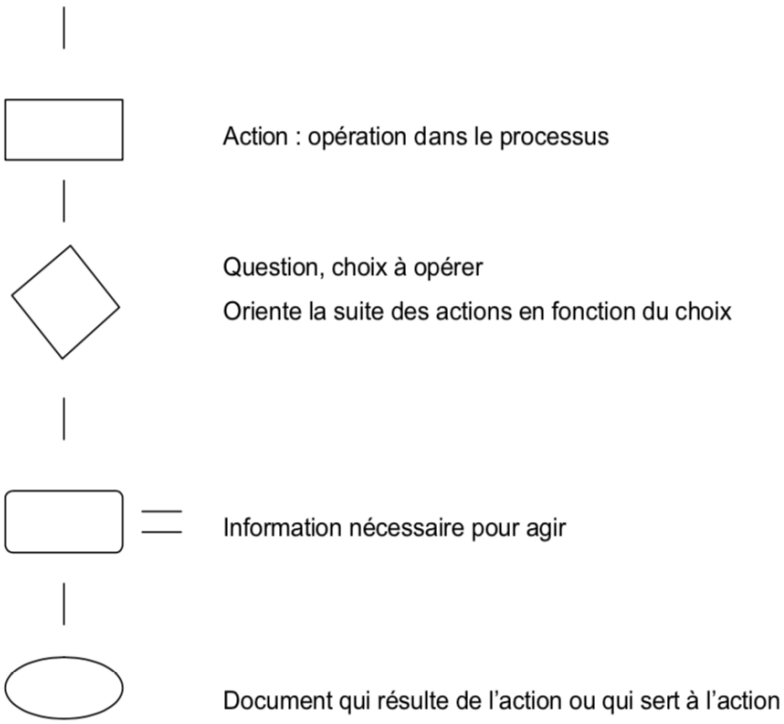
Le logigramme est génialement utilisé dans les démarches qualité, c'est la description graphique des enchaînements logiques d'une série d'opérations. Il a pour objectif de transcrire et à visualiser rapidement un mode opératoire ou un protocole. Un logigramme se lit comme un jeu de piste, un roadbook. Par sa forme, il représente en une seule fois l'ensemble des opérations et des choix décrits.

Sa méthode de construction:

- Définir son début et sa fin
- Identifier les questions: un logigramme s'articule autour de choix qui sont autant de réponses possibles aux questions que l'utilisateur peut se poser lors de sa lecture
- Identifier la chaîne principale: c'est le squelette du logigramme, c'est-à-dire l'enchaînement logique de la procedure "si tout se passe bien" sans nécessité d'aiguillage.
- Identifier les boucles: chaque fois qu'une question est posée, une boucle de logigramme est créée entre la question posée et la chaîne principale lorsque l'exécution ou la variante se termine.

La symbolique du logigramme

Des symboles de base standardisés permettent aux utilisateurs d'identifier chaque étape qui les compose.



V. Accréditation – Démarche Qualité: des Liens Étroits

L'accréditation peut se définit comme le « contrôle du contrôle ». Son objet est d'établir la confiance en garantissant la compétence et l'impartialité des organismes accrédités. Par l'établissement d'accords de reconnaissance internationaux, elle vise à la facilitation des échanges commerciaux: un seul essai, une seule certification partout reconnue par Daniel Pierre, Directeur du COFRAC, Président d'EA, Vice-président d'ILAC.

Le guide ISO/CEI n°2 définit l'accréditation comme une procédure par laquelle un organisme faisant autorité reconnaît formellement qu'un organisme

ou un individu est compétent pour effectuer des tâches spécifiques.

En d'autres termes, il s'agit d'un contrôle de second niveau s'exerçant sur les organismes d'attestation de la conformité (laboratoires, organismes d'inspection, organismes certificateurs) afin d'attester de leur compétence pour réaliser des étalonnages, des essais ou des inspections ou pour certifier des produits, des systèmes ou des personnes.

Dans le domaine de santé, l'accréditation et qualité sont deux démarches étroitement liées, qui forment un nouveau système à intégrer dans les établissements de santé.

Anne Marie Boix[6] (OIXAM) explique cela en affirmant que l'accréditation, *« visant explicitement à introduire une démarche institutionnelle d'amélioration de la qualité, l'accréditation constitue bel et bien le nouvel ordre auquel l'ensemble des établissements doit se référer ».*

a) L'accréditation : principes et objectifs

A. Principes

L'accréditation est une procédure d'évaluation externe à un établissement de soins qui est réalisée par des professionnels, indépendante de l'établissement ou de ses organismes de tutelle, son objectif est d'évaluer l'ensemble de son fonctionnement et de ses pratiques, afin de garantir la sécurité et la qualité des soins donnés au malade et à instaurer une politique de développement continu de la qualité au sein de l'établissement. L'organisme accréditeur établit avec tous les acteurs du système de santé des normes et des référentiels, conçus pour apprécier les structures, les procédures et les résultats en termes de gain de santé et de satisfaction du patient.

Dans le cadre défini par l'ordonnance du 24 avril 1996, cette procédure est conduite par l'agence nationale d'accréditation et d'évaluation en santé (ANAES).

En se basant sur des référentiels, la procédure d'accréditation évalue le positionnement de l'établissement par rapport à des références thématiques qui sont:

1. Le patient et sa prise en charge

- Droits et Information du Patient (DIP)
- Dossier du Patient (DPA)
- Organisation de la Prise en Charge du patient (OPC)

2. Management et gestion au service du patient

- Management de l'Établissement et des secteurs d'Activité (MEA)
- Gestion des Ressources Humaines (GRH)
- Gestion des Fonctions Logistiques (GFL)
- Gestion du Système d'Information (GSI)

3. Qualité et la prévention

- Gestion de la Qualité et Prévention des Risques (QPR)
- Vigilances Sanitaires et Sécurité Transfusionnelle (VST)
- Surveillance, Prévention et contrôle du risque Infectieux (SPI).

C'est une procédure qui aide à l'évaluation de la qualité au sein de l'établissement sur l'ensemble de ces thèmes, et qui permet de mesurer le niveau de structuration de la démarche qualité au plan institutionnel. Il est considéré comme un système de reconnaissance externe de la qualité quistructure une démarche explicitement définie par étape.

B. Objectifs

En application de l'ordonnance du 24 avril 1996, la procédure conduite par l'A.N.A.E.S. définie six objectifs principaux:

- L'appréciation de la qualité et de la sécurité des soins
- L'appréciation de la capacité de l'établissement à améliorer de façon continue la qualité des soins et la prise en charge globale du patient
- La formulation de recommandations explicites (l'A.N.A.E.S, 2003)
- L'implication des professionnels à tous les stades de la démarche qualité
- La reconnaissance externe de la qualité des soins dans les établissements de santé
- L'amélioration de la confiance du public.

b) Le champ d'activité de laprocédure

La procédure d'accréditation concerne tous les établissements de santé: publics et privés, civils et, potentiellement, militaires, les établissements assurant laprise en charge au titre de l'hospitalisation à domicile, ceux exerçant une activité de dialyse, les réseaux de soins et les groupements de coopérations sanitaires entre établissements de santé.

