Need for Enhanced Monitoring
Brazilian Patient Organizations

Assessment of Hearing Profile
Potassium Levels in COVID Subjects

Discovering Thoughts, Inventing Future
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Potassium Levels in COVID Subjects: Current Observations and New Possibilities for its use in COVID Diagnosis

By Sriram Padmanabhan

Abstract- Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) causing covid infection in humans is a major global threat to healthcare and economy. According to the recent statistics of the World Health Organization (WHO), the disease has already involved all continents, with almost 117,498,522 cases with more than 2,606,626 deaths all over the globe until March 2021. It is thus, imperative to study and develop pharmacological treatments suitable for the prevention and treatment of COVID-19. The COVID causing virus is mainly transmitted through cough or sneeze droplets generated by an infected person. Hence its early and accurate diagnosis appears essential for minimizing spread, prevention and eventually containment of the pandemic. Also, since the clinical presentation of the COVID infection is varied starting from asymptomatic to severe cases, it reinforces the need for detection methods that are simple, early and with good sensitivity and specificity. This article reviews impact of potassium ions in functioning of various organs in humans and its possible role in COVID disease progression.

Keywords: potassium, ivermectin, favipiravir, remdisivir, coronavirus, SARS-CoV-2, COVID-19.

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Sriram Padmanabhan

Abstract: Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) causing covid infection in humans is a major global threat to healthcare and economy. According to the recent statistics of the World Health Organization (WHO), the disease has already involved all continents, with almost 117,498,522 cases with more than 2,606,626 deaths all over the globe until March 2021. It is thus, imperative to study and develop pharmacological treatments suitable for the prevention and treatment of COVID-19. The COVID causing virus is mainly transmitted through cough or sneeze droplets generated by an infected person. Hence its early and accurate diagnosis appears essential for minimizing spread, prevention and eventually containment of the pandemic. Also, since the clinical presentation of the COVID infection is varied starting from asymptomatic to severe cases, it reinforces the need for detection methods that are simple, early and with good sensitivity and specificity. This article reviews impact of potassium ions in functioning of various organs in humans and its possible role in COVID disease progression. Looking at the critical role of potassium ions in human body, it is speculated that estimation of potassium ions in the urine of covid patients could be beneficial and may enable early treatment options and arrest disease progression considerably. This article hypothesizes the possible role of active constituents of herbal medicines, known for their anti-covid properties, through balancing the level of potassium ions in the human body.

Keywords: potassium, ivermectin, favipiravir, remdesivir, coronavirus, SARS-CoV-2, COVID-19.

I. Introduction

Coronavirus disease 2019 (COVID-19), also known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is caused by a strain of coronavirus belonging to the Coronaviridae family continues to spread around the world affecting the lives of billions of people worldwide. The International Committee on Taxonomy of Viruses (ICTV) has named the virus causing COVID infection as SARS-CoV-2 [1, 2]. Many findings regarding COVID-19 etiology, epidemiology, diagnosis, and treatment strategies have been reported and it is evident that COVID affects almost all organs like heart, lungs, liver, kidney, brain, [3] causing loss of sense of taste and rashes in the skin.

It has been suggested by Moreno-Pérez et al. [4] that serum potassium levels is a sensitive biomarker of severe progression of COVID-19, although the clinical significance of lower levels of potassium ions in serum of COVID patients is not clear. Lippi et al. [5] establish that COVID-19 severity is associated with lower serum concentrations of sodium, potassium and calcium.

A study conducted at Wenzhou Central Hospital and Sixth People’s Hospital of Wenzhou, Wenzhou, China, observed various levels of plasma potassium incovid affected patients. Nearly 18% patients were classified as having severe hypokalemia (plasma potassium 3.5 mmol/L), 37% hypokalemia (plasma potassium 3-3.5 mmol/L), and 46% normokalemia (plasma potassium >3.5 mmol/L). From the above reports, it appears potassium levels could be potential indicators of covid progression. Patients with severe hypokalemia had higher body temperature, higher creatine kinase levels, higher lactate dehydrogenase levels and higher C-reactive protein levels. Patients with severe hypokalemia were given potassium at a dose of 40 mEq per day and they responded well to potassium supplements as they recovered. Distribution of potassium across the cell membrane appears to be critical for normal cellular function [6].

To understand the impact of potassium level in covid subjects, I looked at all possible roles that potassium plays in human body and extrapolated these reports in covid scenario and a hypothesis in this regard is described in this paper.

II. Plasma Potassium Levels and its Association with Angiotensin-Converting Enzyme 2 (ACE2)

ACE2, is the principal counter-regulatory mechanism for the main axis of the rennin-angiotensin system (RAS), which is critical in the control of blood pressure and electrolyte balance by balancing potassium and sodium [7]. The invasion of the human cells by the covid-2 virus is through binding of the virus to the ACE2 receptors present on the surface of the cell membrane of human vital organs, such as heart, liver, kidney, and lungs. The low levels of potassium observed in COVID-19 patients possibly reflects a disordered rennin-angiotensin system activity, which increases as a
result of reduced counter activity of angiotensin-converting enzyme 2.

SARS-CoV-2 virus binds to ACE2 and enhances the degradation of ACE2 and, thus, decreases the counteraction of ACE2 on RAS. This leads to increased reabsorption of sodium and water, thereby increasing blood pressure and excretion of potassium [8]. In addition, patients with COVID-19 often have gastrointestinal symptoms, such as diarrhea and vomiting, leading to disruptions of homeostasis of electrolytes and pH [9].

a) **Role of potassium in multiplication of other viruses**

K⁺ deficiency affects host-virus interactions by affecting the accessibility of virus attached to tissue and by affecting the intracellular synthesis of new virus. Since supplementation of potassium reverses such effects, it was concluded that such in-vitro effects of virus suppression was achieved by potassium depletion[10].

Choi et al. [11] showed 50% decrease in HIV-1 production when the host cells of CD4+ lymphoblastoid cells infected by HIV-1 (strain LAI) was incubated in low K+ medium in comparison to a normal K+ concentration (5 mM). The decrease in HIV-1 production by low K+ medium and increase by high K+ media has been attributed to its effects on HIV-1 reverse transcription. Potassium is required for efficient viral replication and to induce cells for disease and infection.

K ions are reported to promote viral infection [12] since negative-stranded (SNS) 2 RNA viruses exposed to high K⁺ also displayed enhanced infectivity.

b) **Potassium levels in other viral infections**

Viral infections, such as Dengue and Chikungunya, have also been reported to precipitate hypokalemic paralysis [13]. This is attributed to redistribution of potassium in cells or increased urinary potassium wasting as a result of transient renal tubular abnormalities.

c) **Role of anti-covid drugs and potassium levels**

i. Ivermectin (IVM) and potassium

Ivermectin, a highly active broad-spectrum, anti-parasitic agent used to treat scabies [14], is a non-selective inhibitor of three important mammalian P-type ATPases. When used at high doses, IVM causes adverse effects [15]. With respect to the inhibition of the Na(+) K(+)-ATPase, IVM acts by a mechanism different from the classical cardiac glycosides, based on selectivity towards the isozymes, sensitivity to the antagonistic effect of K(+) and to ionic conditions favoring different conformations of the enzyme. Administration of IVM with or without albendazole to rats showed significant increase (P<0.05) in serum potassium, urea, creatinine, glucose and cholesterol concentrations while serum albumin was significantly reduced (P<0.05)[16].

Apart from its uses to address parasitic infections, IVM has been reported to inhibit the replication of COVID-2 virus [17] and identified as an inhibitor of interactions between the human HIV integrase protein and the importin α/β 1 heterodimer. In COVID context, IVM is known to affect the nuclear transport of viral proteins that is essential for the replication cycle and inhibition of the host’s antiviral response.

ii. Potassium and Favipiravir

Favipiravir, released in 2002 in Japan, as an inhibitor of influenza virus replication was subsequently proved to have inhibitory activity against several classes of viruses, including EBOV [18], and used as a prophylaxis and also for therapy during the recent EBOV epidemic in West Africa is an inhibitor of the RNA-dependent RNA polymerase of many RNA viruses, including influenza viruses, Arenaviruses, Phleboviruses, Hantaviruses, Flaviviruses, Enteroviruses, and Noroviruses. QT interval, indicative of rate of heart beats is slower when QTc is prolonged and this has already been described in other EBOV-infected patients treated outside Africa and electrolyte disturbances, particularly hypokalaemia, may induce QTc interval prolongation [19].

Potassium levels <3.0 mmol/l can be arrhythmogenic and specifically can cause QTc interval prolongation, hence the regulation and control of potassium levels in such patients is high. The cardiac involvement in SARS-CoV-2 is high (44.4% of infected patients admitted to ICU experienced an arrhythmia) and hence the significance to maintaining normokalaemia in these patients is emphasized to reduce morbidity and mortality [20].

iii. Remdesivir and potassium

Remdesivir, an adenosine analogue, is a broad antiviral agent for filovirus, Ebola virus, Middle East respiratory syndrome coronavirus (MERS-CoV), Marburg virus, Respiratory syncytial virus (RSV), HCV, pneumoviruses, coronaviruses and several paramyxoviruses. A potent inhibitor of SARS-CoV-2 replication, Remdesivir affects such viruses is in human nasal and bronchial airway epithelial cells [21]. A recent paper by Wang et al.[22] have shown increased levels of plasma potassium in patients treated with Remdesivir.

d) **Hypokalemia and cardiovascular disease**

Yadav et al. [23] report that in China, 27.8% of admitted COVID-19 patients had myocardial injury mortality with higher elevated troponin levels causing death of 59.6% patient vs 8.9% death of patients with normal troponin levels [24]. Since nearly 7% to 17% of patients with cardiovascular disease have lower levels of plasma potassium levels, drugs, such as angiotensin-converting (ACE2) enzyme inhibitors, have a positive effect on mortality and morbidity rates in heart failure.
patients since they increase plasma potassium concentration.

e) Herbal medications and potassium levels

There are ample numbers of herbal drugs that can offer as a source of potassium [25]. Active phytoconstituents of medicinal plants such as Withania somnifera, Tinosporacordifolia and Ocimum sanctum have been found to affect the activity of the protease of SARS-CoV-2, affecting its multiplication [26]. Shimmi et al. [27] demonstrate that Withania somnifera treatment increases the level of potassium in serum of rats that were challenged with gentamycin. Similarly T. cordifolia dose-dependently has been shown to increase potassium levels [28]. It is tempting to speculate that the anti-covid activity of such plant extracts could also be through the route of balancing the levels of potassium ions in the human body which needs to be experimentally proven in COVID patients. There are some conflicting reports on inability of Glycyrrhiza glabra (licorice) extract to influence the potassium levels in humans [29] and the potassium levels were normal in 98.3% patients with a dose of 8.7 g per day for 18 days. Also, some herbal drugs which are used as laxatives like Cassia senna L may lead to hypokalemia, since senna can cause excessive water and potassium loss. [30]. Hence, choice of herbal medicines to be taken for addressing potassium levels must be practiced with caution.

f) Lung diseases and potassium levels

Chronic Obstructive Pulmonary Disease (COPD) is a disease of increasing public health importance and COPD patients display typical features of acute respiratory infections like productive cough and dyspnoea along other metabolic derangements such as hyponatremia, hypokalemia, hyperbilirubinemia, elevated transaminases, elevated blood urea and elevated serum creatinine etc.[31]. Patients with COPD also show a slower rate of potassium exchange than the control subjects [32]. Levels of serum electrolytes e.g sodium, potassium, magnesium, and chloride are abnormal in patients with acute exacerbation of COPD and in particular the levels of potassium is 3.19±0.96 mEq/l in such patients in comparison to healthy controls (potassium= 4.50±0.02 mEq/l [33, 34].

It is also consistent with reported associations between increased urinary potassium and increased airway hyper responsiveness [35] and also lower lung function in girls [36] and lower levels of serum potassium were associated with a greater risk of asthma [37]. However, there are studies that report no association of serum potassium and asthma. [38, 39].

g) Potassium level in other diseases

A recent study linked potassium with irritable bowel syndrome and showed that dietary potassium, was inversely correlated with risk of Crohn’s disease in two large prospective cohorts of US women [40]. The levels of potassium had an inverse association with the disease activity in state of inflammation [41]. Hypokalemia is reported in several rheumatoid arthritis (RA) patients [42], which are reported to alleviate pain due to RA through diets rich in potassium.

In hyperaldosteronism (PHA), a disorder that is increasingly recognized as one of the most prevalent forms of secondary hypertension [43], there is hypokalemia due to an increased urinary potassium excretion. Similarly, a case of severe hypokalemia in a dementia patient [44] exists. Hypokalemia paralysis with low plasma potassium (<3.5 mEq/L) is caused either by an enhanced shift of potassium ion into the cells or following a significant renal or gastrointestinal loss of potassium[45].

h) Potassium level in urine as markers for disease progression

A study by Afridi et al. [46] show lower levels of calcium, potassium, magnesium and natrium in blood, serum and scalp hair of Acquired Immune Deficiency Syndrome (AIDS) suffering subjects in comparison to healthy controls, and the levels of these elements were higher in urine samples of the AIDS patients than in those of the control group, opening up a new possibility of examining levels of potassium as a measure of covid patients.

Khandelwal et al. [47] report low values of serum sodium (Hyponatremia) and potassium (hypokalemia) in dengue patients. The mean value of serum sodium was 133.92 mEq/L and of serum potassium was 3.62 mEq/L in such patients with more lower values in severely affected dengue patients in comparison to mildly affected dengue patients.

As SARS-CoVirus, Corona-2 virus also uses angiotensin converting enzyme 2 (ACE2) as a cell entry receptor [48]. Recent human tissue RNA-sequencing data demonstrated that ACE2 expression in kidney was nearly 100-fold higher than in lungs. Li et al. [49], hence the kidney disease may be caused by coronavirus entering kidney cells through an ACE2-dependent pathway. Hence, the possibility of having potassium in the urine of covid affected patients with acute kidney injury/necrosis appears high.

i) Potassium and mental health

70 percent of the ions that play a significant role electrical and cellular function in human cells is through potassium ions. Lower levels of potassium ions (between 2.7 mEq/L–3.3 mEq/L) is known to cause mental tiredness, depression, mood swings, psychosis, muscular weakness, disorientation, nervousness and confusions [50].

The COVID-19 pandemic has implications in the emotional and social functioning of the affected patients. A recent publication report development of mental health issues such as depression, anxiety,
insomnia within 3 months of diagnosis in ~ 18% of COVID-19 patients [51]. It is tempting to speculate that potassium supplementation in covid affected patients could improve such mental issues and such supplementation could be along with the regular anti-viral regime that is prescribed to the affected patients. In normal health, serum potassium levels is between 3.5 to 5.2 mmol/L and disturbances in potassium levels have adverse effects on skeletal and cardiac muscle function [52] and lower potassium levels in urine samples indicates cardiac dysfunction [53]. It is possible that potassium supplementation can better the cardiac function and reduce the mortality due to cardiac failure in covid patients.

**j) Potassium estimation methods**

Potassium levels from spot urine specimens collected at any time has been successfully developed by Tanaka et al. [54] using emission flame photometry. The most commonly used methods are methods as described by Kawasaki et al.[55], Brown et al. [56] and Tanaka et al. [54].

### III. Conclusions and Future Directions

Potassium plays an important role (Normal serum potassium level = 3.5-5.0 mEq/L) in regulation of the heart beat and function of muscles. Along with sodium, potassium is also involved in regulation of water and acid-base balance in blood and tissue [57]. In mammals, the osmotic pressure and water distribution maintenance is the primary function of electrolytes such as sodium and potassium and these ions play a role in maintenance of pH, in oxidation reduction reactions, in heart muscle functioning and as cofactors for enzymes [58] and the body restores potassium balance by shifting the plasma potassium into cells or by renal elimination.

The new coronavirus is reported to cause low potassium levels because it blocks an enzyme called ACE2 that regulates blood pressure by balancing potassium and sodium. Mg²⁺ and K⁺ participate in several biochemical processes and its deficiency affects lung function and also influence respiratory symptoms. Increased airway sensitiveness is reported to be associated with a higher urinary potassium excretion [59].

Presence of covid virus in the body fluid such as urine is contradictory. While Wang et al. [60] report the presence of SARS-CoV-2 in sputum (72%), fibrobronchoscope brush biopsy (46%), pharyngeal swabs (32%), feces (29%), and blood (1%) and no detection of virus in urine samples suggesting that the transmission of the SARS-CoV-2 is by the fecal route [61]. However, a recent study by Peng et al. [62] could detect the covid virus in 1 sample of urine of the 9 patients tested (11%). Ling and colleagues [63] reported 66 patients with COVID-19 from Shanghai, China. Urine samples of 4 patients (6.9%) were positive for COVID-19. In 3 patients, urinary samples were positive even after clearance of virus in oropharyngeal samples.

*Tinospora cordifolia* is reported for covid use. It has high potassium (0.845%) and could be playing a role in improving the hypokalemia status in covid patients [64]. Use of drugs that promote potassium loss like hydrochlorothiazide must be avoided. Further, the decreased potassium levels in conditions such as chronic renal failure, were restored to normal by day 30 in *Boerhaavia diffusa* root extract treatment, which can be attributed to the potassium nitrate content (6%) in the *B. diffusa* root extract [65]. *Withania somnifera* root extract may have some role in maintaining some of the serum electrolyte levels especially potassium within normal limit [27].

In addition to respiratory organs, up-regulation of ACE2 expression was also identified in urogenital system including kidney proximal tubule cells, bladder urothelial cells and genital organs including testis. Since the hypokalemia effect has been monitored and found to last more than 5 months in subjects with COVID-19 pulmonary infection and continued to have hypokalemia and even after the disappearance of the common COVID-19 symptoms [66], the suggestion of examining the estimation of potassium in urine of covid patients assumes critical importance. Since COVID-19 is detected in urine of infected individuals, infection transmission through urine remains possible, hence medical interventions like endoscopy and urethral catheterization for covid patients' needs to be done with care and caution [67].

Acute kidney injury (AKI) represents reduced glomerular filtration rate and/or reduced urine flow associated with mortality which is a regular feature in COVID-19 disease. Biomarkers of tissue damage e.g. creatinine may identify patients of particular risk [68]. Burns and Ho [69] report the higher levels of potassium in the urine of acute kidney injury patients, supporting our hypotheses in diagnosis of covid patients by measuring urine potassium levels. AKI has been found to be an independent risk factor for death in hospitalized COVID-19 patients [70], hence detection of covid virus in the urine might indicate possible kidney injury as described by de Souza et al. [71]. Also, in COVID patients, due to gastrointestinal disturbances, there is loss of water and electrolytes in the body, which is associated with diarrhea. Treatment of such patients with adequate water and electrolyte helps [72].

For the suggestion of testing urine of covid patients for the detection of virus genetic material requires no additional requirements than what is carried out presently with the nasopharyngeal (NP) swab and/or an oropharyngeal (OP) swab of the suspected/affected patient and then the isolation of RNA of the covid virus is carried out in a biosafety level III lab. The viral RNA is then subjected to RT-PCR that requires trained and
skilled personnel and also facilities for handling PCR products in air-controlled laboratories. Hence, the recommendation of Goudorlis et al. [73] that the diagnosis of COVID-19 should be based on clinical data, epidemiological history and new diagnostic methods with higher sensitivity and specificity, as well as faster results, appears relevant and essential.

Rapid antigen lateral flow assays, although is rapid and low-cost for detection of SARS-CoV-2, it suffers from poor sensitivity early in infection [74]. Infectious SARS-CoV-2 was successfully isolated from urine of a COVID-19 patient and since the isolated virus isolated could infect new susceptible cells, it was emphasized that urine samples must be handled with care [75], however damage to kidney is ruled out [76].

Since the early diagnosis of covid would reduce spread of the disease, I believe the present hypothesis of using potassium estimation in urine of covid patients as results of diagnostic tests will have significant and beneficial implications for minimizing risks for health professionals and humans in general. Although Liu et al. [77] found that COVID disease severity could be predicted by lower counts of lymphocytes, neutrophils, albumin and increased values of LDH and CRP, the present observations of novel associations of potassium ions in viral diseases in general, tempts me to suggest examination of potassium levels in the urine of COVID patients’ although, this merits further investigation.

Genetic variation in covid virus have been reported to be restricted to the gene coding for the spike protein [78, 79] and such mutations have been suggested to play a prominent role in viral transmission and overall stability of the virus. In the recent past, the United Kingdom has faced a rapid surge in COVID-19 cases and genome mapping has indicated multiple mutations in the spike protein gene and mutations in other genomic regions of the viral genome. Studies have shown that these variants are more transmissible than previously circulating variants [80]. Nearly 14% of SARS-CoV-2 variants were not detectable by RT-PCR using commercialized primers [81], hence one cannot ascertain that the employed methods of covid virus detection like RT-PCR might not yield false negative results. The currently described hypothesis of estimation of potassium ions in urine of covid patients will not be affected by such mutations and hence in all probabilities might serve as a fool-proof method for detection of covid-19 infection.

A recent study with 290 non-ICU admitted patients with COVID-19 in a hospital of Modena, Italy has revealed an increase of urinary potassium excretion in almost 95.5% cases [82] while another study with 175 patients where patients were classified based on serum potassium levels were found to improve by potassium supplementation through the use of potassium chloride at a daily dose of 40 mEq per day [83]. These recent reports do support the significance of monitoring potassium levels in covid-19 patients and hence the current proposal of estimation of urinary potassium levels in covid-19 patients will benefit clinicians for faster diagnosis and initiation of treatment.

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Declaration of Competing Interest
The author declares that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported this paper.

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Year 2021


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Brazilian Patient Organizations and Regenerative Medicine: Selective Comparisons with the Experience of the United Kingdom

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Abstract- Patient organizations have become a privileged locus to mediate relations in health care between state and society. This study analyses the roles played in regenerative medicine by Brazilian disease-specific and rare disease patient organizations and draws comparisons with those of the United Kingdom. International public engagement, citizen science, and patient-centered medicine policies are briefly discussed as well as the organizing models of patient associations, the relations of ‘biosociality’, and the construction of alternative ‘civicepistemologies’ or tacit forms of knowing. Qualitative analysis is based on documentary information on the sector, secondary data from the organizations’ websites and 18 online interviews with representatives of Brazilian patient organizations. These data show that disease-specific organizations mainly support patients and contribute to their treatments – an auxiliary operational model – and train members to become informed interlocutors – an emancipatory model. By contrast, most rare disease associations tend to form partnerships with researchers to reformulate treatments and impact public policy.

Keywords: patient organizations; rare disease; biosocialities; civic epistemologies; regenerative medicine; cellular therapy; genetic therapy; citizen science; public engagement; patient-centered medicine.

GJMR-K Classification: NLMC Code: QU 450

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Brazilian Patient Organizations and Regenerative Medicine: Selective Comparisons with the Experience of the United Kingdom

Liliana Acero

Abstract: Patient organizations have become a privileged locus to mediate relations in health care between state and society. This study analyses the roles played in regenerative medicine by Brazilian disease-specific and rare disease patient organizations and draws comparisons with those of the United Kingdom. International public engagement, citizen science, and patient-centered medicine policies are briefly discussed as well as the organizing models of patient associations, the relations of 'biosociality', and the construction of alternative 'civic epistemologies' or tacit forms of knowing. Qualitative analysis is based on documentary information on the sector, secondary data from the organizations’ websites and 18 online interviews with representatives of Brazilian patient organizations. These data show that disease-specific organizations mainly support patients and contribute to their treatments – an auxiliary operational model – and train members to become informed interlocutors – an emancipatory model. By contrast, most rare disease associations tend to form partnerships with researchers to reformulate treatments and impact public policy. The study also finds that public engagement, citizen science, and patient-centered medicine initiatives are extremely limited in Brazil, thus leaving civic society on its own to demand changes in science and health policies.

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I. Introduction

In recent decades public interest in the social control of health activities has increased substantively, especially in relation to new cellular and genetic therapies that form part of regenerative medicine (RM) (Webster & Wyatt, 2020; Irwin et al., 2013). Patient associations have become a global privileged locus through which to mediate state-society relations in health care (e.g. MacGowan et al., 2016). The role of these organizations has become more relevant in light of globalization and the effects of neoliberal policies in health implemented in the 1990s. These include the tertiarization of health care services and the monopolistic participation, enabled by more-restrictive intellectual property rights clauses, of the pharmaceutical industry in the market, leading to very high prices for medicines This combination of economic and social factors has left large proportions of vulnerable populations unprotected with regard to health care, especially in emerging countries (Farmer, 2005; Leach et al., 2005; Araujo Aureliano, 2018; Souza Soares & Deprá, 2012).

Consumer demands for new therapies and medicines – faced with a lack of ‘solutions’ to their critical health problems and in opposition to the hegemonic conventional values supported by science, medicine, and industry – has given rise to the increasing collective organization of consumers and the questioning of those previous forms of authority (Salter et al., 2015). These organizations have been able to develop their own forms of knowledge, access alternative treatments, and make political demands related to the redefinition of the rules, and values of conventional health supply models. Many are patient and family associations, that sometimes include activists; they act following ‘evidence-based health’ (Barbosa, 2015; Rabeharisoa et al., 2014).

Since the 1980s, new challenges to the established professions, changes in the epistemologies of the life sciences and biotechnology, and significant limitations in the perspectives of specialists in the design of therapies and medicines have produced a distrust of specialists, mainly in advanced countries. Different criteria have been applied in the definition of specialized knowledge, including experienced-based knowledge (Williams and Calnan, 1996; Nowotny, Scott, and Gibbons, 2001) and ‘situated knowledge’ according to age, sex, race, ethnic group, class, and sexual orientation (Haraway, 1988). Borkman (1976, 1997) was a pioneer in developing the concept of the ‘experiential knowledge’ of patients and he formulated an epistemological claim that patients’ experiences on their own right generate knowledge. Different and sometimes controversial regulatory frameworks on health have given rise to a more pluralistic vision of knowledge, helped legitimize citizens’ reflections and extend democratic participation in specialized...
knowledge fields to social groups once excluded (Irwin, 1995; Acero, 2017).

The present study analyzes the role of patient organizations in relation to RM in Brazil, and makes selective comparisons with that of patient organizations with a similar focus in the United Kingdom (UK), a global leader in RM. It intends to answer two interrelated questions:

- How can the role of patient organizations in RM best be characterized in the UK and Brazil? What are their main differences in each context?
- What are the organizational models and main activities of the different type of Brazilian patient organizations? What is their level of involvement in RM?

II. Theoretical Reflections

This section will discuss the main frameworks in place to promote citizen participation in health care policy making, mainly in the UK, and the involvement of patient associations.

a) Public policies regarding citizen engagement in science and health

Different types of public policies to encourage the engagement of lay people in science and health care policy-making, including in RM, have been implemented in Europe and, up to a certain extent, in the US. They can be classified into three different types: public participation in science and health, citizen science, and patient-centered medicine.

The first type involves the strategies for citizen engagement designed by governments, such as citizen juries, public consultations, and consensus conferences and forums (Horst & Michael, 2011; Bussu et al., 2014; McGowan et al., 2016; Collins et al., 2017; Irwin et al., 2013). In the UK, these were promoted as a governmental answer to increasing citizen distrust in science and medicine due to inadequate policies implemented to contain "mad cow disease" (bovine spongiform encephalopathy) transmitted to humans through the consumption of beef, as well as citizen resistance to the introduction of transgenics into local agriculture (Irwin & Wynne, 2003; Van Zwanenberg & Millstone, 2005).

These policies implicitly criticized the ‘deficit model’ used to characterize levels of scientific knowledge among lay publics, a description that led to a ‘top-down’ model of participation whereby citizens were considered as passive recipients to be trained in new technologies by specialists (Wynne, 1995; Collins & Evans, 2002; Collins et al., 2017). The new engagement strategies have fostered active participation, the prioritization of dialogue, and the pursuit of the gradual democratization of scientific content through the promotion of ‘bottom-up’ participatory activities (Irwin et al., 2013). These policies have been usually implemented as group experiments or applied to small populations where new forms of governance are being tried out.

Academic reflection on these initiatives has found a number of problems: the limited range of people involved in the activities performed, difficulties in the articulation of the impacts of the case studies developed, an excessive focus on generating consensus among participants, and a lack of analysis of participants’ body language and voice tones (Wynne, 1993; Collins et al., 2017; Stirling, 2008). Studies have also noted that these practices can sometimes be used to legitimize institutional perspectives or commercial decisions previously made. In this sense, these engagement strategies can contribute to preventing plural understandings of a certain issue, instead of facilitating the processes for which they were initially designed. Alternatively, the unintended consequences of these practices can include hard-to-manage social ‘overflows’ (Callon et al., 2009). However, most academic studies do tend to emphasize the value of public engagement as a project of dialogical governance (Macnaghten & Chilvers, 2013), despite the drawbacks mentioned above.

In citizen science policies, the term ‘citizen’ refers to different types of individuals and organized social actors, including stakeholders, lay people, patients, consumers, interest groups, lobbies, and corporate groups. A good example of a citizen science endeavor is the online community, Patients Like Me. Participants share symptoms and experiences of a disease and self-management as well as the results of treatments. They use aggregate data to design new research trajectories (Wicks et al., 2018).

The European Group on Science and New Technology, in its Opinion29 (2015), describes five different models of citizen science, according to the degree and manner of citizen participation in the scientific projects. These models are the contractual, contributive, collaborative, co-created, and collegial contribution types- where citizens and specialists design initiatives and subsequent functions in research projects vary substantively. Moreover, citizens can engage in projects at two different stages: ‘upstream’, where they participate in research agenda formulation, priority setting, and decision making on funding. In ‘downstream’ involvement, lay citizens engage in the evaluation, access to and decisions on data production, analysis, and result dissemination.

Research crowd sourcing also tends to be adopted by citizen science projects for the purposes of information gathering, image classification, systematic revision, and funding. Participants are recruited to obtain large quantities of data over long periods of time across different environments – an impossible task for an individual scientist or a small team (Bonnie et al., 2009).
Volunteers design protocols and develop capacities to formulate questions, collect and submit data, and contribute to online data processing and analysis (Kobori et al., 2015).

Biomedical innovations have received support from citizen science in the research and action programs of the European Commission, such as Program Horizon 2020. This program promotes the application of the theoretical and practical approach called Responsible Research in Innovation, in which volunteer citizens participate in project formulation and implementation in three different roles: as knowledge producers, e.g. citizens ‘making science’; as contributors, e.g. in the evaluation and feedback on new medicines; and as consumers, e.g. during online self-diagnosis and the design of healthy life programs.

‘Patient-centered medicine’ policies actively promote patient empowerment. They are based on a global governmental and citizen movement that has been active during almost the last 40 years. This understanding of medicine proposes new health arrangements that imply taking a wider clinical vision, whereby clinical interest is expanded to include not only the human body but also the subjective thoughts and emotional states of the patients, as well as factors in the patients’ contexts and their abilities to act within them (Gardner, 2016, p. 240).

This approach proposes a psychosocial understanding of medicine and a perspective that considers the patient ‘as a person’, taking into account his/her own history and disease management. The doctor/patient relationship is thereby reconfigured as more symmetrical (Mead & Bower, 2000). In the UK, this public policy has been characterized as ‘the new orthodoxy’ (Cribb, 2011). For example, the National Health Service (NHS) claims that one of its main objectives consists of “placing patients at the heart of everything it does. . . . NHS services should reflect and be coordinated according to the needs and preferences of patients, their families and care-takers” (NHS, 2013, p. 3).

Some academic authors have reported that at the beginning of the present decade, patients in the UK were invited to redesign health services by participating in events, interviews, and surveys as well as in the design of new hospitals (Keating & Cambrosio, 2003). However, other authors note that it has been difficult to translate this public policy into clinical routine practice and that success in its implementation has varied substantially according to the possibilities and infrastructures of each clinical setting (Dubbin et al., 2013; Liberati et al., 2015).

In the three types of policies described, patient and family social groups reformulate what Jasanoff (2005, p. 127) has called ‘civic epistemologies’ or tacit forms of knowing. These are defined as a mix of ways in which knowledge is produced, presented, tested, verified and used in the public arena, i.e. a collective apparatus of sense making or cultural forms of knowing that reflect specific framings of meanings.