L'accréditation ne s'applique pas actuellement aux activités médico-sociales, même lorsque celles-ci, et c'est le cas des hôpitaux locaux, s'exercent au sein d'un établissement de santé.

Elle s'applique à l'établissement au sens juridique du terme et concerne l'ensemble desstructures et des activités d'un établissement.

c) Les étapes de ladémarche

La phase d'auto-évaluation se considère comme le cœur de la procédure d'accréditation, elle aide à construire un diagnostic de l'existant à travers une démarche participative basée sur le référentiel A.N.A.E.S. Les résultats de cette auto évaluation se soumettent à l'A.N.A.E.S. Une équipe d'experts

[6] OIXAM : « L'accréditation hospitalière, quel impact sur la culture et le management des établissements de santé ? », Paris : L'Harmattan, 197 p., p. 41.

visiteurs, dont le nombre varie en fonction de la taille de l'établissement, se déplace ensuite sur site afin d'évaluer la dynamique d'amélioration de la qualité en s'appuyant sur les résultats de l'auto évaluation. Ces experts sont tous des professionnels de santé en exercice, formés par l'A.N.A.E.S.

Dans les deux mois qui suivent la visite, le rapport rédigé par les experts se transmet à l'établissement de santé, qui peut faire des remarques ou de donner des précisions.

Une analyse du rapport et des observations de l'établissement est ensuite faite par le collège d'accréditation de l'A.N.A.E.S. qui formule ses conclusions dans un rapport d'accréditation. Celui-ci comprend d'éventuelles recommandations, voire d'éventuelles réserves assorties de précisions sur les modalités de suivi.

VI. Les Enjeux Del' Accréditation

- Des enjeux réglementaires

Les établissements ont l'obligation de s'engager dans la procédure en signant un contrat d'accréditation avec l'A.N.A.E.S.

Il s'agit également, notamment grâce à l'examen des fiches de sécurité, de permettre à l'établissement de se mettre davantage en conformité avec les normes en vigueur. C'est le cas par exemple de la sécurité incendie, de la pharmacie, de la sécurité de l'air ou de l'eau.

- Des enjeux liés à l'amélioration continue de la qualité

Le but est de constituer une démarche pérenne, qui permet de créer une véritable culture institutionnelle de la qualité dans l'établissement.

- Des enjeux organisationnels

L'accréditation permet de développer une approche transversale de l'organisation et non plus un modèle de management vertical. Mobilisation des personnels, développement des interfaces, décloisonnement, l'objectif est de mettre en place une culture de partage des responsabilités.

- Des enjeux de positionnement de la structure

La publication du rapport du collège sur Internet et sa transmission à l'A.R.H. impacte l'image et le positionnement de l'établissement dans son bassin d'attraction. En interne, comme vis à vis de la population locale.

- Des enjeux pour le patient

Il s'agit de créer un lien de confiance avec le patient, en une structure capable de mettre en place et de respecter un ensemble de procédures d'amélioration de la qualité et de la sécurité des soins.

- Des enjeux budgétaires et financiers

Il n'existe pas encore de liaison claire et officielle entre l'accréditation d'un établissement et l'allocation de ses ressources. Cependant, les coûts liés à la non qualité peuvent être réduits.

VII. Les Perspectives

Lors de son Conseil d'Administration du 6 février 2003, l'A.N.A.E.S. a exprimé le choix de faire de la qualité des pratiques médicales et de l'offre de soins un élément central de la régulation du système de santé: (l'A.N.A.E.S, 2003)

⇒ Le programme de travail 2003 prévoyait de doubler le nombre d'établissements accrédités en 2002, soit 650 en 2003[7] .

⇒ Une deuxième procédure expérimentale simplifiée et comprenant davantage l'appréciation de la qualité du service médical rendu est mise en œuvre depuis 2004 avec les établissements volontaires ayant transmis leur premier cycle.

VIII. Méthodes de la Qualité Hospitalière Inspirées du Monde Industriel

Il existe trois méthodes principales de la qualité développées dans l'industrie: le contrôle final a posteriori; l'assurance qualité et la qualité totale.

- Le contrôle final a posteriori

Le contrôle final a pour mission de mesurer la qualité du produit final et son aptitude à satisfaire les clients externes et internes. Il n'est pas utilisé actuellement dans le secteur de santé, mais certaines approches traditionnelles de la qualité des soins se sont inspirées de lui.

[7] A.N.A.E.S.,« Dossier de presse accréditation », Paris : Juin 2003 – contact.presse@anaes.fr

Figure 12: Modèles qualité dans l'industrie

- Assurance qualité

La qualité a comme objectif de satisfaire les besoins du client, ainsi l'entreprise s'engage à produire des biens et services qui sont conçus pour répandre aux attentes des consommateurs. Tous les moyens de contrôle et de correction entrepris par l'entreprise s'intègrent dans ce même objectif.

L'assurance qualité propose des procédures de contrôle et dispositifs préventifs qui ont comme rôle de s'assurer de la qualité du produit durant tous les niveaux de production. Le contrôle ne se fait plus qu'en bout de chaîne de fabrication.

Dans les années 1980, l'application du principe de l'assurance qualité au domaine hospitalier apparaît aux États-Unis, au Royaume-Unis, puis au Pays-Bas, le processus de l'audit se base sur l'évaluation et l'observation de toutes les activités de soins en référence à des normes et standards préétablis., par la suite la norme ISO 9001 voit le jour dans le domaine industriel et ne trouve pas de difficultés à s'intégrer au milieux hospitalier, mais il est constaté rapidement plus tard que cette norme est peu appropriée aux pratiques cliniques, donc une troisième approche se manifeste qui est l'accréditation,

- Qualité totale

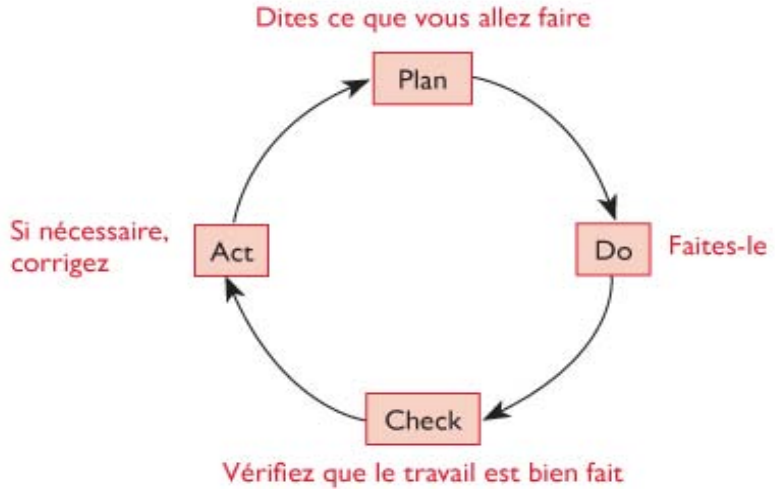
Les bases de la qualité totale ont été mises en évidence par l'assurance qualité évoquée précédemment qui sont:

- Le contrôle de la qualité débute dès la conception du produit jusqu'à la livraison au consommateur.
- Le contrôle de la qualité implique toute personne qui intervient dans le processus de fabrication.