Citizen health organizations’ plural understandings and actions impact these civic epistemologies substantively. Patients/families and activists jointly produce alternative or minority narratives, socially conscious representations of health and disease based upon experience and often in contrast with hegemonic or dominant narratives.

Some properties of these contrasting epistemologies regarding RM can be described through the categories presented in Table 1.

### Table 1: Dominant and minority civic epistemologies in Brazilian RM

<table>
<thead>
<tr>
<th>Diagnostic and analytical variables/ framing categories</th>
<th>Dominant narrative (Techno-deterministic)</th>
<th>Alternative narrative (Socially conscious)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Styles of knowledge making</td>
<td>Authoritative/excluding; interest based; top-down</td>
<td>Pluralistic; inclusive; service based; bottom-up</td>
</tr>
<tr>
<td>Public accountability (basis for trust)</td>
<td>Assumptions of trust Role based</td>
<td>Assumptions of distrust Relational</td>
</tr>
<tr>
<td>Technical demonstration (practices)</td>
<td>Empirical science</td>
<td>Sociotechnical explanations</td>
</tr>
<tr>
<td>Objectivity (registers)</td>
<td>Formal</td>
<td>Consultative</td>
</tr>
<tr>
<td>Main forms of expertise</td>
<td>Professional skills</td>
<td>Skills and experience</td>
</tr>
<tr>
<td>Visibility of expert bodies</td>
<td>Nontransparent</td>
<td>Transparent</td>
</tr>
</tbody>
</table>

b) Organizational models of patient associations

Based on a reformulation of Rabeharisoa (2003), three different models of patient organizations: the auxiliary, the emancipatory, and the partnership one, will be summarized next.

In the auxiliary model, scientific and medical functions are delegated to specialists working for the organization, who select research trajectories, support laboratories, develop new practices, and disseminate knowledge. However, the association does not participate in the decision making in relation to the research it funds. In one variant, some participants are trained to become ‘lay experts’ who can dialogue with specialists – an approach born within HIV/AIDS activism through the Act-Up movement (Epstein, 1995).

The emancipatory model grew out of the advocacy movement of the 1960s and 1970s that confronted the mainstream tradition of self-help groups in those decades. This model is followed, for example, by several organizations focused on breast cancer (Dresser, 2001) and by most of the community-level services in the US. Patient organizations operating this way tend to battle for the inclusion of their demands in public policy agendas; they assert their collective identity and criticize professional monopolies. Some of them also delink completely from disease definitions and treatments not based upon experience – an attitude often found among groups representing people with differential capacities, e.g. deaf people organized against cochlear implants and/or defending their right to have deaf children (Blume, 2000).

Patient organizations working in a partnership model adhere to the principle of ‘follow science and medicine, but not be controlled by scientists and medical doctors’. They become specialized partners in knowledge production, treatment, and patient care. Patient and family participants relate to researchers in such a way that their objectives, hypotheses, and observations influence and improve each other. This operating model is most frequently found in rare disease patient organizations, which are trying to break the vicious cycle of scientific and social ignorance and indifference (Rabeharisoa et al., 2014). Associations often define new research trajectories and, through collective mobilization, contribute to the reformulation of the fields of competence of many research institutions. Participants often publish coauthored articles in scientific journals and/or become coinventors of patents on genes and biological materials (Callon, 2003; Nowotny et al., 2001). Examples of organizations following this model include the French Rare Disease Alliance and the French Association of Muscular Dystrophy.

The role of patients in this last model has been described by some authors as ‘researchers in the wild’, in reference to the fact that the patients themselves are the only ones qualified to pursue a certain kind of knowledge (Callon et al., 2001). They contribute to the reformulation of medical knowledge by the way they articulate scientific and experiential knowledges (Rabeharisoa et al., 2014). All three models are represented in RM.

To characterize patient groups, most especially those functioning within a partnership model, authors have coined the terms ‘biosociality’ and ‘biosociability’. These are defined as the social relationships mediated by health biotechnologies that collectively democratize applications in the biosciences and recreate conventional institutional hierarchies (Rabinow, 1996; Novas, 2008). People directly interested in the resolution of a health problem become ‘biosocial’ in their search for answers. They organize themselves into ‘expert’ networks, create new framings of disease, and actively search for information on a certain disease related to research, clinical trials, and funding. Their practices are motivated by the hope of finding a cure, which in turn legitimizes the manner in which they deal with their own diseases as well as with the future of their category of disease (Mazanderani et al., 2018; Pinto et al., 2018).

III. Methodological Approach

The present study forms part of a wider research program developed intermittently since 2009 to analyze innovation, regulation, and governance in relation to RM in Brazil (see, for example, Acero, 2010a; 2010b; 2011a; 2011b; 2019, 2020a; 2020b; 2020c). This article was based on a qualitative study that included a bibliographical and documentary analysis of academic literature and official national and international reports on the specific topic. Secondary information was gathered on the principal civil organizations which support RM in the UK – foundations, charities, and patient organizations – from their websites and online interviews were conducted with selected key informants. An in-depth analysis based on information gathered in the websites of the main patient organizations in Brazil related to RM and a total of 18 interviews with representatives of some of these organizations complement this study.

Patient organizations focusing on specific diseases that are more actively involved with RM were selected from a sample of 23 such Brazilian associations within the Latin American network called Latin Alliance (Alianza Latina). Five semi-structured hour-long online interviews were conducted that were recorded and transcribed at the beginning of 2021. In relation to rare diseases, a total of 40 national organizations were selected from a list of 470 Brazilian rare disease patient organizations compiled by the NGO Cure Tay-Sachs Brasil, and relevant information was collected from their websites. The main criteria for the selection of the 40 organizations were (a) their support or interest in research/clinical trials related to the
diseases in question and (b) their interest in research in or clinical trial support for RM, which include genetic diagnosis and treatments.

Thirteen semi-structured hour-long online interviews were carried out between January and March 2021 with representatives from some of the rare disease patient organizations more active in RM. The interviews were recorded and transcribed. Interviewees were selected based on the organizations' websites or contacted through the qualitative technique snowball, in which some participants suggest new participants who in turn suggest successively new participants (e.g. Biernack & Waldorf 1981).

Content analysis was applied in the study of the narratives in the interviews (e.g. Cavalcanti et al., 2014), whereby after several systematic and in-depth readings of the answers, main categories of analysis and coding were defined. These are type of services offered to affiliates, involvement in RM research and clinical trials, role played by public agencies in relation to the disease, organization's engagement in public policy, and relationship established with national and international institutions and with the media.

IV. A Brief Summary of the UK Experience

State agencies, scientific networks, and civil society associations of patients, foundations, and charities are involved in the three types of public policy initiatives discussed above. In the UK, they form a complex network that supports RM research activities and provides a significant percentage of the funding for the sector (Acero, 2011).

Charities are extremely relevant in the UK because they finance infrastructure, research programs, and fellowships; help define RM bioethics guidelines; and decisively influence the formulation of public policies. Two of the most active ones in RM are the Nuffield Council on Bioethics and the Wellcome Trust. The first, founded in 1991, is an independent and highly influential group that functions as a consultative body for the technical assessment of 'the publics' in relation to different subjects on bioethics in biomedicine. Its recommendations, based on periodic public consultations, tend to influence lay and professional public views highly as well as public policy initiatives. The Wellcome Trust, an independent charity, is the main agent of nongovernmental funding of biomedical research in the world. At present, it works on a budget of approximately 29.1 billion pounds and focuses on three main areas: the financial support of researchers of excellence, the acceleration of clinical research results, and the study of key medical topics in different historical and cultural contexts. It also supports public engagement activities.

In summary, both institutions are helping to guide RM research and therapy through the evaluation of research proposals, funding, and bioethics guidelines, as well as international scientific cooperation. Their recommendations transcend the UK context and collaborate substantively to global governance of this area of medicine.

A significant number of European disease-specific patient organizations in RM participate in a total of 11 regional consortia to finance research and development of RM therapies through the European Consortium of Stem Cell Research (Eurostemcells) (see www.eurostemcell.org). It was impossible to calculate the exact number of disease-specific patient organizations in the RM universe in the UK. The Real College of Surgeons in England estimates there are hundreds of active patient groups. As of July 31, 2019, the NHS had listed more than 180 certified organizations, more than half of which had some form of RM involvement (see www.eurostemcell.org).

The role of this type of UK patient organizations can be illustrated through a brief discussion of the activities of the larger disease-specific UK patient organizations with a long history: the British Heart Foundation (BHF), Cancer Research UK, and the Juvenile Diabetes Research Foundation (JDRF). They not only offer support to patients, public information, and treatments, but also finance national and international research projects, centers, fellowships for specialists, and public education events. For example, BHF funds three pioneering centers in RM based at well-known local universities with the aim of studying the repair of damage caused by heart attacks. Cancer Research UK, focused on immunotherapy and the cellular therapy for cancer called CAR-T, has invested 85 million pounds for research purposes, as well as approving 122 scholarships. The JDRC’s global program on type 1 diabetes funds more than 500 active research projects around the world and supports more than 70 clinical trials, having invested internationally more than 1.5 billion pounds in research to date.

The World Health Organization defines a rare disease as one that affects fewer than 65 per 100,000 persons or 1.3 per 2000 and estimates that there exist more than 7,000 types of these diseases globally. These affect 8% of the global population and in Brazil that translates to between 13 and 15 million people (Domingues de Lima et al., 2018). Rare diseases are chronic and/or degenerative diseases that generate various types of deficiencies, are responsible for high morbidity and mortality rates, and mostly have a genetic and hereditary etiology that, as such, can affect families for generations. It often takes a very long time to detect these diseases and medicines/therapies tend to have very high prices (EORD, 2005). It has been estimated globally that only 10% of these health conditions have a specific treatment and that at present there exist only 400 medicines on the market (Melnikova, 2012).
Novas (2012) shows the role played by civic society organizations in the evolution of legislation on rare disease in the US, relating that American health authorities were informed of the importance of drug development for such diseases through a combination of activism carried out by a patient group coalition, Congress hearings, surveys, academic conferences, and media reports. As a result, cutting-edge legislation was approved – the US Orphan Drug Act (1983) – a policy model that was also recently adopted by the majority of European countries.

There are hundreds of rare disease patient organizations in the UK. Only some of the main umbrella organizations that act within the national territory will be mentioned here. For example, the National Organization for Rare Disorders, Inc. is an advocacy, research, and services association for patients made up of more than 300 organizations based in England and the US that pursues the identification, treatment, and cure of this type of disease. The European Organization for Rare Diseases, an NGO that represents 956 rare disease patient organizations, has the goal of improving the life of 30 million patients in Europe.

In summary, public engagement of civil society in RM in the UK is multiple, in terms of the actions and organizations involved. On the one hand, there are a number of governmental initiatives on public engagement, often related to controversial ethics and social topics on RM, for example, on gene editing techniques and the flexibilization of CT approval (Faulkner, 2016; Dickenson, Darnovsky, 2019; Acero, 2020). On the other hand, key foundations as well as patient associations contribute to the definition of research themes, research project implementation and funding and influence the design of national and international policy in RM. The UK also recruits innumerable volunteers for activities in citizen science. The NHS, already knowledgeable in the application of several types of genetic and cellular therapies, openly promotes ‘patient-centered medicine’ including in RM. Some of these trends will be contrasted next with the experience in Brazil.

V. Results and Discussion

a) The organization of Brazilian civil society in RM

In Brazil, state promotion of public engagement policies in science and health has been very limited and does not form part of an explicit program with assigned funding and a stable structure as, for example, in many European countries. Public engagement is solicited in relation to specific actions or in the form of internet consultations organized by specialized agencies relating laws and normative resolutions. These tend to be directed at selected stakeholders; public convocation is hardly transparent and notices of consultations are rarely disseminated by the mass media. Reports on results are restrictively distributed to selected stakeholders. The general public has little or no access to the results of consultations, even more so in the case of RM, a sector that has only recently emerged (e.g. Acero, 2011 b). In this sense, civil society remains ‘free’ to use its own criteria and initiative for collective organization. On the other hand, a ‘patient centered’ approach to medicine has not been promoted as a national policy within the public health system, Sistema Único de Saúde (SUS), or in the private sector (see, for example, Agrell et al., 2016 for a comparison between local and international initiatives on this subject).

Beyond the associations of scientists/medical doctors, two main forms of organizations of Brazilian civil society exist in relation to RM. These can be classified as (a) those specific to RM, like MOVITAE (Movement in Favor of Life), and some of the many rare disease patient organizations; and (b) other organizations that include a few concerns associated with RM in their agendas and are active in relation to those only during specific events. The latter include organizations focusing on legal issues or human rights (CONECTAS-DDHH), ethics and gender (Anis), civic and political rights (OABS), and NGOs within the women and racial movements (e.g. CRIOLA, Catholics for the Right to Decide, National Network of Women’s Health and Sexual and Reproductive Rights).

The largest national mobilization of civil society in favor of RM took place between 2005 and 2008 during debates on stem cell research and on embryonic stem cell research (ESCR) in particular while the national Biosecurity Law was being approved. Subsequently, a claim for a Direct Action of Unconstitutionality was made that contested the legality of ESCR and the Federal Supreme Court (STF) in 2008 convened a Public Audience, after which the claim was reversed in favor of ESCR (see Acero, 2010 a; b). Some of the associations founded in that historic period remain active today.

More recently, there have been important mobilizations organized by rare disease patient groups to aid in the formulation and implementation of public policies, such as during the development of the National Program on Rare Disease, as well as in support of the approval of specific medicines (Pinto et al., 2018). Rare disease patient organizations have also been mobilizing more substantially since 2016 in relation to specific cases of ‘health judicialization’, for example when the STF judged a legal demand on the approval of medicine for the treatment of pulmonary arterial hypertension – a high-cost treatment unregistered by the National Sanitary Vigilance Agency (ANVISA) – against the State of Rio Grande do Norte. This mobilization was named: “STF my life has no price” (Domínguez de Lima et al., 2018).

Institutional flaws in the public health sector relating to community health have contributed to the proliferation of NGOs supporting public sector activities
in science and health care (Acero, 2011). In relation to RM, a wide range of NGOs disseminates practical information on bone marrow and umbilical cord blood donations to public banks and provides access to voluntary donor registries. Some of them collaborate directly with the National Network of Umbilical Cord and Placenta Banks and with the Brazilian Registry of Voluntary Donors of Bone Marrow associated with the Ministry of Health. Among the most active groups are the Alliance for Organ and Tissue Donations, the Pro-Vita Association for Bone Marrow Transplant, and the Bone Marrow Association.

b) Disease-specific patient organizations

Some associations are formed by stakeholders in relation to a specific non-infectious disease. These groups tend to contest institutions and conventional norms “from the outside” (Salter et al., 2015; Leach et al., 2005; Rabeharisoa, 2014). Most of them were founded by patients and/or relatives of patients searching for treatments of health conditions or by scientists and/or medical doctors with similar motivations.

Information collected via the internet for the present study shows that there are 23 Brazilian disease-specific patient associations that are integrated into the Latin Alliance, a Latin American network of more than 100 different patient organizations created in 2006 (https://redalianzalatina.org/pt-br/alianza-latina/membros). Most of these associations have been formed since the 1990s; they tend to operate nationally, with representation in as many as 20 states, and to work in association with other related NGOs.

Five interviews were conducted with (a) representatives of the Brazilian Association of Amyotrophic Lateral Sclerosis (Abrale) and the Brazilian Association of Thalassemia (Abrasta) (these two associations were addressed in a single interview because they often work together), (b) the Brazilian Federation of Philanthropic Institutes of Support to Breast Health (FEMAMA), (c) the Brazilian Association of Muscular Dystrophy (ABDIM), (d) Love and Union Against Cancer (AMUCC), and (e) the Brazilian Association of Ulcerative Colitis and Crohn Disease (ABCD).

On their websites, half of the 23 organizations mention their participation in RM research and/or clinical trials, some developed at relevant public and private charity hospitals. Other organizations, like AMUCC, only use biosimilar medicines to treat women’s breast and ovarian cancers. Biosimilar medicines are developed from live cells and since 2017 have been adopted by SUS.

Most associations sound very optimistic about the present and future results in CT. For example, the ABCD representative mentioned that in 2017 the first successful treatment of Crohn’s disease with CT in Brazil took place: it involved only one patient and used a technique that had already been approved to treat severe cases in Europe and the US.

FEMAMA’s affiliates are making a strong effort to have genetic and hereditary tests included in the treatment of breast cancer and genomic-based tumors at SUS. AFEMAMA representative who was interviewed commented, “Once regenerative medicine takes more space and becomes more important, things will change and our NGO will try to become more knowledgeable in this respect”.

An Abrale/Abrastra representative reflected upon Brazil’s relative backwardness in terms of CT development and application:

In relation to the use of CT, Brazil is some steps behind the rest of the world. For thalassemia, the type of treatment that exists today is bone marrow transplant, that is still in an initial and risky phase – in spite of having been already incorporated into SUS. The first transplant here took place no more than ten years ago and since then, there have been no more than 20 other transplants in Brazil. Beyond transplants, there is a new CT for cancer treatment: Car-T cell therapy. It is applied for some types of leukemia and lymphoma. In Brazil, it is still in the trial and approval phase; it will be some time before it is widely available to patients.

An aspect common to all these organizations is that they recruit a wide spectrum of volunteers. In terms of offering support to patients, the organizations carry out treatments, rehabilitation, and complementary health activities; disseminate the results of national and international research; organize mobilization campaigns; provide legal support; make equipment and prosthesis donations; promote self-help groups; advocate for the passage and implementation of laws and influence the design of public policies; monitor data on the diseases represented; ease access to SUS; help with the reentry of patients into the labor market; and facilitate contact between patients and specialists.

These organizations are sometimes substantively involved in the recruitment of patients for RM clinical trials, either via the dissemination of news, promoting the sponsorship of local clinical trials– often drawing upon the support of regional or international associations – or via direct patient recruitment, as the following three narratives relate:

When there are research projects that need dissemination and are suitable, we disseminate them through our communication channels. But patients get in contact with them directly. (representative of ABCD)

ADB [Brazilian Dystrophy Alliance], together with other Latin American NGOs, are trying to persuade TREAT-NMD [Neuromuscular Network – an international patient association] to promote a Latin American clinical trial. As this is only in an initial
negotiation, I cannot tell you on what specific subject the trial will focus. (representative of ABDIM)

There is a Brazilian organization called Institute to Defeat Cancer (IVOC). They have a platform that maps all the local clinical research projects that are taking place for cancer treatment. In this way, they are able to handle the recruitment of patients. Abrasta sends to them the patients interested in participating in clinical trials. . . Normally, our organization gives preference to the dissemination of national level clinical trials because it is very difficult to create expectations in a patient when something is far from taking place locally. (representative of Abrale/Abrasta)

As the last narrative suggests, these local organizations try not to generate false hope in patients regarding treatment possibilities and cures – a phenomenon known as RM ‘hype’ that is often present in media reporting – and also to avoid widespread use of risky, unproven treatments and medical tourism, which is a global concern in the sector (see Caulfield & McGuire, 2012; Acero, 2014; McMahon, 2014). These patient organizations often provide the public information on the experiences of patients with the different treatments. For example, a representative of Abrale/Abrasta stated, “Practically in all the reports published we include a real case, usually interviewing a patient or family member”.

Most of these organizations are funded by donations from individuals and/or private hospitals and research centers related to their topics of concern; almost half of them, receive some level of international funding and/or are integrated into international patient organizations and a third of them receive donations from private national enterprises and the large international pharmaceutical firms. Few receive any form of financial support from the public sector.

Most of the organizations have entered into long-term informal collaborations with researchers affiliated to public universities/hospitals. Some of these partnership are aimed at providing benefits to their members in terms of the use of health care services, as is the case with ABCD and FEMAMA. They also often develop their own printed or online publications (e.g. RevistaJeito de Viver of ADJ- Diabetes Brasil) regularly where they disseminate, for example, cases of successful treatments and scientific and medical world news on the diseases represented, as well as run YouTube channels (e.g. TV Abrasta), for public education regarding their diseases of concern.

The majority of these associations are not directly involved with scientific research either in their disease area or in RM. But some of their members participate in mixed study groups with disease specialists and these frequently include discussions on RM. However, more than half of the organizations do conduct research on the evolution of the health of their affiliated patients. For example, AMUCC has two qualitative/evaluative research projects underway that are taking this approach to different treatments being evaluated. Two other patient organizations work in four interrelated subareas: education and information, public policies, research, and support to patients. Representatives from Abrale/Abrasta reported that “the research axis can be divided into two areas: research on the patient trajectory (primary research). There is a database where patients are registered and followed up. And research on data mining (secondary research) where information from the DataSUS platform [a platform on health care of the public health system] on a certain disease is organized”. Abrasta also operates a nationwide Cancer Observatory and in its research projects compares local and foreign patient trajectories to establish differences and trends.

Larger patient organizations or those with a longer history tend to point out that, though there exist plenty of public participatory venues, the representation of patient organizations in them is quite minimal. For example:

In relation to government, there are different and important settings for deliberation: CONITEC, ANS, CNS, Cosinca, and many others. Some of these institutional spaces are occupied both by government and civic society. Seats for civic society members may be sometimes occupied by representatives of patient organizations. However, the patient organization representation in these settings is still limited. In the Chamber for Supplementary Health (CAMSS), for example, there are only two chairs for associations on pathologies out of almost forty. Abrale and Abrasta have already participated in this venue and today we are fighting to win more chairs. (representative of Abrale/Abrasta)

The associations recognize that some measures taken by the Ministry of Health (MS) have been beneficial for their affiliates, such as the approval of the Program for Assisted Non-Invasive Ventilation (MS, decree No 1.370, of July 3rd 2008), which has saved lives through the free provision by SUS of respiratory equipment. However, they are critical of the scant recognition the federal and state governments have given to their efforts to increase patients’ access to treatments and of public agencies’ unresponsiveness to their demands for meetings with policy makers.

Opinions are divided between those who consider the mass media very helpful and supportive of their public campaigns and those who avoid all media exposure, because of the low quality of the reporting: “ABDIM has already been invited to present in different media but did not accept, because it tends to be very sensationalist, instead of dealing with our problems
seriously. Some patients from our NGO participate in interviews but at a personal level, not as organizational representatives” (representative of ABDIM).

Variations in media representations can be partially explained by the marked differences between the characteristics of national-level news channels and those of state and local news coverage. The latter tend to be more supportive of these patient organizations.

In summary, unlike their counterparts in the UK, Brazilian disease-specific patient associations do not provide any financial resources for research centers, let alone for RM research. Given structural and social constraints related to health care in Brazil, these organizations specialize in supporting the improvement of patients’ health in different ways and compensate for crucial gaps in public health care delivery.

c) Patient organizations focused on rare diseases

There are approximately 470 rare-disease patient organizations in Brazil, most of which are developing digital activism intensely and thus expanding identity frontiers and geographical boundaries (Souza, 2006). The category ‘rare disease’ entered the public consciousness in a significant way in Brazil in 2009 with the organization of the First Brazilian Congress on Rare Disease; the next major step was the formation of a working group for the formulation of the National Policy of Integral Treatment of People with Rare Disease (Brasil, 2014). This policy had as its precedent the National Policy of Integral Treatment on Clinical Genetics, implemented in 2009 (MS, 2009). More recently, the Health Ministry in 2016 invested in the modification of seven preexisting health establishments so that they are now endorsed as genetic services of excellence (Nunez Moreira et al., 2018).

However, in most cases where specific therapies and medicines have been approved for use in a substantial number of countries, patients in Brazil have no access to them. They either have not been incorporated into SUS or have not received commercial authorization locally (Meira & Acosta, 2009). For example, out of a total of almost 400 rare diseases identified in the country in 2018, only 34 of them were mentioned in the official resolution on Clinical Protocols and Therapeutic Guidelines (PCDTs) and thus had medicines/therapies available within SUS (MS, 2015). Analysis of the information collected via the internet shows that the 40 rare disease patient associations researched for this study are engaged in tasks that are very similar to those of disease-specific patient organizations. At the same time, they have undertaken some specific tasks due to the characteristics of the diseases on which they focus being less well known clinically, their late social acknowledgement in Brazil, and their involvement in gene therapy.

Some of the principal differences in tasks are that rare disease patient organizations encourage more intensely than do disease-specific organizations the participation of their members in the public consultations on clinical protocols developed by the National Commission for the Adoption of Technologies (CONITEC) at SUS—even though no representative of the former organizations can serve on the commission—and also in the consultations by the National Commission of Research Ethics (CONEP). They take action in tandem with local health agencies to verify the availability of medicines and demand that state authorities purchase them; they also participate in the organization of patient and medicine registries as well as in the distribution of medicines and even help hospitals with the scheduling of patient appointments. They frequently pay some or even all of the lawyers’ fees for the many instances of litigation in progress; help patients access genetic diagnostics; find referrals to specialists; lecture within specialized trainings on rare diseases; offer and often cover some portion of the cost of complementary treatments for long-term diseases, as well as connect patients with researchers to access adequate diagnostics within the public health network. Associations also promote the ‘value of being rare’ to develop affirmative actions that bring in other informed social sectors to participate in networks that can increase the visibility of their demands (Nunez Moreira et al., 2018).

Rare disease patient groups tend to be smaller in size than those concerned with specific diseases, even though they differ substantively in the number of participants in their directing bodies (between 3 and 120 active individuals) as well as in their membership; they range between 59 (e.g. DII) and 7,000 (e.g. Retina Brasil) affiliates.

Thirteen interviews were carried out with representatives of the following organizations: Brazilian Group for the Study of Cystic Fibrosis (GBEFC), the Multiple Sclerosis Association from the State of Rio de Janeiro (APEMERJ), Multiple Sclerosis Carriers Association (APEMBS), Brazilian Association of Assistance to Mucoviscidosis (ABRAM), Retina-Brazil, Brazilian Association of Huntington (ABH), Brazilian Association of People with Crohn Disease and Ulcerative Retro Colitis (DII Brasil), Association of Volunteers, Researchers, and Carriers of Pathologies Involving Clogs (AJUDE-C), Maria Vitória Association of Rare and Chronic Disease (AMAVI), Hunter House, Carioca Association of Assistance to Mucoviscidosis (ACAM-RJ), Retina Brasil, Brazilian Association of Rett Syndrome (Abre-Te) and Tay Sachs-Brazil. Approximately 75% of these organizations have patient members who are taking medicines of a biological/cellular nature, making use of genetic diagnostics, or participating in RM clinical trials.
d) The narratives of the interviewees on rare disease

Rare disease organizations tend to participate actively in patient recruitment for existing local clinical trials related to the diseases on which they focus. For example, a representative of Retina Brasil reported that, the University of the State of São Paulo (UNIFESP) has a research group on hereditary retina diseases and one of the scientists involved, Dr. Juliana Sallum, created a laboratory that performs clinical tests on medicines, the only laboratory in Brazil and it is affiliated to a public university. . . . In the State of Minas (Gerais), Dr. Fernanda Porto has turned her clinic into a laboratory: Clinic and Research Centre (INRET). . . . Retina Brasil helps Dr. Juliana and Fernanda [by] sending patients for the clinical trials they carry out. . . . Recently, patients have been referred for a research project on Stargardt disease, for a clinical trial on Leber congenital amaurosis. . . . and for a new trial, called “Natural History” . . . . Beyond this, we [Retina Brasil] try to raise consciousness among patients on the need to carry out genetic tests”.

However, the majority of the interviewees observed, in contrast with the citizen science experiences in Europe already discussed, that “what we try to do is to follow research development and invite researchers to events whenever we can. Beyond this, medical doctors form a ‘closed up’ community and tend not to share much of their information with our associations” (representative of AMAVI).

Interviewees estimated that there were more than 15 local clinical trials on genetic/cellular therapies for rare diseases at different phases running at the time, but they complained that this was insufficient:

“The only reason why Brazil is behind the rest of the world in relation to treatments is the fact that there are many more clinical trials taking place in other countries. In that case, there are more opportunities for foreign patients to be treated in those research projects, if they do not take placebos (representative of ABH).”

There is a genetic therapy, approved by the FDA since 2017, that was only recently approved by Anvisa, in 2020. It involves eye surgery, whereby a modified gene is injected into the patient’s eye. At present, Retina Brasil is trying to have it incorporated into SUS’s treatments. Though very expensive, there would be few patients who could try this therapy. . . . In cellular therapy, there is an ophthalmologist at Ribeirão Preto [São Paulo State] who tried to develop a experiment with stem cells for the retina to treat pigmentary restenosis. . . . But it was rejected by the medical community. This new type of technology is called optogenetics. . . . At present, genetic and cellular therapies are beginning to converge, and optogenetics is one of its expressions (representative of Retina Brasil).

A representative from ABRAM reflected that it was not an easy matter even in advanced countries to implement CT and gene therapy and that the process had also demanded constant activism from patient associations.

Some of the associations’ representatives described RM treatment as very expensive and commented that “in Brazil, it is only being applied when other forms of therapy (such as, medication with antibiotics) are ineffective. I do not know of cases of RM performed by SUS – the few cases I know of here are financed by private health plans” (representative of APEMERJ).

In some cases, public resistance to CT treatments is justified by medical doctors’ not recommending these therapies and their associated risks – though the specialized literature shows CT risks do not tend to be higher than those of genetic therapies (e.g. Webster & Wyatt, 2020). Other interviewees explained this resistance as being based on dominant social assumptions that make their affiliates reject participation in CT clinical trials. They observed that “there is a very great prejudice in relation to these procedures here in Brazil, people are afraid in relation to cellular therapy” (representative of APEMBS).

It could be some of these negative public opinions can be partially attributed to remnants of the influence on public representations – especially of embryonic stem cell research – as expressed by some social sectors during the long public debate that took place between 2005 and 2008 mentioned above (Acero, 2010 a; b), as well as the local exclusion of medical doctors from the initial stage of stem cell research development (Acero, 2011). But it could also partially reflect public disinformation on RM, often influenced by the poor quality of local media reporting on RM scientific, ethical, and social controversies (Acero, 2020 a;b; c).

Eleven of the representatives interviewed emphasized that in Brazil many cases of rare diseases are only treated after legal settlements are reached. They explain that their organizations had to get involved in political battles so that patients could simply access medicines and treatments, even when they had already been approved by ANVISA. They characterize policy agents as not being very proactive in demanding that the pharmaceutical industry price medicines affordably and/or make a stronger effort to sponsor clinical trials: for example, “There is scarce information on why these medicines are so expensive. A good negotiation between the pharmaceutical industry and the Federal government is required to reduce prices. The universe of patients with cystic fibrosis is big enough (almost 6 to 8 million patients in Brazil). The government needs to
listen more closely to our organizations. . . .Beyond this, it would be important to rethink the 2012 law in order to make it more flexible, so that it could attract pharmaceutical firms to sponsor these trials in the country” (representative of ABRAM).

They add that the situation is different in other countries, where gene and cellular therapies are available and frequently applied:

In the rest of the world, there are already some countries that apply these therapies for cystic fibrosis systematically, especially in England, Scotland and the US. . . . At present, the few cases treated with these therapies in Brazil required winning legal cases. In those cases, the government purchased the medicine for a specific patient through the retail market (representative of GBEFC).

Cellular and gene research on therapies to treat hemophilia are quite advanced – phase II or III – and look very promising [elsewhere in the world]. . . . Research is generally not so advanced in Brazil. We do not have advanced clinical trials in gene and stem cell therapies. In this sense, other countries in the world are very much ahead of us (representative of AJUDE-C).

There are two main types of treatments for Rett syndrome: one with gene therapy that has the aim of curing the disease and others that try to reduce symptoms. In Brazil, there is still no medicine tested on either of these two fronts. . . . In the rest of the world there are at least three ongoing research projects that use gene therapy; one by Novartis will start human trials by the end of this year and all sound very promising. Rett Syndrome Research Trust (RSRT) has a consortium to finance research and it is looking for other genetic solutions in the near future. (volunteer from Abre-Te).

Two of the interviewees mentioned that ANVISA has only very recently approved new cellular/gene therapies and that the necessary authorizations have already been granted for their incorporation into SUS, as illustrated by the following narrative: “After the approval of the resolution by ANVISA, just a few months later, the first gene therapy registered in the country was announced: Luxturna. This medicine is for hereditary retina dystrophy. Novartis is the pharmaceutical firm producing it and it had to wait for the resolution mentioned to be able to register the drug in Brazil. . . . Very soon afterwards, the most expensive genetic therapy in the world was also registered locally: Zolgensma, for spinal muscular atrophy (SMA)” (representative of Casa Hunter).