Cette approche est fondée sur cinq principes fondamentaux:

- Se focaliser sur le client, l'un des principes clés de l'assurance qualité.
- Se baser sur l'approche processus avec une vision préventive,
- Impliquer toutes les fonctions dans la démarche qualité.
- Se donner comme but l'amélioration continue, tiré de la notion 0 défauts.
- Faire participer l'ensemble du personnel.

Cette approche est appliquée dans les établissements de soins à l'échelle de l'unité ou dans le champ de la qualité spécifique, en se basant principalement dans cette approche sur la roue de Deming. « PDCA-Plan Do Check Act »



- Évaluation des différents modèles

Les outils de contrôle à postériori restent les moins efficaces, en effet dégager le problème après sa survenu ne suffit pas pour assurer la qualité des soins, car ils ne permettent pas d'anticiper les défaillances et erreurs.

Les méthodes de l'assurance qualité sont perçues d'une manière contrastée, les audits des professionnels de santé sont efficaces et contribue à l'amélioration des pratiques professionnelles, et sont facile à accepter par les acteurs de soins notamment les médecins, tandis que l'efficacité de l'outil de l'accréditation est toujours remise en cause, et n'est pas facile à tolérer par les médecins qui exigent une autonomie professionnel, et affirment que ce n'est qu'une machine administrative lourde en application.

Les outils liés à la qualité totale, principalement le PDCA ont donné de bons résultats au niveau de l'amélioration de la qualité des soins, ceci dit leur application est restreinte à des unités ou domaines spécifiques.

La réussite des facteurs et méthodes de qualité au milieu hospitalier demeure un sujet qui exige encore plus de recherches afin de rapporter des réponses plus claires.

Aux États-Unis, une étude publiée en 2011 développe un modèle conceptuel; le modèle MUSIQ (Model for understandingsuccess in quality) qui identifie cinq catégories de facteurs qui contribuent au succès d'un management qualité, ces catégories sont: l'environnement externe, l'organisation elle-même, les microsystèmes, les équipes de soins et des facteurs divers tels que des événements marquants ou le développement de plans stratégiques.

D'autres recherches sont toujours effectuées dans ce sens, car le domaine de soins attend toujours des réponses plus précises sur les facteurs de succès de la qualité des soins.

Les trois méthodes de l'amélioration de la qualité conçues dans le domaine industriel ont tous étés adoptés dans le milieu hospitalier, le contrôle final et l'assurance qualité sont l'une des méthodes qui ont étés acceptées par les professionnels de santé mais leur efficacité reste incertaine. Le modèle de' la qualité totale a prouvé son efficacité mais à un niveau spécifique (unités de soins ou qualité spécifique), son efficacité dans tout le système de soin reste à discuter.

IX. Conclusion

A travers cet article, nous avons défini les bases de la qualité des soins et les points essentiels pour son application dans le milieu hospitalier pour enfin identifier les bases et méthodes tirés de la qualité industrielle et appliquées dans le management hospitalier.

Nous concluons que la mise en place d'un système de management de la qualité nécessite l'application et le respect des principes fondamentaux.

La réussite de la conception et l'exécution d'un système de management de la qualité hospitalière demande un changement organisationnel, mais aussi l'implication du personnel et l'investissement des moyens humains et matériels.

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Improvement on Packaging and Referencing Tuberculosis Samples- Experience in Zambezia, Mozambique

By D. Malamule, E. Manguene, B. Mutandiua, C. Madeira, A. Abdula, J. Conjera, I. Nasseco, S. Viegas, A. Baptista & J. Melo

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Abstract- With 552 new cases of tuberculosis (TB) per 100,000 people per year, Mozambique is among the 14 countries globally with the highest estimated incidence of TB; however, Mozambique has one of the lowest case-detection rates in the world, identifying only 45% of all estimated cases of TB, well below the World Health Organization (WHO) target of 70%. In Mozambique, as in other low-income countries, missed cases of TB have been attributed in part to difficulties transporting TB samples quickly and appropriately. A secure referencing system of biological samples from the periphery health facilities to referral labs at the district/provincial/central level is crucial to ensure access to Tuberculosis (TB) tests with timely and reliable results within the diagnostic network. Sputum spillage of 6% is a challenge faced during sputum referral and transportation system in Zambezia Province in Mozambique. Is common that samples are packed in inappropriate closed boxes, resulting in spillover and loss with high biological risk of possible primary TB transmission.

Keywords: referral, packaging, sample, tuberculosis.

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Improvement on Packaging and Referencing Tuberculosis Samples- Experience in Zambezia, Mozambique

D. Malamule [α], E. Manguene [σ], B. Mutandiua [ρ], C. Madeira [ω], A. Abdula [¥], J. Conjera [§], I. Nasseco [χ], S. Viegas [ν], A. Baptista [Θ] & J. Melo [ζ]

Abstract- With 552 new cases of tuberculosis (TB) per 100,000 people per year, Mozambique is among the 14 countries globally with the highest estimated incidence of TB; however, Mozambique has one of the lowest case-detection rates in the world, identifying only 45% of all estimated cases of TB, well below the World Health Organization (WHO) target of 70%. In Mozambique, as in other low-income countries, missed cases of TB have been attributed in part to difficulties transporting TB samples quickly and appropriately. A secure referencing system of biological samples from the periphery health facilities to referral labs at the district/provincial/central level is crucial to ensure access to Tuberculosis (TB) tests with timely and reliable results within the diagnostic network. Sputum spillage of 6% is a challenge faced during sputum referral and transportation system in Zambezia Province in Mozambique. Is common that samples are packed in inappropriate closed boxes, resulting in spillover and loss with high biological risk of possible primary TB transmission. During the three months, the study evaluated the system referral sample in Zambezia province, comparing the current improvised boxes vs new secondary packing developed in conjunction with FHI360's LTBR implementation partner and National Tuberculosis Laboratory Reference. The secondary packaging was piloted in 5 districts of Zambezia province (Quelimane, Namacurra, Morrumbala, Lugela and Pebane), two with good access roads and other three with poor access roads, what may contribute to increase samples spillage. LTBR activists and motorbike riders were trained and are using the secondary package to transport sputum samples from remote communities and/or peripheral Health Facilities to Health Facilities with TB laboratory services, using bicycles and motorbikes with cooler boxes. As a result, 2,689 TB samples were transported using secondary packaging in the 5 districts and only 2% were rejected (46/2689). Two districts (Morrumbala and Namacurra) has 0 rejections. Quelimane has less than 1% of rejection (1/292), Lugela 1% (3/214) and Pebane 7% (32/429). Out of the 46 rejections, 23 were attributed to spillover, Pebane-18 and Lugela-5, all using adapted alternative packaging. Health Facilities with more spills were Impaca (17) and Naburi (7) and Pele-Pele (5) all in Pebane District. Zero samples were spilled using the secondary packaging developed. The use of the secondary packaging by activists and motorbike riders are substantially improving TB sample referencing and reducing dramatically spillage.

Keywords: referral, packaging, sample, tuberculosis.

I. Introduction

Equitable access to quality and timely diagnosis linked to appropriate care is critical for ensuring health for all. However, access to testing is the weakest link across the patient care-seeking pathway [1]. On the other hand, specimen referral systems play a critical role in ensuring access to laboratory services by allowing patients to receive care and treatment at one location, while their specimens are transferred to various levels of a tiered laboratory system for testing [2].

Delivering patient-centred and equitable diagnostic testing services is complex. Despite significant investments over the past decade to strengthen diagnostic systems, particularly for HIV and tuberculosis (TB), critical gaps and weaknesses remain [3, 4, 5].

Referral systems can efficiently increase access to diagnostics in areas where testing is not available, prevent the need and associated costs for patients to travel, and lead to equity in access to health care. Furthermore, tests centralized or regionalized testing and a robust specimen referral system may be more cost-effective than placing staff, procuring, and maintaining equipment to conduct testing at lower levels [2].

The goal of a diagnostic network to deliver the right amount of testing, in the right place, at the right time, for the right people and at an affordable and sustainable cost, ensuring that accurate test results are delivered in a timely manner to inform patient care and public health decision-making, on a scale consistent with national goals and strategies. The present study aim was to evaluate the efficiency of the new secondary package for biological sample, locally developed in Maputo-Mozambique to respond the challenge of spillage, reducing the loss of sputum for TB diagnostic.

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II. Method

a) Study design and area

To prevent spillage of samples, Local TB Response (LTBR)/FHI360 collaborated with National TB Reference Laboratory (NTRL) to design and pilot use of individualized, water and leak-proof insulated secondary packaging and ensure triple packaging for TB specimens transport as recommended. The secondary packaging was piloted in 5 districts of Zambezia province (Quelimane, Namacurra, Morrumbala, Lugela and Pebane), two with good access roads and other three with poor access roads, what may contribute to increase samples spillage during twelve weeks. LTBR ADPP activists and motorbike riders were trained on usage of the secondary package to transport sputum samples from remote communities and/or peripheral Health Facilities to Health Facilities with laboratory services, using bicycle and motorbikes with cooler boxes.

Figure 1: Districts of Zambezia selected for prior study: Quelimane, Namacurra, Morrumbala, Lugela and Pebane. Source: https://www.rm.co.mz/wp-content/uploads/2021/02/bcea33a3ae6fb784fd70ad232843b527.jpg

b) Brief Information about Zambezia

Zambezia Province is located in central Mozambique, bordered by Nampula and Niassa Provinces to the North, Malawi and Tete Province to the West, Sofala Province to the South and the Indian Ocean to the East. It has an area of 105,008 Km^2, with Quelimane as its capital city. The Province is divided in 22 Districts and 6 Municipalities. As of 2017, Zambézia has a total population of 5,164,732, which is equivalent to roughly 19% of the national population (INE). About 52.05% of the population is female. The economy is dominated by subsistence agriculture; a few of the cash crops include cashews, sesame seeds and cotton. Artisanal fishing and livestock production are also important subsectors in the socioeconomic life of the population for employment, income and food security. Other important sectors include tourism (eg Gilé National Reserve, Namuli Mountain and Primeiras e Segundas Environmental Protected Area), trade and manufacturing. Zambezia Province is responsible for 9% of Mozambique's Gross Domestic Product (GDP) and 61.76% of the population of the Province is living below poverty line [6].

c) The role of community activists selected

Local staffing requirements were identified and a programme of staff training was developed. Local community outreach worker was prior employed through the project TB Response in order to access all affected communities with known or suspicious TB cases. For this study, we used the same people and in meantime, laboratory technician and a TB coordinator were appointed and trained on use of the secondary package.

Figure 2: Secondary package locally developed

Figure 3: Training staff on the new developed package

Using approach for tuberculosis treatment, the activists hired by TB Response play a similar role as DOTS in tuberculosis treatment and control. Basically, they are well-trained health care worker or other designated individual (excluding a family member) who provides the prescribed TB drugs and watches the patient swallow every dose, gives instruction on sample collection and follow the contacts of people with DR TB or DS TB, delivering the prescribed medication, checking for side effects, watching the patient swallow the medication, documenting the visit and answering questions.

The strategy has been successful, it helps prevent TB from spreading to others, decreases the risk of drug-resistance resulting from erratic or incomplete treatment, decreases the chances of treatment failure and relapse.

The big challenge noted during these activities was the boxes used by the activists to transport sputum from the community to health facility avoiding spillage. Because of improvised boxes got from the pharmacy, not all sample reached the lab properly for testing and some were rejected.

To evaluate the efficiency of the new developed secondary package vs improvised boxes, specific forms were adopted to record in the lab when sample were delivering. In each district, not all activists received the new box to allow comparison result. It is, if a district selected had 4 or 5 activists, only 2 received the new boxes and others still using the improvised. It was a group control with new boxes and study group with the improvised boxes.

Figure 4: Improvised boxes used for sample transportation

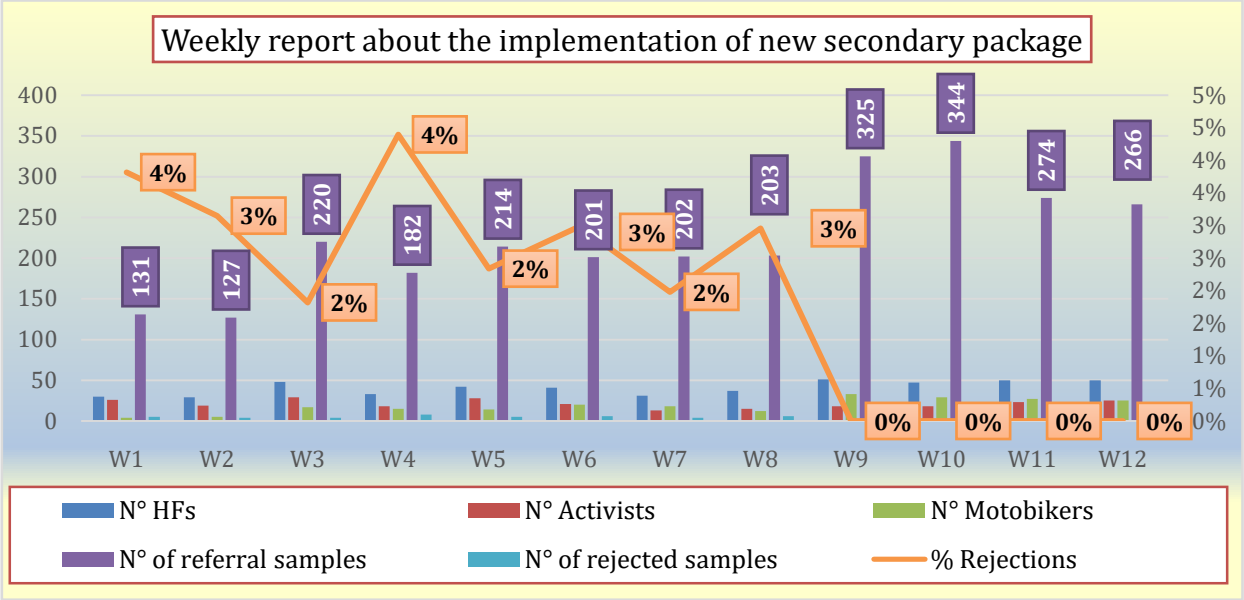
Figure 5: How the samples reaches the laboratory for testing