According to several interviewees, the main hindrance to local advancement in gene treatments is the low availability of genetic diagnostics and/or their poor quality, as well as the concentration of these services in the South and Southeast regions of Brazil – an obstacle already documented by pioneering academic studies (e.g. Horovitz et al., 2013). This situation also leads to an under-representation of the number of patients registered.

Representatives of the various organizations held very different positions in relation to the 2014 National Plan on Rare Disease. The most common critique was that the law’s ruling jointly on diseases of very different kinds is a major flaw. Interviewees also mentioned that some diseases have mistakenly been defined as rare diseases due to national under-reporting. Representatives complained about the lack of a public registry for the identification of the number of Brazilian cases of each type of rare disease.

However, other representatives shared a more positive opinion of the national plan, explaining that it has facilitated a number of breakthroughs: “The 199 resolution from 2014 helped, in the sense of building a framework for the visibility of rare diseases. Moreover, it was responsible for the creation of diagnostic and treatment centers of reference. It allows the Federal Government to distribute the funding needed by the centers. . . . However, the implementation of these norms, at the state and municipal levels, has proved a difficult task” (representative of ABH).

A minority position stated that aggregating the different type of rare diseases into one national program makes sense because the communities, though heterogeneous, are rather small and their demands are similar. Representatives of most organizations expressed the view that, though beneficial, “there are still many challenges in the regulation of this resolution. The establishment of the centers of reference has not yet taken place adequately in all states” (representative of AMAVI). Another interviewee added that for the specific disease they represent, there is still no center of reference – though this has been demanded by the Brazilian Federation of Rare Disease (representative of AJUDE-C).

The majority of the interviewees reported their institutions were participating directly in key international associations on their topics of interest. From the latter, the Brazilian associations primarily obtain scientific information, support for participating in and organizing events, and often even medical assessment. For example, they mentioned being affiliates to the International Huntington Association (IHA), the European Federation of Crohn’s and Ulcerative Colitis Association (EFCCA), the International Cystic Fibrosis/Mucoviscidosis Association (ICFMA), and EURORDIS (The Voice of Rare Disease Patients in Europe) and Retina International. They emphasized that, unlike Brazilian patient organizations, international associations charge membership fees, which they use to fund research, a practice the interviewees considered unthinkable in Brazil, mainly due to their members’ much lower income levels.
Most of rare disease patient organizations tend to be affiliated to the Brazilian Federation of Rare Disease (FEBRARARAS), an umbrella organization for 58 national associations, which has a lot of political strength, and advocates for the development of adequate public policies for rare disease.

Universities, like the University of Campinas (UNICAMP), research centers and hospitals are rare disease patient organizations’ main partners in research and treatment and associated NGOs occupy the second place in terms of partnerships. Collaboration with the pharmaceutical and biotechnology industries has had less importance up to now, except in some of the existing clinical trials with RM. For example, AzidusBrasil is testing the medicine Cellavita HD for Huntington disease in phases I and II clinical trials.

All interviewees complained about the lack of dissemination of their work by policy agencies, most especially by ANVISA. They also reported that their organizations have sometimes been excluded from participating in key public events on rare diseases organized by the government. A volunteer from Abre-Te who was interviewed offered the following suggestions: “We have a lot of public demands: SUS should cover expenses of genetic testing, ANS [the National Agency of Supplemental Health] should include a wider range of therapies etc. There should be a structured channel for associations to present their demands publicly on these subjects”.

On the other hand, representatives of a few organizations did praise the work carried out on their behalf by state-level legislative chambers: “We have had support from the courts and the legislative assembly. The courts disseminate the work of DII Brasil through intranet [a local online platform for state employees]. But the support of these institutions would be wider if we had a national law regulating inflammation and intestinal disease treatments. When a state-level law was approved in the State of Minas Gerais, the courts became much more responsive and supportive” (representative of DII Brasil).

Interviewees differed substantively more on their representations of the role played by the mass media than on other issues. Many of them value state- and municipal-level media highly, because they invite members of their organizations in order to publicize specific events – like the ‘Orange August’ in the case of multiple sclerosis or the ‘Purple May Campaign’ on intestinal disease. In contrast, other interviewees commented that access to the media largely depended on personal contacts and complained about the media’s lack of interest in obtaining quality information on treatments, as has been documented in previous studies by the author (e.g. Acero, 2020 a; b). A representative of ABRAM commented, “The media adores denunciation, but it does not try to reveal the real progress the country has had in relation to rare diseases. It could do better in portraying scientific knowledge and reporting updated information”.

In summary, these recently formed rare disease associations are extremely active on the national scene and have also many international partners. They fill up vacancies in local health practices, advocate for the formulation of new regulations, and help with public administrative work. They seek to empower their members, participate in the generation of alternative forms of understanding of rare diseases, and offer their patients and families the means of access to existing diagnostics and treatments.

**VI. Conclusions**

In the newly emerging sector of RM in Brazil, there are a number of key steps that need to be taken to enable an expansion in testing and the approval of CT and gene therapies, and patient organizations are at the forefront of the efforts to bring this about. Their participation seems crucial to mobilize government towards an acceleration of the present translational phase in RM locally, to support and bring in patient recruits to local and international trials in the short term within the country, to speed up the approval of medicines/therapies by local agencies and the expedited free introduction of those medicines/therapies into SUS, thus helping to achieve greater health equality in RM. They work from ‘alternative civic epistemologies’ to science and health care that are service-oriented, inclusive and pluralistic.

Coming back to the analytic categories in the opening theoretical reflections, Brazilian patient organizations of both the types analyzed operate according to a hybrid mix of models. Organizational differences also partially reflected the associations’ variety in terms of size and access to funding – a characteristic of this universe.

The organizing model most common to specific-disease patient associations can be considered a hybrid between the auxiliary and the emancipatory models discussed. On the one hand, they only have control of the research they carry out internally with their own patients and, in those projects in which they associate with scientists and medical doctors from other institutions, they do not contribute substantively to research design or implementation, participating solely in an auxiliary function. These organizations are mainly concerned with helping their patients deal with their often-chronic diseases (Pierret 2003).

On the other hand, some participants usually train with specialists in order to act as ‘expert’ interlocutors regarding certain diseases and the organizations advocate for the development and implementation of public policies – both of which are characteristics of an emancipatory organizational model. Some members in their directing bodies participate in
governmental institutions that represent patient demands, such as the health councils. In these senses, the organizations intend to make a substantive contribution to public policy as well as offer reformist input ‘from the inside’ of public institutions.

Perhaps due to the late official recognition of rare diseases and the greater scientific uncertainties in treatments, most rare disease patient organizations, by contrast, are shaped by an ‘activism based in evidence’ (Rabeharisoa et al., 2014). Many of them work from ‘within science and medicine’ to imagine policy designs in relation to the health conditions they support, putting patients and activists in contact with specialists to formulate new bases for scientific knowledge. They act within an organizational model more similar to that previously described as ‘a partnership model’.

A smaller number of these organizations, however, function according to the definition of an emancipatory model: they train members to facilitate informed communication with specialists. They are dedicated to mobilizing to gain public recognition of rare disease and patient rights and influence public policy.

While neither of the two types of Brazilian patient associations fit the typical profile defined as ‘citizen science’, they are associated with some elements of this approach. They act more like contributors to and consumers of the existing scientific and medical knowledge than as producers of it, with the exception of some of the rare disease patient organizations. Lay participants, in general, contribute research data and aid in the dissemination of research results downstream. However, two questions deserve further research: Does ‘citizen science’ assume specific characteristics in emerging countries? Is the format it takes culturally and institutionally conditioned in the Brazilian case?

What can be said is that all the Brazilian patient associations directly or indirectly involved in RM are building new ‘biosocialities’ or ‘biosocialiabilies’ mediated by biotechnology. Rare disease patient associations in particular offer a more typical example of ‘biosocial’ groupings or BIO associations, as defined by Barbosa (2015). Firstly, they were generally founded by people affected by specific rare diseases and/or their families and friends, are motivated by shared biological issues that have been explored scientifically only to a limited extent, and recruit numerous activists as affiliates. Secondly, the majority of them are active participants in the national social movement in health care. Thirdly, they construct alternative civic epistemologies in science and health care that interconnect a plurality of understandings, are oriented towards community service and supporting activities based on the experiential knowledge and abilities of their lay members. Moreover, they tend to avoid hierarchies, work from a dialogical standpoint, and try to develop transparency in their relations with public agencies as well as with specialized institutions.

The information analyzed shows that, in contrast to the UK experience, there is no structured and explicit strategy of public engagement in RM at the governmental level. Moreover, the Brazilian public experience in RM, unlike that in the UK, is seeking a patient-centered approach to health care in a very limited way. The closest initiatives to this orientation being applied selectively at SUS, the analysis of which exceeds the scope of this article, are the consumer-centered work process within the interprofessional collaborative practice, the person-centered clinical method, integral care, the Amplified Clinic (CA), and the National Humanization Policy (PNH), all of them anchored in the principles of patient wholeness (Bonfada et al., 2012). However, in the newly emerging field of RM these methods and policies are nonexistent, and thus patients become more distrustful of the new therapies. Perhaps with the further expansion of RM-based therapies into SUS in the near future and, depending on political will, the integration of this patient-centered approach to health care may be considered more seriously.

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Reaching Women and Newborns with Multidisciplinary Specialized Care Via Whatsapp Interaction. A One-Year Experience from Tanzania

By Ahmad Mohamed Makuwani, Dr. Regine Unkels, Zamoyoni Julius, Habibu Ismail, Rachel Nathaniel Manongi, Martin Kaunda Magogwa, Naibu Mkongwa, Faraja Mgeni, Grace Mariki, Jacquelline Ndashau, Leonard Maduhu Subi, Abel Makubi, Muhammad Bakari Kambi & Ulisubisya Mpoki Mwasumbi

Abstract- Introduction: EmONC is one of the interventions that reduce maternal and newborn morbidity and mortality by treatment of complications that may arise during pregnancy and childbirth. To support provision of EmONC service to critically ill patients, in 2018, Maternity WhatsApp Groups (MWGs) were established to render technical assistance to frontline skilled health care providers.

Materials and methods: A total of 9 MWGs were formed with members from Regional and District Health Management Teams, hospitals (referral and district), health centres and HFIs (both public and private). Clinicians, paramedics and policy makers constituted membership of groups. Interactive messages generated from groups were exported in notebook and then word. Generated were manually coded into themes and subthemes using the structural functionalism and grounded theories. An inductive approach was used to analyze data.

GJMR-K Classification: NLMC Code: WS 200, WS 420
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Results: A total of 431,845 texts were generated the 9 MWGs and were coded in themes; (i) Management of Referral, (ii) Occurrence of unique events, (iii) Availability of medicines, (iv) Process of care, (v) Addressing Management Challenges, (vi) Commodities and Supplies, and (vii) Feedback and Compliment. In 12 months period, 584 critically ill cases were discussed and CFR was 4.6% (n=27).

Discussion: While, there is paucity of data on telemedicine use in provision of service to patients. Use of MWGs presented here ushers some light on its usefulness. Findings have demonstrated that the successful telemedicine requires a motivated leadership so as a guideline. Further, the effectiveness of ICU telemedicine program was influenced by various factors within the domain leadership and organization structure. The MWGs have supported management of supplies when one geographical area face scarcity of life saving commodities. In this program women and newborn from remote areas received multidisciplinary specialized care at the time when they needed most through MWGs.

I. Background

The WHO estimates show that about 295,000 women died due to mostly pregnancy related complications in 2017. Over 94% of these deaths occurred in low-resource settings, and most could have been prevented by applying simple medical interventions (1). Emergency Obstetric and Newborn Care (EmONC) are interventions that can reduce maternal and newborn morbidity and mortality from complications that may arise during pregnancy and childbirth (2). Bhandari, et al in 2014 showed that timely referral from basic to comprehensive EmONC services is key to reducing maternal death and disability(3).

Ansari, et al (2015) demonstrated that improving maternal and newborn health (MNH) indicators remains the biggest challenge in low resource countries (4). This challenge emanates from inadequate numbers and training of Skilled Birth Attendants (SBAs), a bottleneck that impacts provision of EmONC services, especially in low resource countries (5, 6, 7).

Electronic social media provides an opportunity for health experts to improve care through the exchange of knowledge and skills and mentoring, maximizing the impact of the few available health specialists by increasing the magnitude of contact. Amani, et al (2017) reported that in Cameroon WhatsApp managed to address challenges to knowledge, referral, equipment and expertise in emergencies related to neonates (8). This tallies with experience in Oman, where the WhatsApp platform facilitated interaction and discussion of health specialists with other staff, thus improving consultation was conclusive (10). Bakshi et al (2017) and Clavier et al (2019) showed that use of the WhatsApp platform provided a more rapid response in referral leading to optimal utilization of specialized care and reducing inappropriate patient transfers (9).

Koparal, et al (2019) showed that the WhatsApp platform supported dental care and in most cases consultation was conclusive (10). Bakshi et al (2017) and Clavier et al (2019) showed that use of the WhatsApp platform facilitated interaction and discussion of health specialists with other staff, thus improving
knowledge, confidence and documentation in clinical notes (11, 12).

Tanzania is in accord with the Global Strategy for Women and Children (2016-2030), The Health Sector Strategic Plan IV and One Plan II (2008-2015) that aim to improve MNH by ensuring access to SBAs and EmONC services (13, 14, 15). It is also important to note that in Tanzania the availability of Nurse Midwives stands at 52% (16). Ueno, et al (2015), Harvey, et al (2007) and the Tanzanian EmONC Assessment (2015), have shown that provision of EmONC services was limited by inadequate knowledge and skills in the performance of basic MNH interventions (17,18,19).

To bridge the gap in knowledge and skills in provision of EmONC services, in 2018, Maternity WhatsApp Groups (MWGs) were established to support health service providers from lower health facilities (HFs) with technical assistance from medical specialists who are locally available in Tanzania and those residing outside the Country. This case study aimed to explore how health care providers and their remote mentors communicated in finding solutions to the acute problems discussed, which challenges were described and how they were addressed, with the ultimate goal of sharing these unique experiences with stakeholders in a condensed and structured way.

a) Methodology
We used a case study approach to explore routine data derived from the MWGs.

b) Theoretical framework
Our approach was guided by structural functionalism theory of how systems function, and grounded theory. (20, 21).

c) Study area
Tanzanian Mainland, from June 2018 to July 2019.

d) Maternal WhatsApp Groups to support Emergency Obstetric and Newborn Care in Tanzania
MWGs were formed by the Reproductive and Child Health Section (RCHS), in the Ministry of Health in 2018 to improve decision making and service provision for maternal and newborn emergency cases at primary and secondary levels of care. Mentors in each group were available day and night and provided advice free of charge. Any participant could post a case or a question at any time. Administrators were selected by the groups, usually the zonal reproductive and child health coordinator, who monitored conversations with regards to confidentiality and appropriateness and facilitated individual follow up or referral. Each group had a representative from RCHS to assist with system-related issues that could not be solved at the district or regional level, e.g. distribution of drugs or medical equipment. They were also tasked with collecting experience with ethical aspects of the use of social media in health care with the aim of informing the development of a legal framework for Tanzania.

Anonymou physical data on patients were shared in the group by clinicians or nurses in need of specialist opinion. The specialists could ask for more information in order to arrive at a conclusion, and at times individual calls were made to discuss a case with the frontline workers. Providers in HFs sometimes WhatsApp video or voice calls at night, to ask for support.

On Mainland Tanzania there are eight health zones, each led by a Zonal Reproductive and Child Health coordinator (RCHco). Each zone consists of 2-3 regions (Table 1). The regions and districts also have Regional RCHco and District RCHco. Zonal RCHco provide a link between the regions and the Ministry, while Regional RCHco and District RCHco are responsible for overseeing the RMNCAH implementation at the regional or district levels, respectively.

A total of 9 MWGs were formed (Table 1). The Lake Region was later divided into three zones and Dar Es Salaam City was a stand-alone zone. Members of MWGs were drawn from Regional and District Health Management Teams, hospitals (referral and district), health centres, from both public and private HFs. General practitioners, obstetricians, midwives, anaesthesia experts, pharmacists and laboratory staff, blood services and others, formed the core of expert mentors.

Table 1: Zone and regions vs No. of words processed

<table>
<thead>
<tr>
<th>Health zones</th>
<th>Regions for each zone</th>
<th>WhatsApp Consultation No. of words</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>Kilimanjaro, Arusha and Tanga</td>
<td>14,952</td>
</tr>
<tr>
<td>Southern</td>
<td>Mtwara and Lindi</td>
<td>127,635</td>
</tr>
<tr>
<td>Western</td>
<td>Kigoma and Tabora</td>
<td>14,650</td>
</tr>
<tr>
<td>Eastern</td>
<td>Pwani and Morogoro</td>
<td>70,165</td>
</tr>
<tr>
<td>Central</td>
<td>Dodoma, Manyara, Singida</td>
<td>91,522</td>
</tr>
<tr>
<td>Southern Highland</td>
<td>Iringa, Njombe and Ruvuma</td>
<td>23,039</td>
</tr>
</tbody>
</table>
e) Ethical considerations

This retrospective case study used routine data from WhatsApp Groups organized by the Ministry of Health to support service provision in emergency cases, hence was not registered as research work.

Individual consent from health care providers and managers participating in the groups was not sought, but through group assent. The Ministry issued an official statement, that data from these groups would be stored as routine, analyzed and may be published with the aim of improving the use of digital communication to enhance quality care. Prior to starting the groups, guidance was sought about data security. Previously no legal framework had existed in Tanzania with regards to the use of digital techniques. The groups were therefore advised to use medical ethical standards in their communication to ensure confidentiality. The administrators of MWGs were instructed to remind members of the confidentiality of the information shared and anonymity of cases while seeking medical consultation at the various levels, from the primary to the tertiary level.

In a certain sense, this article describes how policy makers to can share their experience in implementation of various policies, strategies, and guidelines, without which such data would be lost forever.

f) Data collection methods

Data from these groups was considered routine data related to service provision. Data generated from these groups through consultation via WhatsApp were exported by notebook, transcribed verbatim to word and stored in 9 files, one for each per zone and on a password protected computer at the Ministry of Health. Each transcript contained the whole communication of each group over one year (June 2019 - May 2019) and was translated into English where primary communication was in Kiswahili, by experienced translators. Any remaining names or locations that could reveal patient or provider identities were removed. To ensure meaning was not lost during the translation, all translated transcripts had both the original text (Kiswahili and English version) and the English translation. These documents were then reviewed by the principal researcher and the RCHS team to ensure no translation errors were embedded before the transcript was moved to next level of analysis.

g) Data Analysis

To ensure integrity of findings, each transcript was assigned to two research assistants working independently and results were compared with an inter-coder reliability threshold of at least 60%.

An inductive approach was used to analyze the data. This helped to condense the extensive and varied raw text into themes and provided insights into current processes of care for mothers and newborns in Tanzania. To enhance the plausibility of conclusions, manual coding of MWGs discussion data into themes and sub-themes was conducted.

To aid coding, a list of codes was developed. As a control measure to ensure new codes were only created when necessary, the data analysis team was asked to develop a code-book with code definitions and examples of when to use the codes and when not to use them. These codes and definitions were shared with the broader team for validation before they were adopted for final analysis. The transcripts were clustered by inductively forming categories based on the raw text, and then sorting quotations into the categories.

II. Results

A total of 642,484 words were extracted from the nine groups and seven themes emerged during coding; (i) Management of Referral, (ii) Occurrence of unique events, (iii) Availability of medicines, (iv) Process of care, (v) Addressing management challenges (vi) Commodities and supplies, and (vii) Feedback and Compliment.

During the 12 month period, the nine groups contributed to the management of 584 cases of critically ill patients, with a case fatality rate of 4.6% (n=27). The number of cases reported showed variation from 319 in the Central Zone to as low as 1 in the Northern Zone. This may be attributed to the level of acceptability and stewardship of the use of innovative methods. All groups contributed valuable data by seeking help, responding and following up with care of critical cases. However, the Southern, Lake, and Eastern zones were especially effective in strong stewardship and coordination of the MWGs (Table 2).
**Table 2: Cases attended by Maternity WhatsApp Groups**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Obstetric Haemorrhag</th>
<th>Eclampsia</th>
<th>Prolonged labour</th>
<th>Septis</th>
<th>Anaesthesia complication</th>
<th>Severe anaemia</th>
<th>Venous thromboembolism</th>
<th>Others</th>
<th>Total No. of cases</th>
<th>Deaths</th>
<th>Overall case fatality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Southern</td>
<td>18</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>11</td>
<td>41</td>
<td>3</td>
<td>7.3</td>
</tr>
<tr>
<td>Eastern</td>
<td>10</td>
<td>11</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>9</td>
<td>38</td>
<td>5</td>
<td>13.2</td>
</tr>
<tr>
<td>Western</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>16.7</td>
</tr>
<tr>
<td>Central</td>
<td>29</td>
<td>43</td>
<td>181</td>
<td>1</td>
<td>1</td>
<td>9</td>
<td>0</td>
<td>55</td>
<td>319</td>
<td>5</td>
<td>1.6</td>
</tr>
<tr>
<td>Lake</td>
<td>33</td>
<td>33</td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>15</td>
<td>5</td>
<td>31</td>
<td>134</td>
<td>9</td>
<td>6.7</td>
</tr>
<tr>
<td>Southern Highland</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>South West</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>28</td>
<td>3</td>
<td>10.7</td>
<td></td>
</tr>
<tr>
<td>Dar Es Salaam</td>
<td>3</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>12</td>
<td>1</td>
<td>8.3</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>98</td>
<td>197</td>
<td>17</td>
<td>8</td>
<td>31</td>
<td>7</td>
<td>130</td>
<td>584</td>
<td>27</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Example of one of the messages:
Below is an extract of one of the interactions, which regarded a ruptured uterus that was nearly missed:

**Box 1**

**SZ. 230718:** HF A: We have a Gravida 4 P 3 woman admitted a day ago with 2 living children, with history of previous Caesarean section. Current pregnancy the GA 35 weeks. Admitted with labour pain, painless vaginal bleeding, which has stopped. No foetal kicks. On examination patient is severely pale, dry mouth, oedema ++ with cold extremities, tachypnoea, weak pulse 50 b/min and BP 120/52 mm-Hg. Working diagnosis was Severe Anaemia in failure, IUFD and 3 Previous scars. Investigation done FBP 7 g/dl. Platelets 202 and the patient was transfused 2 unit of blood and injected frusemide 80mg. Today still dyspnoic, BP 117/75 mmHg, PR 112 b/minute, pale and control Hb 8.4 g/dl. platelets 117 and we are preparing 2 more units of blood.

Obstetrician 1: Can you do ultrasound? Please look for free fluid in the abdomen and assess placenta. She may have a silent partial rupture. You may also be able to see the lower part of pleura and heart.

GP 1: What is the situation with urine output?

GP 2: Auscultate chest and check Oxygen saturation.

HFM: Since yesterday urine output is 1000mls, oxygen saturation range 93-97% in room air.

Obstetrician 2: Anaemia in failure with HB of 7-8 does not tally.

Obstetrician 2: Do a quick USS as asked. She may have ruptured uterus!

Obstetrician 1: I completely agree, there is something else going on.

Obstetrician 1: Venous thromboembolism is unlikely with O2 saturation profile.

Obstetrician 2: She may have abruptio placenta or ruptured uterus.

Obstetrician 2: All these condition leads to foetal demise.

Obstetrician 1: The thrombocytes are going down, you should also prepare for replacement. and DIC. Can you do a bedside clothing test or anything more sophisticated?

GP 1: Can we try to do serum and full blood picture so as to see if there is active bleeding somewhere?

Obstetrician 2: Whatever condition, OP is mandatory. Check bedside 1. clotting time, x match, the OP under GA intubation is needed.

Obstetrician 2: No more semiard in my opinion, you may worsen the situation.

Obstetrician 2: You need to move fast for laparatomy of this patient.

Obstetrician 2: No chance for vaginal delivery of this patient!

HFM: Unfortunate our health facility can not provide general anaesthesia by intubation, we need to refer the patient to a neighbour hospital where such service is available.....

**Health Facility B:**

Technologist: As you leave tell us to get prepared to receive the patient.

Obstetrician 3: we received the mother with ruptured uterus. Haemoglobin level at admission was 10g/dl. Patient was transfused 2 units of FFP and 1 unit of blood. Then, emergency laparatomy done, macerated still birth female baby extracted with weight 2900Kg. Today mother is fine and continuing with antibiotics. Vitals signs BP 115/90 mmHg pulse rate 101b/min and Body temperature is 37.1. Generally patient is fine.
a) Communication on accountability for maternal and newborn’s health

MWGs included decision makers from the national, regional, district and health facility levels (Health Facility person in-charge, matron, laboratory technician in-charge, etc). This broad inclusion enabled the improvement of decision making for critically ill patients as shown below.

_LZ. 111018_. A patient in Lake Zone who developed disseminated intravascular coagulation (DIC) provides a good example of accountability. The patient needed 4-5 FFP before transfusing RBCs units, which were not readily available. Mobilization of safe blood was made along leadership hierarchy and these supplies were shipped at night for a distance of 200 kilometres. The Regional and District Medical Officers organized teams of laboratory technicians and drivers to prepare requested units at night and ship them to the health centre in need. In 3 hours, these products where at the health centre and life was saved.

MWGs demonstrated successful mentorship and coaching in management of complicated PPH with DIC, abruptio placenta, shock, suspected venous thromboembolism, anaesthesia and other complications, (SZ 280618).

_SZ. DH. 280618_: Primi para delivered by CS with general anaesthesia due to eclampsia on the fourth day when she became unconscious. Post operative the patient had good recovery with regaining consciousness but a day later she deteriorated again, losing consciousness. She was on eclampsia management protocol with anticonvulsant injection magnesium sulphate, antihypertensives and antibiotics. She was started on intramuscular dexamethasone 4mg 8 times hourly. Initial report showed; PR 78 beats per minute, BP 150/104 mmHg, respiratory rate was 21 breaths per minute and oxygen saturation, 95%. Chest was clear and urine output was approximately 60 mls per hour. Brain function showed that pupils were reacting to light but there was diminished knee jerk reflexes. The team in health facility decided to seek help from MWG.

MWG responses: Experts advised a HF to designate an “ICU like bed” to provide conservative management aimed at reducing suspected raised intracranial pressure. The group deferred sending the patient to Muhimbili National Hospital due to the distance and to conditions surrounding the referring ambulance. After three days of management the patient regained consciousness and was later discharged. In turn, the HF benefited from learning basic elements of ICU.

In a previous presentation of _SZ. 230718_, MWGs specialists and other members equivocally agreed to the diagnosis of ruptured uterus. This was a near miss, the management of which changed from severe anaemia to ruptured uterus, whereby the team conducted the appropriate procedure using crystalloids fluids, preparation of safe blood for transfusion and finally, a subtotal hysterectomy was performed. This process revealed that the diagnosis by the MWG was correct and the patient survived.

The case described below shows the value of the MWG in a situation where obstetric findings contradicted normal labour. This patient finally required CS as mode of delivery (SHZ. 150818).

b) Mentoring of skilled HCPs in real cases

In the developing world there is a huge challenge in mentoring and couching of HCPs after graduating from pre- or in-service training resulting in suboptimal performance. The MWGs were observed to fill this gap through continuous non-structured mentoring, while managing complicated obstetric and newborn cases. This mentoring process contributed to change of practice and behaviour of HCPs through support from various experts (MPZ 170718).
**SHZ. 150818.** A primigravida mother 18 years old at term who was reported to be in labour, fully dilated for more than one-hour with viable foetus, membranes were ruptured and she had moderate contractions. Initially, the team thought the patient was truly at second stage of labour pain and thought to augment labour and possibly assisted delivery with a vacuum extractor. However, after a thorough consultation in MWG benefit of doubt was given and she was referred to a neighbour regional referral hospital. The feedback showed the woman had cephalopelvic disproportion with presented part having both caput and moulding. The caesarean section and the outcome of both mother and newborn was good.

c) **Logistic support through the platform**

In August 2018, the health facilities experienced a shortage of antin-convulsant injection magnesium sulphate to treat eclampsia. The MWGs mitigated this challenge by mobilizing the Zonal Medical Stores Department (MSD) warehouse and from other HFs such as dispensaries and health centers and arranging a quick redistribution to meet the demand on time.

MWGs also identified and mediated a demand for low molecular weight heparin in management of suspected venous thromboembolism patients. For a short time, the demand for the medicine at HFs increased sharply. This medication is now considered by HCP as a lifesaving commodity for maternal care. The increased demand for LMW heparin led the MSD to increase the supply to meet the needs of the HFs.

d) **Improvement in the quality of referral**

Referral of critically ill patients is a major challenge for health care systems in most developing countries. Ideally, the referring team needs to fulfil a number of lifesaving tasks to ensure that the referred patient reaches point B safely. Experts in MWG have often refrained from transporting patients because of lack of ideal ambulance services, frequently deciding instead to support local teams with knowledge and skills to manage such patients locally. When referral becomes necessary, these experts ensure that the patient is stabilized, referred and transported. The above narrative case of **SZ. 230718,** a patient treated after setting up an ICU bed, illustrates this challenge.

e) **Collaboration and teamwork in management of complicated patients through the MWG platform**

Using MWGs, health care providers have managed to bring together administrators, obstetricians, midwives, anaestesiologists and other experts to manage a single given patient who is critically ill, hence cultivating a sense of team work as shown in the previous presentation.

### III. Discussion

In Tanzania, MWGs have enabled us to unify the various sectors of the health system as one, the various actors brought together to manage a single woman and her newborn. Acknowledging the paucity of data on the use of telemedicine to provide services directly to patients, this case study sheds some light on its usefulness. The findings of Wilcox and Adhikari (2012), and Vranas, et al (2018) tally with ours, demonstrating that the use of telemedicine was associated with a reduction of mortality hence providing promise for support for future use in critical care (22, 23).

This study also observed that a lack of guidelines had implications for the effectiveness of telemedicine in the management of patients, as providers felt they were not protected and that they might be “required” to use telemedicine. Kahn and Rak’s (2019) findings have demonstrated that successful telemedicine requires motivated leadership, sound organization, structural influence and the availability of clear guidelines (24). The observations above tally with our experience that where the local leadership was supportive of MWGs, the performance was good - and vice-verse.

In review, it is our observation that the majority of studies focused more on the use of the platform in training and leadership (25, 26, 27). This finding calls for the need for more documentation of experience with the use of electronic platforms for real-time management of patients.

Finally, we would like to share our experience with the limitations in making electronic platform use for patient management more successful:

<table>
<thead>
<tr>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of MWGs were limited by 6 major issues;</td>
</tr>
<tr>
<td>i. Lack of guidelines in clinically related telemedicine caused HCP to have some reservations on the use of the technology.</td>
</tr>
<tr>
<td>ii. The experts, not belonging to the HFs, had little control of the execution of final decisions.</td>
</tr>
<tr>
<td>iii. The intervention was voluntary and depended on personal motivation.</td>
</tr>
<tr>
<td>iv. Seeking help is a process that requires change of practices and attitudes that depends on how the expert is formed in their pre-service training.</td>
</tr>
<tr>
<td>v. The MWGs were limited to 256 participants.</td>
</tr>
<tr>
<td>vi. The importance of this unconventional way of consultation may not be considered as equally important by policy makers.</td>
</tr>
</tbody>
</table>
IV. Conclusions

We have seen in these MWGs that leadership and stewardship has an important role in management of critically ill patients. Strong teamwork in the groups was a key to sharing information and to making critical decisions for the management of individual patients. The MWGs expanded their function to include management of supplies when one geographical area faced scarcity of life saving commodities. In a certain way the intervention galvanized the whole concept of accountability along the lines of the “Every Woman, Every Child Initiative”.

It is fair to mention that women in rural settings in developing countries seldom enjoy the fruits of their taxes when it comes to access to health services from qualified personnel. In this program women and newborns from remote areas received multidisciplinary specialized care at the time when they needed it most, through these MWGs.