III. Results

The outcomes of usage of the new package could be evaluated after three months of pilot from April to June 2022, when the sample where transported in both way as explained above. To improve TB sample referring system in the 4 supported provinces, TB Response Project in collaboration with the National Tuberculosis Reference Laboratory designed a compartmentalized and robust secondary packaging to prevent spills in 5 districts of Zambezia piloted by Activists and motorbike riders.

During the pilot, 2689 TB sample was transported and only 46 were rejected in the laboratory due to spillage using the improvised boxes. Data's were weekly reported and analyzed per district as we can see below.

Table: data collection of twelve weeks on implementation of new secondary package



Two districts (Morrumbala and Namacurra) has 0 rejections. The Health facility with more rejected sample were Impaca (6) and Naburi (5) both in Pebane district, all associated with the improvised boxes. No spillover or rejected sample notified for all districts, using the new secondary package.

Namacurra was the district that had a lot of irregularity in the report, having reported data only in weeks 1, 3, 5, 9 and 12. A total of 108 originated were referenced, without any rejection.

Comparing the improvised boxes used by the activists and motorbike riders, we can see that they are not appropriate leak-proof seal. In case of spill is common to lose the patient opportunity to test and minimize the chance of spreading TB. Although the first approach in packaging sample must be follow the international standards, related to triple packaging as recommended, the required material is scares in the country. This is why people try to adopt easy solution to deliver the samples for testing.

IV. Discussion

The interpretation of the microbiological results depends, to a great extent, on the quality of the samples received for study. Therefore, an appropriate management of the samples is necessary to achieve an optimal diagnosis in Microbiology [7]. The analyzable substances are all the biological samples available, from sterile fluids, samples from different organs or systems, such as faeces, urine, sputum, Broncho alveolar lavage, aspirates, biopsies and exudates from different locations or superficial or deep lesions, and hospital devices, such as catheters and prostheses [8].

There is a great variety of containers in which microbiological samples can be collected, with a common characteristic to all of them being that they are sterile and with a leak-proof seal [7]. The issue in the process of sample transportation, a part of the type of container, avoid spillage must be considered. As in other low-income countries, missed cases of TB have been attributed in part to difficulties transporting and handling TB specimens and Mozambique is not an exception [9]. Road infrastructure is poor and at times impassable and also contribute for spill increasing and loss of specimen [10].

The handling of the samples should only be carried out by trained and qualified personnel, who should also be in charge of their safekeeping and organization of the transportation [11]. Since samples are transported by couriers who do not take care of the samples and sometimes do not show evidence of training in biological sample management, this may be associated with the high number of spills, given the road situation also.

To transport all infectious substances, the basic triple packaging system must be used. This transport system comprises three layers: Primary container, which is the primary leak-proof and watertight container that contains the sample. This container should be wrapped in absorbent material with the capacity to absorb all the fluid in case of breakage or leakage; Secondary container, resistant, watertight, leak-proof container that encloses and protects the primary container. Several wrapped primary containers can be placed in a secondary container, but sufficient absorbent material must be used to absorb all the fluid in case of breakage or leakage and Outer container, where the secondary

containers are placed in outer transport packages provided with a suitable cushioning material. The outer containers protect the contents from the external elements, such as physical damage, while the package is in transit [12].

Given the severity of the TB epidemic, innovative solutions are needed to ensure that patients have the diagnosis needed for clinical management and for public health measures [13]. Considering the different situations of spill management, safe transport of samples and safety of personnel, the secondary packaging was designed with the objective of covering these needs identified during the process of sending samples in the country.

Everyone has a responsibility to manage the potential for occupational exposures. Responsibility for the cleaning of body fluid spillage should be clear within each care setting. Following a spill, sampling programs play a vital role in documenting the extent of contamination and providing valuable information to inform clean-up strategies [14].

V. Conclusion

The use of the secondary packaging by activists and motorbike riders are substantially improving TB sample referencing and reducing dramatically spillage. The stroke rate also remained at 2%. Eighty-nine percent (89%) of the rejected samples are caused by spills due to the use of TDR boxes, improvised for the transport of samples.

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Measure the Specialized Quality of Services Provided by the Hospitals and Overall Satisfaction of the Patients of Select Multi – Speciality Hospitals in Coimbatore City

By Dr. M.R. Chandrasekar

Abstract- The present study has empirically investigated of measure the specialized quality of services provided by the hospitals and overall satisfaction of the patients of select multi – speciality hospitals in Coimbatore city. The study also considered Parasuraman, Zeithaml and Berry have identified the service quality as crucial (Reliability, Responsiveness, Assurance, Empathy, Tangibles). Hence the present study focused on Patients' Satisfaction framed (Parasuraman et al.) by incorporating modifications according to the native settings and to measure the level of satisfaction towards specialized services and DNC services (Doctors, Nursing and Clinical). These are included in the study to fill in the research gap which is not specifically handled with the service quality aspects and satisfaction dimensions also. The study was undertaken to find out whether the hospital (Multi – speciality Hospitals) under study has any systematic management system followed for providing better services to its customers (patients). For this purpose, a structured questionnaire was designed to collect information from the patients of Hospital in Coimbatore city. Therefore, the objective is to study patient satisfaction towards services rendered by the select multi-specialty hospitals in Coimbatore city. The research design of this study is descriptive research.

Keywords: inpatients, service quality of the hospitals, patients' satisfaction and DNC services.

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Keywords: inpatients, service quality of the hospitals, patients' satisfaction and DNC services.

I. Introduction of the Study

Medical assistance is a need for each and every human being irrespective of demographic or social settings. Health problems pose a serious threat to health, and require specific treatment and management to cure the problem. Medical care aims not only at improving health status but also to respond to patient needs and wish to ensure their satisfaction with care. The quality of service by a hospital is the number one factor that will either turn a customer/patient away or ensure satisfaction and faith. More and more hospitals are competing for greater shares in the market, and customer-driven quality management is becoming the preferred method for improving the performance of hospitals. Patient judgement on medical care also contributes to medical outcomes. In the case of in-patient care, it has been clearly shown that satisfied patients are more likely to cooperate with treatment, to maintain a continuing relationship with a practitioner and thus enjoy a better medical prognosis. This happens consistently in multi-speciality hospitals which adequately provide support to patients.

Service Quality is defined as a "Global judgment or attitude relating to the overall superiority of the service" (Parasuraman et al.). In service organizations, customer perceived service quality is considered as one of the key determinants of business performance (Parikh). The issue of how best to conceptualize and operationalize service quality is still a subject of heated debate (Cronin and Taylor). However, it is generally agreed that Service Quality is a multi-dimensional or multi-attribute construct. Good service quality means that the customers' perception on service performance meets or exceeds their expectations or what the service firm should provide. The applicability of SERVQUAL in a different culture is to be considered. Consumers varied in both their overall expectations with regard to service quality and their expectation of each of the service quality dimensions as a result of cultural orientation.

II. Objective of the Study

1. To measure the specialized quality of services provided by the hospitals and overall satisfaction of the Patients of select multi – speciality hospitals in Coimbatore.

III. Statement of the Problems

Hospital is a place where people who are ill or injured are treated and taken care of by specialized doctors, staff and nurses. In the past, the hospitals were set up as charity institutions, especially for poor and weaker sections. The only function of those institutions was to care for the sick and poor. The patients also approached the hospitals with disinclination, anxiety and

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fear of death, but today the hospitals are set up with a motto to serve all sections of the society. The set-up of the hospitals has been spoiled by preferential treatment. Some hospitals are running with below average staff and doctors, and the hospitals are under - utilizing their staff due to improper management, policies and other medical requirements. In other words, the managerial administrative atmosphere is sick at times. Most of the patients often prefer medical treatment in Government hospitals, some private clinics, dispensaries and primary healthcare centers, while they fail to provide quality health care services both the curative and promotive cares and some of them offer poor quality service. The above scanning of the problems reveals that the concept of health services has changed a great deal. Thus, there is a widespread belief that better management of health services is essential if higher standards of healthcare are to be achieved. Best services will lead to greater success.

IV. Need for the Study

The service industries, so as to bring themselves to a better position in the market, promote promotional programs, provide advanced equipment's and render high quality services to their patients. It is also important to note here that only if these services are able to create a good positive impact on the target group, they will be successful and vice-versa. In this study the opinion was collected from the patients of select multi - hospitals in Coimbatore city.

V. Hypothesis of the Study

- There is no significant difference between Hospitalization of in-patients for treatment and specialized services (T-Test and ANOVA).
- There is no significant difference between demographic variables and patients.

VI. Literature Review

Sharama O.P. (1970) in his research concludes that in the present era of scare hospital resources, high cost of hospital operations and increasing demand of hospital services, the development of patient satisfaction assumes great significant for the hospital administrations. The public, general patients and their relatives can be almost fully satisfied in existing conditions available in hospitals. The study suggests no extra funds are necessary. Change in attitude and approach is required. Fitzpatrick and Hopkins (1983) stated that expectations have affective and cognitive components and are multidimensional. They are the result of complex cognitive processes, modified by previous experiences and other influences. Some investigators focus on what patients think will happen (probability or realistic expectations) and others on what patients would like to happen (value or ideal expectations). Predicted or expectancy probability expectations are judgments about the likelihood of an event occurring, for example based on past experience, self-confidence or perceived difficulty of the goal.

a) Service Quality

The position of the patient in the hospital is that of a paying guest. The person going to medical attention provisions for physical comfort and protection. Every arrangement and every people working in the hospital are aiming at the same goal of patient care. Therefore, the service quality dimension.

b) Dimensions of Service Quality

Tangibles: The appearance of physical facilities, equipment's, appearance of personnel and communication materials.

Reliability: The ability of hospital to perform the promised service dependable and accurately (that is, when something is promised, it is done and provision of services at the time promised). Responsiveness: The willingness of hospitals personnel to help (patients) and provide prompt service.

Assurance: The knowledge and courtesy of hospital employees and their ability to inspire trust and confidence.

Empathy: The caring individualized attention the hospital provides to its customers (patients) (that is, employees understand specific needs and employees give personal attention.

VII. Research Methodology

The objective and systematic method of finding solution to a problem systematic collection, recording, analyzing, interpretation and reporting of information about facts of a phenomenon under study". The sources of data included both primary as well as secondary data. Questionnaires were used for the primary data collection whereas secondary data collection was made based on the information provided by the hospital officials. Questionnaire was adopted as research instrument. The questionnaires were administrated through distribution specific to the patient's undergoing treatment in the select multi-specialty hospitals. The survey was conducted among various patients who are specifically taking treatment in the select multi speciality hospitals in the study area. The sample size of the study is 810 inpatients. The sampling technique selected for the study is on multi stage sampling method. The researcher has circulated the instrument only to the in-patients for data collection. The objectives framed for the present study formed the basis of the identification of the relevant statistical techniques such as Structural Equation Modeling (SEM) with the support of AMOS 16 to deliver statistical implications.

VIII. Limitations of the Study

The respondents felt time and cost constraints during data collection. The study is conducted to know the facilities provided in the hospital of the patient's views and the information provided by the patients are expected with some personal bias.

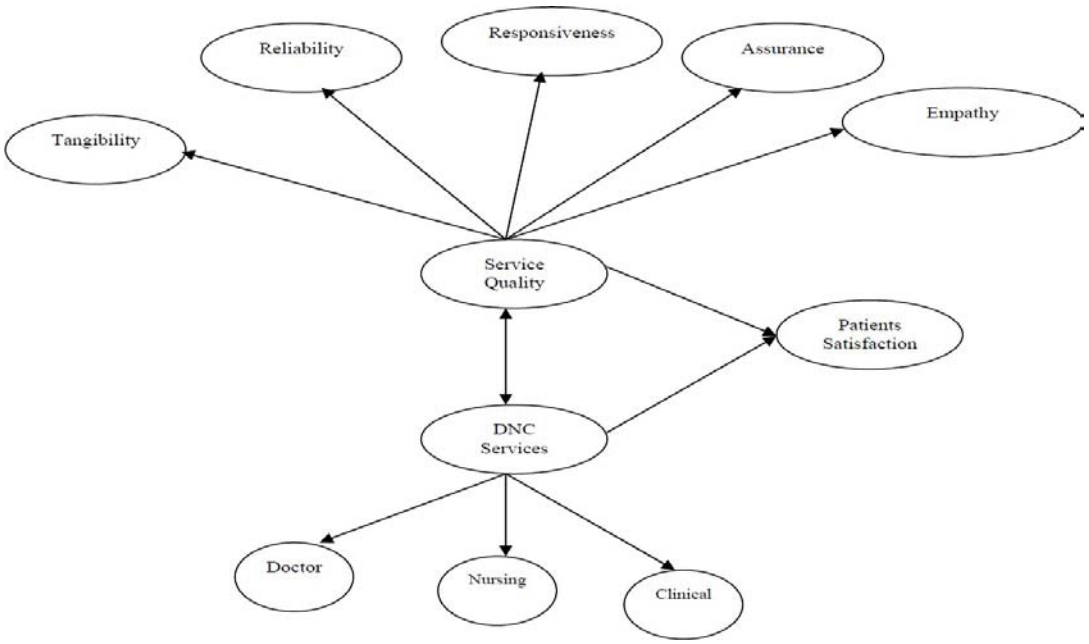
IX. Analysis and Results

This study attempted to understand the reasons for taking the services from select multi- specialty hospitals for which categorical variables are classified based on illness, treatment, affordability and service quality aspects. Followed by descriptive statistics using weighted mean, three specialized service quality constructs viz (DNC) Doctor, Nursing and Clinical services are analyzed along with the overall satisfaction of the services provided by the select hospitals as dependent variable are further compared using correlation and regression analysis.