Acknowledgements

The Permanent Secretary at the time (Dr. Mpoki Mwasumbi Ulisubisya) of implementation of this program was motivated to spearhead the use of the WhatsApp platform in management of patients to the extent that he had a personal consultation with the owners of the WhatsApp platform. We also acknowledge the champions from every MWG who used their precious time to respond to consultation and to motivate others to seek support.

The MWGs are sustained by the support of the national and sub national commitments from: The Association of Gynaecologists and Obstetricians of Tanzania (AGOTA), the Tanzanian Midwives Association (TAMA), the Society of Anaesthesiologists of Tanzania (SATA) and other medical specialities, including zonal, regional and council health management teams. Your support of this innovation is highly appreciated.

References Références Referencias


Assessment of Hearing Profile and Psychosocial Reactions of Elderly with Tinnitus in Southwestern, Nigeria

By Ayo Osisanya, Adewumi A. Ojetoyinbo & Olusola Olatunde

University of Ibadan

Abstract- Tinnitus is an observed condition in which people experience different kinds of auditory sensation without any external stimulation. It is a kind of health-related condition with evidence of perception of noise or ringing in the ear/head without propagation of sound signals. Often, tinnitus occurs as a symptom of underlying conditions such as age-related hearing loss, drug-related conditions, high blood pressure, ear injury, and evidence of accumulated earwax, cardiovascular disorders or metabolic disorder and/or a circulatory system disorder. Thus, without adequate health-care, individuals with tinnitus will experience communication difficulties and poor health-related quality of life. Evidently, research outcomes have established significant relationships among tinnitus, reduced auditory performance and hypertension, with little attention paid to psychosocial well-being of elderly with tinnitus. This study was therefore, designed to determine the types, degrees and patterns of hearing loss that existed among the elderly with tinnitus. The psychosocial reactions of the same elderly due to tinnitus - experience were also investigated. The study adopted an ex post facto research design.

Keywords: hearing status, quality of life, elderly, tinnitus.

GJMR-K Classification: NLMC Code: WV 272
Assessment of Hearing Profile and Psychosocial Reactions of Elderly with Tinnitus in Southwestern, Nigeria

Ayo Osisanya ¹, Adewumi A. Ojetoyinbo ² & Olusola Olatunde ³

Abstract- Tinnitus is an observed condition in which people experience different kinds of auditory sensation without any external stimulation. It is a kind of health-related condition with evidence of perception of noise or ringing in the ear/head without propagation of sound signals. Often, tinnitus occurs as a symptom of underlying conditions such as age-related hearing loss, drug-related conditions, high blood pressure, ear injury, and evidence of accumulated ear wax, cardiovascular disorders or metabolic disorder and/or a circulatory system disorder. Thus, without adequate health-care, individuals with tinnitus will experience communication difficulties and poor health-related quality of life. Evidently, research outcomes have established significant relationships among tinnitus, reduced auditory performance and hypertension, with little attention paid to psychosocial well-being of elderly with tinnitus. This study was therefore, designed to determine the types, degrees and patterns of hearing loss that existed among the elderly with tinnitus. The psychosocial reactions of the same elderly due to tinnitus - experience were also investigated. The study adopted an ex post facto research design. Multi-stage sampling technique was employed to select 960 participants from four Southwestern states (Lagos, Ogun, Oyo and Osun) in Nigeria. The study was carried out, using Pure-tone audiometric test (PTA) to determine the types, degrees and patterns of hearing loss, while Tinnitus Reaction (TRQ) and Tinnitus Handicap (THQ) Questionnaires, and MOS SF- 36 Health Survey were employed to investigate the perceived psychosocial reactions of the participants. Data were analysed, using frequency counts and percentages. The findings reveal conductive (208), sensorineural (680) and mixed (72) types of hearing loss, while there were mild (86), moderate (226), moderately severe (436) and severe (212) degrees of hearing loss. Flat (96), slopping (88), rising (116), noise-notched (287), U-shape (36), and high frequency (336) were the patterns of hearing loss observed. Hearing loss among the elderly with tinnitus was not peculiar to any gender (Male = 52.0%; Female =47.0%). Also, the findings establish high level of socio-emotional adjustment problems, reduced auditory performance, poor social relationships and withdrawal syndrome, feelings of depression and loneliness, reduced daily living functions, poor general well-being and reduced quality of life among the elderly assessed. Therefore, it was recommended that cases of tinnitus, with or without hearing loss should be rehabilitated early. Also, health-hearing care and comprehensive hearing conservation strategies as well as promotion of improved quality of life of the elderly should be given utmost priority.

Keywords: hearing status, quality of life, elderly, tinnitus.

I.

In the recent times, tinnitus has become more rampant in the modern world, especially among the elderly with civilized and cosmopolitan background. It is an observed condition in which people experience different kinds of auditory sensation without any external stimulation. This health-related condition is more prevalent among those with stress-related or psychosocial health challenges. Tinnitus, as a health-related condition, can be described as an evidence of perception of noise or ringing in the ear/head without external influence or generation (propagation) of sound signals (Osisanya, 2019). According to Wang and Ho (2019), tinnitus is more like a civilized disease in most countries of the world, due to people’s lifestyles which become more and more stressful, as stress is one of the risk factors and a psychological symptom of tinnitus. Also, tinnitus may be connected to ageing, auditory pathway, hearing loss, psychological issues, and loud sounds, because such exposure to noise could be a high-risk factor of tinnitus experience. Thus, tinnitus could negatively affect the communication skills, quality of life, and social life of any individual with such a condition (Wang and Ho, 2019).

Tinnitus is regarded as the sensation of hearing kind(s) such as ringing, buzzing, hissing, chirping, whistling or other sounds without external sound signal. It is rather a symptom of underlying condition(s) such as age-related hearing loss, drug-related conditions, high blood pressure, ear injury, evidence of accumulated ear wax, cardiovascular disorders or metabolic disorder and/or a circulatory system disorder (Osisanya, Ojetoyinbo and Olatunde, 2014). In some cases, tinnitus might be as a result of infections or blockages in the ear. Once the underlying cause has been treated in some cases, symptoms of tinnitus may completely be eradicated. Another prominent cause of tinnitus is long-term exposure to noise. People who work in construction sites, markets and other places with at least an average of 70dB are at higher risk of tinnitus. Vangerwua (2019) noted that the noise heard in the

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affected person’s ear creates a vicious cycle of anxiety and increase in discomfort. The condition can also be unilateral or bilateral depending on the site of lesion as well as the causative factor. Møller (2006) defined tinnitus as the perception of meaningless sounds without any sound reaching the ear from outside or inside the body. The sound heard by tinnitus patients is different from the regular physical noise and there are indications that the noise perceived has to do with perception of “self” (Jastreboff, 1990; Møller, 2011). The sound often varies and fluctuates from time to time. In this regard, Møller (2011) noted that severe tinnitus can be accompanied by lowered tolerance of sounds (hyperacusis), while it is also associated with other conditions such as emotional distress, perception of pain among other psychosocial issues. Tinnitus is associated with a number of medical conditions such as presbycusis, meniere disease, otosclerosis, head trauma, acoustic neuroma, middle ear effusion, temporomandibular joint problems, hyperlidemia, meningitis, syphilis (Nodar, 1996).

National Institute of Health (2017) stated that sometimes tinnitus can be the first sign of hearing loss in elderly persons. In the United States, there is 19% incidence of tinnitus, with severity of condition usually increasing with age; only 1% of these patients below the age of 45 years experience tinnitus, and there are about 12% within the ages of 60 to 69 years of age and 25 to 30% in those who are 70 years and above (Borghi, Cosentino, Rinaldi, Brandlioni, Rimondi, et. al. 2011). Another study also noted that the prevalence of tinnitus increases with age which also reported 5.7% of tinnitus within age of 17 to 30 years and 16% at ages 61 to 71 years. Overall, the National Institute on Deafness and Communication Disorders (NIDCD) as cited by Basaraba (2020) reports that about 10% of the total adult population in United States have some form of tinnitus. The prevalence is also similar in Nigeria as there are about 15.1% persons with tinnitus in the country (Adoga, Adoga and Obindo, 2008). In another research carried out by Adegbembo, Amusa, Ijadiunola and Adeyemo (2013), a prevalence of 6.1% was reported and it was also found out that tinnitus was mostly prevalent in adults within age 45 and above as they had 14.3% incidence rate. In older persons, the most likely causes of tinnitus include high blood pressure, cumulative damage from loud noise, or reaction to medication (Negrilla-Mezei, Enache, and Sarafoleanu, 2011). Tinnitus sounds can be high-pitched, low-pitched, soft, loud, intermittent or constant. Therefore, it ranges from high pitch to low pitch with multiple tones or sounds without tonal quality, but it may be perceived as pulsed, intermittent or continuous noise. Often, this debilitating condition begins suddenly or gradually, as well as being sensed in one ear (or both ears) or in the head (Osisanya, 2019).

According to Han, Lee, Kim, Lim and Shin (2009), the manifestations of tinnitus are usually unrelated to any type or severity of any associated hearing impairment and most tinnitus patients match their tinnitus to a pitch above 3 kHz (Baguley, Williamson and Moffat, 2006) while those tinnitus patients with comorbid meniere’s disease describe their sounds as matching a low-frequency tone that is usually 125 to 250 Hz (Dowek and Reid, 1968; Han, Lee, Kim, Lim and Shin, 2009). About 90 percent of people with tinnitus also have hearing loss, which usually goes unnoticed until when it is diagnosed. While most people who have hearing loss do have tinnitus, only 30 percent of people with hearing loss have tinnitus (Ehrenfeld, 2019). Increased and prolonged noises have the capacity of damaging the hair cells in the cochlea as well as the nerve carrying information to the brain. Research has shown that it is the absence of audiological input from the brain which results in the hearing nerves between the inner ear and the brain to send signals intermittently to the brain which are misinterpreted as sounds. Similarly, age has a great impact on tinnitus diagnosis. Davis and Davis (2009) observed that mild hearing loss increases from 1 to 3 for persons within the age of 55 to 64 years; for those under the age 45 year there is not much impairment besides for mild hearing loss at 20 to 34 dB HL. Higher tinnitus distress increases with old age as the brain structure, function and plasticity are changing with age in a complex way (Goh and Park, 2009; Vangerwua, 2019).

American Tinnitus Association (2020) noted that sensorineural hearing loss is commonly associated with tinnitus. In a study carried out by Tan, Lecluyse, Mcferran and Meddls (2013), persons with tinnitus had worst indicators compared to the non-impaired group. The tinnitus group had lower absolute thresholds, greater residual compression and better tuning than the non-impaired group while the pattern of threshold of the tinnitus was predominantly that of high frequency loss. In a study carried out in Germany, as the data collected from 2838 patients with tinnitus revealed that the patients hearing pattern ranged from mild to moderate bilateral high frequency hearing loss at 4kHz, 50dB hearing loss above 4kHz to severe hearing loss across all frequencies (Langguth, Landgrebe, Schlee, Schecklemann, Vielsmeier, et. al, 2017). In the latter study, high frequency hearing loss is predominant among patients with tinnitus.

Currently, there is yet to be any universally accepted management technique(s) for complete eradication of tinnitus, although sound and relaxation therapies coupled with counseling have shown tremendous result in the management and reduction in the effect of tinnitus (Vangerwua, 2019; Basaraba, 2020). In a research conducted by Engineer, Riley, Seale, Vrana, Shetake, et. al (2011) as cited by Basaraba (2020), it was reported that the study was able...
to eliminate tinnitus in rats using a technique called Vagus Nerve Stimulation (VNS). This technique involves stimulating the Vagus Nerve in the neck of rats suffering from noise-induced tinnitus, and simultaneously playing paired-sounds at specific frequencies, in order to reconfigure the rats’ brains to respond appropriately to all audible frequencies. Four (4) years later, a similar technique was used by the same team on a 59-year old man suffering from tinnitus, and 4 weeks of daily VNS therapy was employed, and with this technique, the man’s tinnitus condition became rehabilitated. The findings of this study have prompted other kinds of research across the globe and the world awaits an expected outcome or a breakthrough in the management as well as in the act of rehabilitation of patients with tinnitus.

In the United Kingdom, it is estimated that there are about 4.7 million persons suffering from tinnitus with about 5% of this population having experienced persistent disorder which has reduced their quality of life (Brunger, 2008; Scott and Lindberg, 2000; Borghi, et al., 2011). Psychological disorders are among common comorbid conditions of tinnitus, as a high prevalence of psychological disorders. Sleep disturbance is another persistent disorder which has reduced their quality of life about 5% of this population having experienced persistent disorder which has reduced their quality of life (Brunger, 2008; Scott and Lindberg, 2000; Borghi, et al., 2011). Psychological disorders are among common comorbid conditions of tinnitus, as a high prevalence of psychological disorders. Sleep disturbance is another persistent disorder which has reduced their quality of life about 5% of this population having experienced persistent disorder which has reduced their quality of life about 5% of this population having experienced persistent disorder which has reduced their quality of life (Brunger, 2008; Scott and Lindberg, 2000; Borghi, et al., 2011). Psychological disorders are among common comorbid conditions of tinnitus, as a high prevalence of psychological disorders. Sleep disturbance is another persistent disorder which has reduced their quality of life about 5% of this population having experienced persistent disorder which has reduced their quality of life. In a similar vein, Sweetow, Fehl and Ramos (2015) stated that the major components of tinnitus distress include auditory, attention and emotional challenges. Reports from studies such as the one above have shown that tinnitus patients are confronted with myriads of problems. Based on this, people with this kind of condition need to be educated on how to take care of their health and psycho-social issues occasioned by the condition, so as to avoid suffering from ringing in the ear as well as other psychological problems in their old age. Most times, people suffering from tinnitus go through tough time as a result of associated psychosocial, emotional and behavioural problems such as severe headache, negative thoughts, dizziness, hearing problem, anxiety, irritation, annoyance, concentration problem, sleep difficulties, depression and poor attention focus (Osisanya, Ojetoyinbo and Olutunde, 2014). Tinnitus is perceived differently and makes the individual to react to it differently. Consequently, it has been observed that a person suffering from tinnitus may not be aware of it and may not feel any discomfort occasioned by the affliction, while another person suffering from tinnitus is constantly aware of the difficulty in attention focus, falling asleep, and enjoying life. It is on this premise that this study investigated the effect of tinnitus on the auditory performance and the attendant psycho-social reactions of elderly individuals with tinnitus in Southwestern, Nigeria. In line with the objectives of the study, the hearing profile as well as the psycho-social feelings of the elderly were determined.

II. Purpose of the Study

The main purpose of this study is to assess the hearing profile and psychosocial reactions of elderly individuals with tinnitus in Southwestern, Nigeria.

III. Research Questions

The following questions were raised to guide the study:

1. What is the prevalence of elderly individuals with tinnitus in Southwestern Nigeria?
2. What is the hearing profile (types, degrees and pattern) of elderly individuals with tinnitus in Southwestern, Nigeria?
3. What are the psychosocial reactions of elderly individuals with tinnitus in Southwestern, Nigeria?

IV. Methodology

The study adopted ex-post facto research design since the researcher only assessed the existing variables. Multi-stage sampling technique was used to select 240 participants from each of the sampled four Southwestern States (Lagos, Ogun, Oyo, and Osun) of Nigeria, totaling 960 participants. Purposive sampling technique was used in selecting the tinnitus treatment centres that were utilized in the study, while random sampling technique was used in the selection of participants.
V. Procedure for Data Collection

The researcher and three research assistants who have been recruited for the study visited all the treatment centres for people with tinnitus in the four Southwestern States of Nigeria. The visit was paid before the commencement of the study so as to sensitize and solicit the cooperation of both the health workers and the prospective participants. Afterwards, ethical approval was obtained from the tinnitus treatment centres in each of the four states. At the commencement of the study, a total number of 1020 suspected participants receiving different kinds of treatments based on the tinnitus condition in the four states were nominated by the health workers. Then, these suspected participants were screened in phases using both objective and subjective assessment to determine their qualification for participation in the study. In the first phase, the participants were subjected to otoscopic examination to rule out outer-ear related disorders or problems while a routine pure-tone audiometry was conducted to examine the hearing perception of the suspected participants. Eventually, 60 suspected participants were screened out for not meeting the inclusion criteria, and the remaining 960 participants were screened using Tinnitus Reaction Questionnaire (TRQ) and Tinnitus Handicap Questionnaires (THQ), while MOS SF-36 Health Survey was employed to investigate the perceived psychosocial reactions of the participants. All the participants were subjected to diagnostic auditory assessment via Puretone audiometric procedure to determine their nature of auditory performance as well as the types, degrees and patterns of hearing loss that might be associated with their tinnitus experience in Southwestern, Nigeria.

a) Inclusion Criteria
Participants involved in this study must be:
1. Persons identified with tinnitus and comorbid hearing loss.
2. Persons with tinnitus within the age of 50 and above.
3. Persons with tinnitus with a duration over 6 months.

b) Research Instruments
Data for the study were collected using the following instruments:
1. Tinnitus Reaction Questionnaire (TRQ)
2. Tinnitus Handicap Questionnaire (THQ)
3. MOS SF-36 Health Survey
4. Otoscope
5. Maico 53 Diagnostic Audiometer

Answering Research Questions
1. What is the prevalence of tinnitus in elderly individuals?