X. Model and Conceptual Framework

A theoretical model is projected to compute the Service quality with regards to Patients Perception and Expectation heading to overall Satisfaction of Services delivered excellently by private multi-specialty hospitals of Coimbatore City. The intermediation outcome is calculated by means of unique service provisions such as Doctors, Nurses and Clinical services. The dependent variable is the Overall Satisfaction of the patients surveyed and model computed by means of Structural Equation Modeling (SEM) with the support of AMOS 16 to deliver statistical implications.

Conceptual Model Measuring Direct and Mediation Effect of Patients Service Quality Perception and Overall Satisfaction Mediated by Specialized (DNC) Services



a) Descriptive Statistics on Specialized Services (Doctors, Nursing and Clinical Quality + Safety)

Frequency is measured for three constructs in which agreement level was found to be the dominant among patients' opinion towards doctors, nurses and clinical services is also considered as DNC services. Therefore, for the likert type five-point scale all positive set of items carry weightage from 5 to 1 for the agreement to disagreement levels therefore an appropriate rank using a weighted average is computed that explains the best and least rating by the patients for all three constructs.

Doctor Services (Frequency Analysis)

Opinion		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The doctors are always kind and caring about my health that makes me feel easy to get medical care in the hospital	Count	64	115	115	159	357
	Row N %	7.90%	14.20%	14.20%	19.63%	44.07%

Doctors exhibit professional skills and elevates trust in the hospital	Count	56	115	210	156	273
	Row N %	6.91%	14.20%	25.93%	19.26%	33.70%
Doctors and nurses team work reassures the quality of service in this hospital	Count	304	105	138	132	131
	Row N %	37.53%	12.96%	17.04%	16.30%	16.17%
The doctors always properly diagnose and explain the disease and further treatment	Count	343	151	159	76	81
	Row N %	42.35%	18.64%	19.63%	9.38%	10.00%
The doctor is neither hasty nor rude	Count	158	117	238	141	156

Patients' opinion towards specialized doctors' services reveals that the doctors are always kind and caring about the patient health which makes the patients to feel easy to get medical care in the hospital for which 44.07% strongly agreed, 19.63% agreed, 14.20% disagreed and opined neutral and the remaining 7.90% strongly disagreed to the statement. Patients' opinion about doctors exhibits professional skills and elevates trust in the hospital for which 33.70% strongly agreed, 19.26% agree, 25.93% opined neutral, 14.20% disagreed and 6.91% strongly disagreed. Patients' opinion about doctors and nurses team work reassures the expected quality of service in the select hospitals for which 37.53% strongly disagreed, 17.04% opined neutral, 16.30% agreed, 16.17% strongly agreed and 12.96% disagreed. Patients' opinion about doctors properly diagnoses and explain the disease and further treatment in the select hospitals for which 42.35% strongly disagreed, 19.63% stated neutral, 18.64% disagreed, 10% strongly agreed and 9.38% agreed. Patients' opinion about doctors are neither haste nor rude to detail of the patient about health condition and duration of stay for treatment in the select hospitals for which 29.38% opined neutral, 19.51% strongly disagreed, 19.26% strongly agreed, 17.41% agreed and 14.44% disagreed. Patients' opinion about doctors visiting the patients as a daily routine and also ensures immediate attention in case of emergencies in the select hospitals for which 38.89% strongly disagreed, 21.60% opined neutral, 20% disagreed, 11.85% agreed and 7.65% strongly agreed.

Doctor Service (Weighted Mean)

(α = 0.844)

Opinion	Mean	Std. Deviation	Rank
The doctors are always kind and caring about my health that makes me feel easy to get medical care in the hospital	3.77	1.347	1
Doctors exhibit professional skills and elevates trust in the hospital	3.58	1.271	2
Doctors and nurses team work reassures the quality of service in thishospital	2.60	1.512	4
The doctors always properly diagnose and explain the disease and further treatment	2.26	1.352	6
The doctor is neither hasty nor rude to detail the patient about the health condition and duration of stay for treatment	3.02	1.367	3
The doctor's visit the patients as a daily routine and also ensure immediate attention in case of emergencies	2.29	1.297	5

Patients rating on doctors service construct and subsequent ranking using weighted average shows first rank towards "The doctors are always kind and caring about my health that makes me feel easy to get medical care in the hospital: M=3.77"; followed by "Doctors exhibit professional skills and elevates trust in the hospital: M=3.58"; "The doctor is neither haste nor rude to detail the patient about the health condition and duration of stay for treatment: M=3.02"; "Doctors and nurses team work reassures the quality of service in this hospital : M=2.60"; "Doctors visiting the patients as a daily routine and also ensures immediate attention in case of emergencies: M=2.29"; and finally, "The doctors always properly diagnose and explain the

disease and further treatment: M=2.26". Cronbach's value (α=0.844) shows high reliability for the doctors' service construct.

Nursing Services (Frequency Analysis)

Opinion		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
The nurses treat me with courtesy and respect	Count	475	123	118	58	36
	Row N %	58.64%	15.19%	14.57%	7.16%	4.44%
The nurses listen carefully to me when I address any problem	Count	461	161	93	49	46
	Row N %	56.91%	19.88%	11.48%	6.05%	5.68%
The nursing staff respond immediately to my call bell	Count	493	144	110	33	30
	Row N %	60.86%	17.78%	13.58%	4.07%	3.70%
The nurses explain things in a way that I could understand	Count	399	182	139	52	38
	Row N %	49.26%	22.47%	17.16%	6.42%	4.69%
Sufficient nurses are on-duty to assist the patients in the hospitals	Count	453	126	151	40	40
	Row N %	55.92%	15.56%	18.64%	4.94%	4.94%
I have confidence and trustin the nurses treating me	Count	531	105	110	32	32
	Row N %	65.56%	12.96%	13.58%	3.95%	3.95%

Patients' opinion towards specialized nursing services in the select hospitals reveals that the nurses treat patients with courtesy and respect in the select hospitals for which 58.64% strongly agreed, 15.19% agreed, 14.57% opined neutral, 7.16% disagree and the remaining 4.44% strongly disagreed. Patients' opinion is that the nurses listen carefully to patients when they address any problem in the select hospitals for which 56.91% strongly agreed, 19.88% agreed, 11.48% opined neutral, 6.05% disagreed and 5.68% strongly disagreed. Patients' opinion is that nursing staff respond immediately to patients call bell for which 60.86% strongly agreed, 17.78% agreed, 13.58% opined neutral, 4.07% disagreed and 3.7% strongly disagreed. Patients' opinion is that staff nurses explain things in the way that the patients could understand for which 49.26% strongly agreed, 22.47% agreed, 17.16% opined neutral, 6.42% disagreed and 4.69% strongly disagreed. Patients' opinion on sufficient staff nurses are on duty to assist the patients in the hospitals for which 55.92% strongly agreed, 15.56% agreed, 18.64% opined neutral, 4.94% disagreed and 4.94% strongly disagreed. Patients' opinion on having trust and confidence in the treatment given by nurses in the select hospitals for which 65.56% strongly agreed, 12.96% agreed, 13.58% opined neutral, 3.95% disagreed and 3.95% strongly disagreed.