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>520</td>
<td>54.2%</td>
</tr>
<tr>
<td>Female</td>
<td>440</td>
<td>45.8%</td>
</tr>
<tr>
<td>Total</td>
<td>960</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1: Prevalence of Elderly Individuals with Tinnitus

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-60</td>
<td>418</td>
<td>43.5%</td>
</tr>
<tr>
<td>70 and above</td>
<td>542</td>
<td>56.5%</td>
</tr>
<tr>
<td>Total</td>
<td>960</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1 reveals that 520 (54.2%) of the participants were males while the remaining 440 (45.8%) were females. This implies that there were more male participants with tinnitus than their female counterparts in Southwestern, Nigeria. Also, 418 (43.5%) of the participants were within the age range of 50 to 60 years, while the remaining 542 (56.5%) were above 70 years of age. This indicates that elderly with tinnitus who were above 70 years of age dominated the study, and that tinnitus experience was more prevalent among the age group compared to other age groups.
2. What is the hearing profile (types, degrees and pattern) of elderly individuals with tinnitus in Southwestern, Nigeria?

*Table 2:* Showing the Hearing Profile (Types, Degrees and Pattern) of Elderly Individuals with Tinnitus in Southwestern, Nigeria

Types of hearing loss

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductive hearing loss</td>
<td>208</td>
<td>22</td>
</tr>
<tr>
<td>Sensorineural hearing loss</td>
<td>680</td>
<td>71</td>
</tr>
<tr>
<td>Mixed hearing loss</td>
<td>72</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>960</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Degrees of hearing loss

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>86</td>
<td>9</td>
</tr>
<tr>
<td>Moderate</td>
<td>226</td>
<td>23</td>
</tr>
<tr>
<td>Moderately-severe</td>
<td>436</td>
<td>45</td>
</tr>
<tr>
<td>Severe</td>
<td>212</td>
<td>28</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>960</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Patterns of Hearing loss

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td>96</td>
<td>10</td>
</tr>
<tr>
<td>Sloping</td>
<td>88</td>
<td>9</td>
</tr>
<tr>
<td>Rising</td>
<td>116</td>
<td>12</td>
</tr>
<tr>
<td>NIHL</td>
<td>288</td>
<td>30</td>
</tr>
<tr>
<td>U shape</td>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>High Frequency</td>
<td>336</td>
<td>35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>960</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 2 shows the hearing profile of elderly individuals with tinnitus in Southwestern, Nigeria. The type of hearing loss of the participants varied, 208 (22.0%) had conductive hearing loss, 608 (71.0%) had sensorineural hearing loss, which is the largest group, while 72 (7.0%) were diagnosed as having mixed hearing loss. As regards the degree of hearing loss of the participants, 86 (9.0%) were with mild hearing loss, 226 (23.0%) present with moderate hearing loss, 436 (45.0%) with moderately severe hearing loss and 212 (28.0%) with severe hearing loss. Also, 96 (10.0%) were with flat hearing pattern, 88 (9.0%) present with sloping hearing pattern, 116 (12.0%) with a rising hearing pattern, 288 (30.0%) diagnosed with noise induced hearing loss, 36 (4.0%) having a U-shaped audiometry hearing pattern, and 336 (35.0%) having high frequency pattern. All the participants had reduced hearing perception, however those findings from the study showed that majority had sensorineural severe hearing loss as well as those with high frequency hearing loss.
3. What are the psychosocial reactions of elderly individuals with tinnitus in Southwestern, Nigeria?

![Figure 1: Tinnitus Reactions of Elderly Individuals with Tinnitus in Southwestern, Nigeria Using Tinnitus Reaction Questionnaire](image1)

Figure 1 explains the reactions of elderly individuals with tinnitus in Southwestern, Nigeria. The figure shows that 623 (64.9%) participants scored between 104 to 79 on the tinnitus reaction questionnaire, closely followed by 233 (24.3%) participants within the range of 78 to 53. The remaining had of less than 53. While, 104 (10.8%) participants had below average level of distress. Thus, in line with the rating of the scale, the higher the score the higher the level of distress. Therefore, those who were within the range of 104 and 79 score exhibited the highest level of distress, followed by those within the range of 78 and 53, while those who scored less than 53 exhibited the lowest level of distress.

![Figure 2: Showing psychosocial reaction of elderly individuals with tinnitus in Southwestern, Nigeria using tinnitus handicap questionnaire.](image2)

Result in figure 2 shows that 522 (54.4%) participants had catastrophic psycho-social reactions (psycho-social handicap) as a result of their continuous tinnitus experience, 217 (22.6%) exhibited severe psycho-social handicapping condition resulting from tinnitus, 56 (5.8%) present with moderate psycho-social handicapping reactions occasioned by tinnitus, 66 (6.9%) exhibited a kind of mild psycho-social handicapping reaction, while 99 (10.3%) exhibited slight psycho-social handicapping reactions resulting from tinnitus. Also, the result in figure 2 has shown that 522 of the participants, which is the category of the majority of
the sampled always experience tremendous trouble or debilitating associated conditions due to their continued tinnitus experience. Thus, tinnitus has been confirmed as a condition capable of affecting the psycho-social life of elderly with tinnitus.

Table 3: Psychosocial Reaction to Tinnitus

<table>
<thead>
<tr>
<th>S/N</th>
<th>Variables</th>
<th>Yes</th>
<th>Sometimes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Because of your tinnitus, is it difficult for you to concentrate?</td>
<td>734</td>
<td>67</td>
<td>159</td>
</tr>
<tr>
<td></td>
<td></td>
<td>76.5%</td>
<td>7%</td>
<td>16.5%</td>
</tr>
<tr>
<td>2</td>
<td>Does your tinnitus interfere with your ability to enjoy social activities?</td>
<td>670</td>
<td>67</td>
<td>223</td>
</tr>
<tr>
<td></td>
<td></td>
<td>69.8%</td>
<td>7%</td>
<td>23.2%</td>
</tr>
<tr>
<td>3</td>
<td>Do you feel that your tinnitus problem has placed stress on your relationships with members of your family and friends?</td>
<td>780</td>
<td>89</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>81.2%</td>
<td>9.3%</td>
<td>9.5%</td>
</tr>
<tr>
<td>4</td>
<td>Does tinnitus make it difficult for you to enjoy life?</td>
<td>500</td>
<td>45</td>
<td>415</td>
</tr>
<tr>
<td></td>
<td></td>
<td>52.1%</td>
<td>4.7%</td>
<td>43.2%</td>
</tr>
<tr>
<td>5</td>
<td>Does tinnitus make you feel desperate?</td>
<td>820</td>
<td>23</td>
<td>117</td>
</tr>
<tr>
<td></td>
<td></td>
<td>85.4%</td>
<td>2.4%</td>
<td>12.2%</td>
</tr>
<tr>
<td>6</td>
<td>Does tinnitus interfere with your household responsibilities?</td>
<td>773</td>
<td>45</td>
<td>142</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80.5%</td>
<td>4.7%</td>
<td>14.8%</td>
</tr>
<tr>
<td>8</td>
<td>Because of your tinnitus, do you feel depressed?</td>
<td>560</td>
<td>23</td>
<td>377</td>
</tr>
<tr>
<td></td>
<td></td>
<td>58.3%</td>
<td>2.4%</td>
<td>39.3%</td>
</tr>
</tbody>
</table>

Table 3 reveals that 734 (76.5%) of the participants find it difficult to concentrate due to their continued tinnitus experience, 67(7.0%) of the participants claimed that they occasionally find it difficult to concentrate as a result of tinnitus, while 159 (16.5%) expressed that they do not experience any difficulty concentrating, even with their tinnitus experience. Similarly, 670 (69.8%) of the participants reported that they do not enjoy social activities due to tinnitus, 67 (7.0%) expressed that tinnitus always interferes with their social activities (deprived them to enjoy social activities) from time to time, while 232 (23.2%) claimed that they continue to enjoy social activities without any interference, regardless of their tinnitus condition. In response to the question ‘do you feel that your tinnitus problem has placed stress on your relationships with members of your family and friends?’ 780 (81.2%) answered yes, to indicate that their tinnitus condition has placed stress and difficulty on their relationship with family and friends, 89(9.3%) remarked that tinnitus sometimes affects their relationship with family and friends. While, 91 (9.5%) claimed that tinnitus does not. Tinnitus makes it difficult for 500(52.1%) to enjoy life, 415 (43.2%) claimed not to be fazed by their tinnitus, while 45(4.7%) sometimes enjoy life. 820 (85.4%) participants feel desperate as a result of tinnitus, 117 (12.2%) do not and 45(4.7%) occasionally feel desperate. Finally, 560 (58.6%) feel depressed as a result of tinnitus, 23(2.4%) sometimes feel depressed while 377(39.3%) do not experience such a feeling. The implication of this is that elderly individuals with tinnitus experience varying psycho-social reactions.

VI. DISCUSSION OF FINDINGS

a) Prevalence of Tinnitus in Elderly Individuals

The findings of the study revealed that 520 (54.2%) of the participants were males while the remaining 440 (45.8%) were females, implying that male participants dominated elderly individuals with tinnitus in Southwestern Nigeria. This is in line with the findings of McCormack, Edmondson-Jones, Fortnum, Dawes, Middleton et al (2014) where it was reported that prevalence of tinnitus is significantly higher in males compared to females. Those within the ages of 50 to 60 had lower prevalence of tinnitus compared to those within 61 years and above. The finding of this study however negates Teixeira, Rosito, Gonçalves, Nunes, Dornelles and Ochik’s (2017) as they reported in their own study that 72.2% of elderly individuals with tinnitus were women.

The result of this study might be due to long-term exposure to industrial noise, which the majority of the male gender are exposed to, as well as the various health and psychological challenges which men within the geographical scope of this study are prone to, due to cultural and societal expectations.
b) Hearing Profile (Types, Degrees and Pattern) of Elderly Individuals with Tinnitus

The report of this study showed that 608 (71%) had sensorineural hearing loss, 436 (45) with moderately severe hearing loss and 212 (28) with severe hearing loss and 116 (12%) with a rising hearing pattern, 288 (30%) diagnosed with noise-induced hearing loss, 36 (4%) having a U-shaped audiometry hearing pattern, and 336 (35%) having high frequency pattern. The result corroborates the finding of Seimetz, Teixeira, Rosito, Flores, Pappen, and Dall’igna (2016) who discovered that presbycusis individuals with tinnitus had a pitch of 6 kHz and 8 kHz indicating a higher prevalence of high frequency hearing loss among tinnitus patients. The study found no correlation between the hearing loss of the participants and the pitch of hearing loss. The majority of the participants (436 (45%)) with moderately severe hearing loss and 212 (28%) with severe hearing loss were diagnosed with reduced hearing perception. The result of this study is also in agreement with that of Haider, Flook, Aparacio, Ribeiro, Marilla, Szczepak (2017) in which noise-induced hearing loss was reported as a major trigger for their tinnitus. The majority of the participants in the study of Haider et al. (2017) were also diagnosed with high frequency loss.

c) Psycho-social Reactions of Elderly Individuals with Tinnitus in Southwestern, Nigeria

The result of findings showed that 560(58.3%) felt depressed as a result of their tinnitus. The finding of this study is in tandem with that of Huang and Tang (2010) which reported that tinnitus interferes with the quality of life of elderly individuals with tinnitus. The result of this finding also corroborates that of Haider et al. (2017) which found out that noise-induced hearing loss was reported as a major trigger for their tinnitus. The majority of the participants had varying levels of handicaps on the Tinnitus Handicap Inventory (THI) and only 10(25%) had slight or no level of handicap. Negrila-mezei, Enache, and Sarafoleaneu (2011) also supported the claim that elderly individuals with tinnitus had significant negative perception of their overall health and poor quality of life. Findings from this study further showed that elderly individuals with tinnitus find it difficult to enjoy life as they cannot concentrate and feel desperate from time to time.

VIII. Recommendations

Based on the findings of this study, the following are recommended:

1. There is need for training, awareness, orientation, reorientation and sensitization of the general public about risk factors for tinnitus while encouraging regular hearing assessment for the purpose of quickly nipping in the bud of hearing-related disorders which are likely to result in tinnitus.

2. Counselling programmes should be infused into the management techniques for tinnitus so as to deal with the comorbid psychological problems.

3. Noise pollution policies should be enacted so as to protect the auditory function and psychological well-being of elderly individuals with tinnitus.

References Références Referencias


38. Sweetow, R. W., Fehl, M., Ramos, P. M. (2015). Do tinnitus patients continue to use amplification and


Progression to Universal Health Coverage- Need for Enhanced Monitoring

By Hari Teja Avirneni, Anugraha John, Sinthu Sarathamani Swaminathan

NRI Institute of Medical Sciences

Universal health coverage (UHC) is considered as a powerful mechanism for achieving better health, promoting human development and enabling equitable access to the health services, for all. With achieving UHC becoming a major policy goal globally and increasing adoptions of UHC at policy levels across various member states of WHO, it is also extremely important to continuously monitor the progress towards UHC across respective states.

The conditions that causes health related problems and the financial power of a nation to protect its citizens from such conditions differs from one nation to the other. Therefore, it is highly important for the respective countries to plan for coverage of health-related services across the entire population and also ensuring financial risk protection based on such aspects while effectively utilising the resources that are limited.

GJMR-K Classification: NLMC Code: W 84.5

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Progression to Universal Health Coverage: Need for Enhanced Monitoring

Hari Teja Avirneni a, Anugraha John a, Sinthu Sarathamani Swaminathan a

Universal health coverage (UHC) is considered as a powerful mechanism for achieving better health, promoting human development and enabling equitable access to the health services, for all.  

With achieving UHC becoming a major policy goal globally and increasing adoptions of UHC at policy levels across various member states of WHO, it is also extremely important to continuously monitor the progress towards UHC across respective states.

The conditions that cause health related problems and the financial power of a nation to protect its citizens from such conditions differs from one nation to the other. Therefore, it is highly important for the respective countries to plan for coverage of health-related services across the entire population and also ensuring financial risk protection based on such aspects while effectively utilising the resources that are limited.

The ultimate aim of UHC is to provide health care services to all the citizens across the spectrum of health while at the same time also protecting them from potential financial risks that may arise from availing such services. Providing full range of services to improve health of everyone requires continuous evaluation of available health services, adopting/inventing feasible interventions to expand equitable coverage of such services and monitoring on how provision of such services is improving the health of people.

At the same time, defining a set of indicators to monitor financial risk protection aspects is also extremely critical. Constantly measuring the OOPE and CHE related to health care and assessing the levels of financial protection to all the citizens, especially among those from economically weaker sections would very much become an obligation.

With low and middle-income countries (LMIC) contributing to significant proportion of global incidence of CHE, a special emphasis has to be made on building support systems to continuously measure the progress towards UHC among those countries by monitoring CHE and impoverishment. This can be done by incorporating the existing global monitoring framework into the national level health schemes or by building the OOPE and CHE estimation mechanisms into such schemes at the lowest operational levels.

Also, of extreme importance is promoting and supporting more research studies, emphasising on the financial aspects of receiving health care, ranging from general descriptive studies to more specialized studies focusing on specific disease conditions or a specific aspect of the treatment among the beneficiaries of various publicly financed health insurance schemes. Findings from such research will enable to formulate multi-level & holistic policy reforms targeting the effects of CHE on the households. This forms the basis for monitoring the progress towards UHC in any given setting.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

References Références Referencias


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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 through 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.
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.

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