Nursing Service (Weighted Mean)

(α=0.875)

Opinion	Mean	Std. Deviation	N
The nurses treat me with courtesy and respect	4.16	1.180	3
The nurses listen carefully to me when I address any problem	4.16	1.188	4
The nursing staff respond immediately to my call bell	4.28	1.078	2

The nurses explain things in a way that I could understand	4.05	1.158	6
Sufficient nurses are on-duty to assist the patients in the hospitals	4.13	1.171	5
I have confidence and trust in the nurses treating me	4.32	1.096	1

Patients rating on nursing service construct and subsequent ranking using weighted average shows first rank towards "I have confidence and trust in the nurses treating me : M=4.32"; "The nursing staff respond immediately to my call bell : M=4.28"; "The nurses treat me with courtesy and respect : M=4.16"; "The nurses listen carefully to me when I address any problem : M=4.16"; "Sufficient nurses are on-duty to assist the patients in the hospitals : M=4.13"; "The nurses explain things in a way that I could understand : M=4.05". Cronbach's value (α=0.875) shows high reliability for the nursing service construct.

Clinical Quality and Safety Services (Frequency Analysis)

Opinion		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Clinical services are intentionally patient-centered	Count	126	177	236	170	101
	Row N %	15.56%	21.85%	29.14%	20.99%	12.47%
Effective doctor-patient communication to promote compliance in medication	Count	125	150	310	184	41
	Row N %	15.43%	18.52%	38.27%	22.72%	5.06%
Psychological support to get rid of the emotional anxiety and fear	Count	157	165	330	144	14
	Row N %	19.38%	20.37%	40.74%	17.78%	1.73%
I feel healthy and protected environment to ensure patients safety and effectiveness of the hospital	Count	84	190	304	203	29
	Row N %	10.37%	23.46%	37.53%	25.06%	3.58%
The hospital guarantee safety to dispose hazardous medical waste	Count	82	141	315	237	35
	Row N %	10.12%	17.41%	38.89%	29.26%	4.32%

Patients' opinion towards specialized clinical services in the select hospitals reveals that the clinical services are intentionally patient-centered for which 29.14% opined neutral, 21.85% disagreed, 20.99% agreed, 15.56% strongly disagreed and the remaining 12.47% strongly agreed. Patients' opinion about the effective doctor patient communication to promote compliance in medication shows 38.27% opined neutral, 22.72% agreed, 18.52% disagreed, 15.43% strongly disagreed and the remaining 5.06% strongly agreed. Patients' opinion about psychological support to ally the emotional anxiety and fear shows 40.74% opined neutral, 20.37% disagreed, 19.38% strongly disagreed, 17.78% agree and the remaining 1.73% strongly agreed. Patients' opinion about feeling healthy and protected environment to ensure patients safety and effectiveness of hospital shows 37.53% opined neutral, 25.06% agreed, 23.46% disagreed, 10.37% strongly disagreed and the remaining 3.58% strongly agreed. Patients' opinion about the hospital guarantee safety to dispose hazardous medical waste shows 38.89% opined neutral, 29.26% agreed, 17.41% disagreed, 10.12% strongly disagreed and the remaining 4.32% strongly agreed.

Clinical Quality and Safety Service (Weighted Mean)

(α=0.846)

Opinion	Mean	Std. Deviation	Rank
Clinical services are intentionally patient-centered	2.92	1.243	2
Effective doctor-patient communication to promote compliance in medication	2.83	1.098	4
Psychological support to get rid off the emotional anxiety and fear	2.62	1.040	5
I feel healthy and protected environment to ensure patients safety and effectiveness of the hospital	2.88	1.014	3
The hospital guarantees safety to dispose hazardous medical waste	3.00	1.022	1

Patients rating on clinical service construct and subsequent ranking using weighted average shows that the first rank towards "The hospital guarantee safety to dispose hazardous medical waste :: M=3.00"; "Clinical services are intentionally patient- centered :: M=2.92" ; "I feel healthy and protected environment to ensure patients safety and effectiveness of the hospital ::M=2.88" ; "Effective doctor-patient communication to promote compliance in medication :: M=2.83" and finally, "Psychological support to ally (get rid of) the emotional anxiety and fear :: M=2.62". Cronbach's value (α=0.846) shows high reliability for the clinical service construct.

XI. Suggestions and Recommendations

- Employee discipline and appearance were satisfying the tangibility aspects not only at the individual level but also at the hospital administration level. Still, patients' feel that the multi-speciality hospitals should concentrate neatness, Hospital-acquired infections increase the risk of death and disease, and add to the cost of care and the duration of stay in a hospital. Standard precautions are essential to prevent hospital-acquired infections. These include washing hands with soap and water or alcohol- based hand rub before and after examining a patient, safely storing and disposing of infectious waste and sharp objects, and sterilizing and disinfecting instruments it controls the communicable spreading disease in the hospitals.
- The selected multi-speciality hospitals give reliability to the in-patients as they were satisfied with the staff accessibility, immediate response on calls or emergency. Though, few patients feel that hospitals should give more attention to the emergency patients with priority and readiness.

XII. Conclusion

In present scenario, different types of hospitals face a lot of problems and the patients are the ultimate sufferer. The most of the patients often prefer medical treatment in Government hospitals, few in private clinics, dispensaries and primary healthcare centers, while they fail to provide quality healthcare services. So that I purposively select multi-speciality hospitals, to measures the patient's perception and expectation of Service Quality (SERVQUAL) scale according to the native settings and to measure the level of satisfaction towards specialized services and DNC services (Doctors, Nursing and Clinical). Healthcare system is a noble cause for the society while the three services such as Doctors' Services (professional), Nursing Service (Assisting professional) and Clinical Services (supporting in all spheres such as administration, safety of patients, etc.). Hence modern healthcare services have to be improved a lot more than from what they were used to be few years ago. Patients in the modern days are not merely patients suffering from ailments; they are in search of treatment options, with good service related to their health and well-being. A good health care service will definitely assure higher level of patients' satisfaction than the difference identified from the results. Therefore, considering these suggestions will further help to improve the facilities to retain the goodwill of the hospitals lending to the welfare of the society.

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Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Medical Research Paper

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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