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Assessment of Hearing Profile

Potassium Levels in COVID Subjects

Discovering Thoughts, Inventing Future



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VOLUME 21 ISSUE 4 (VER. 1.0)

OPEN ASSOCIATION OF RESEARCH SOCIETY

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GLOBAL JOURNAL OF MEDICAL RESEARCH: K  
INTERDISCIPLINARY  
Volume 21 Issue 4 Version 1.0 Year 2021  
Type: Double Blind Peer Reviewed International Research Journal  
Publisher: Global Journals  
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

# 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.*

**GJMR-K Classification:** *NLMC Code: WB 141*



POTASSIUMLEVELSINCVIDSUBJECTSCURRENTOBSERVATIONSANDNEWPOSSIBILITIESFORITSUSEINCVIDDIAGNOSIS

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# Potassium Levels in COVID Subjects: Current Observations and New Possibilities for its use in COVID Diagnosis

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, remdisivir, 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 in covid 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

*Author:* Head R & D, Sava Healthcare Limited, Research Center, Block D1, Plot No. 17/6, MIDC, Chinchwad, Pune-411019, India.  
e-mail: sriram.p@savaglobal.com

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<sup>+</sup> 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 affects, 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<sup>+</sup> lymphoblastoid cells infected by HIV-1 (strain LAI) was incubated in low K<sup>+</sup> medium in comparison to a normal K<sup>+</sup> concentration (5 mM). The decrease in HIV-1 production by low K<sup>+</sup> medium and increase by high K<sup>+</sup> 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<sup>+</sup> 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 isoforms, sensibility 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  $\alpha/\beta$  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  $3.19 \pm 0.96$  mEq/l in such patients in comparison to healthy controls (potassium =  $4.50 \pm 0.02$  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. Hypokalemic 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 sodium 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 supplementations 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.  $Mg^{+2}$  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 Goudoris 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.

#### Funding

This research received no specific grant from any funding agency in the public or commercial sector.

#### 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.

## ACKNOWLEDGEMENTS

The author thanks Mr. Vinod Jadhav, Chairman, SAVA Healthcare Limited and Mr. Avinaash Mandale, Managing Director, SAVA Healthcare Limited for being a constant source of support and encouragement.

## REFERENCES RÉFÉRENCES REFERENCIAS

1. Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun* 2020; 109: 102433. doi: 10.1016/j.jaut.2020.102433.
2. Cui J, Li F, Shi ZL. Origin and evolution of pathogenic coronaviruses. *Nat Rev Microbiol* 2019; 17(3): 181–92. <https://doi.org/10.1038/s41579-018-0118-9>
3. Jain U. Effect of covid-19 on the organs. *Cureus* 2020; 12(8): e9540. doi: 10.7759/cureus.9540
4. Moreno-Pérez O, Leon-Ramirez J-M, Fuertes-Kenneally L, et al. Hypokalemia as a sensitive biomarker of disease severity and the requirement for invasive mechanical ventilation requirement in COVID-19 pneumonia: A case series of 306 Mediterranean patients. *Int. J Infect Dis* 2020; 100: 449-54. <https://doi.org/10.1016/j.ijid.2020.09.033>
5. Lippi G, South AM, Henry BM. Electrolyte imbalances in patients with severe coronavirus disease 2019 (COVID-19). *AnClinBiochem* 2020; 57 (3): 262-265. doi: 10.1177/0004563220922255
6. [Palmer BF, Clegg DJ. Physiology and pathophysiology of potassium homeostasis. *AdvPhysiolEduc* 2016; 40(4): 480–490. <https://doi.org/10.1152/advan.00121.2016>
7. Santos RA, Ferreira AJ, Simões E, Recent advances in the angiotensin-converting enzyme 2-angiotensin (1-7)-Mas axis. *ExpPhysiol* 2008; 93(5): 519-527. doi:10.1113/expphysiol.2008.042002
8. Weir MR, Rolfe M. Potassium homeostasis and renin-angiotensin-aldosterone system inhibitors. *Clin J Am SocNephrol* 2010; 5(3): 531-548. doi:10.2215/CJN.07821109
9. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus– infected pneumonia in Wuhan, China.

- JAMA 2020; 323(11): 1061-1069. doi: 10.1001/jama.2020.1585
10. Levine AS, Bond PH, Scala AR. et al. Studies on the relationship of potassium to influenza virus multiplication. J Immunol 1956; 76 (5): 386-92.
  11. Choi B, Gatti PJ, Haislip AM, et al. Role of potassium in human immunodeficiency virus production and cytopathic effects. Virology 1998; 247(2): 189-99. doi: 10.1006/viro.1998.9251.
  12. Punch EK, Hover S, Blest HTW, et al. Potassium is a trigger for conformational change in the fusion spike of an enveloped RNA virus. J BiolChem 2018; 293(26): 9937-9944. Doi: 10.1074/jbc.RA118.002494
  13. Gutch M, Agarwal A, Amar A. Hypokalaemicquadriparesis: An unusual manifestation of dengue fever. J Nat SciBiol Med 2012; 3(1): 81-83. doi: 10.4103/0976-9668.95976.
  14. Chandler RE. Serious neurological adverse events after Ivermectin—Do they occur beyond the indication of onchocerciasis? Am J Trop Med Hyg 2018; 98(2): 382-388. doi: 10.4269/ajtmh.17-0042
  15. Pimenta PHC, Silva CLM, Noël F. Ivermectin is a nonselective inhibitor of mammalian P-type ATPasesNaunynSchmiedebergs Arch Pharmacol 2010; 381(2): 147-152. doi: 10.1007/s00210-009-0483-z.
  16. Arise RO, Malomo SO. Effects of ivermectin and albendazole on some liver and kidney function indices in rats. Afr J Biochem Res 2009; 3 (5): 190-197.https://doi.org/10.5897/AJBR.9000102
  17. Caly L, Druce JD, Catton MG, et al. The FDA approved drug Ivermectin inhibits the replication of SARS-CoV-2 in vitro. Antiviral Res 2020; 178: 104787. https://doi.org/10.1016/j.antiviral.2020.104787
  18. Oestereich L, Lüdtke A, Wurr S. et al. Successful treatment of advanced Ebola virus infection with T-705 (favipiravir) in a small animal model. Antiviral Res 2014; 105: 17-21.doi: 10.1016/j.antiviral.2014.02.014.
  19. Chinello P, Petrosillo N, Pittalis S, et al. QTc interval prolongation during favipiravir therapy in an Ebolavirus-infected patient. PLoSNegl Trop Dis 2017; 11(12): e0006034. https://doi.org/10.1371/journal.pntd.0006034
  20. Mabillard H, Sayer JA. Electrolyte disturbances in SARS-CoV-2 infection.F1000 Res 2020; 9, 587.doi: 10.12688/f1000research.24441.2.
  21. Pizzorno A, Padey B, Julien T, et al. Characterization and treatment of SARS-CoV-2 in nasal and bronchial human airway epithelia. Cell Reports Med 2020; 1: 100059. DOI:10.1101/2020.03.31.017889
  22. Wang Y, Zhang D, Du G, et al. Remdesivir in adults with severe COVID-19: a randomized, double-blind, placebo-controlled, multicentre trial. Lancet 2020; 395: 1569-1578. https://doi.org/10.1016/S0140-6736(20)31022-9
  23. Yadav R, Bansal R, Budakoty S, et al. COVID-19 and sudden cardiac death: A new potential risk. Indian Heart J 2020; 72(5): 333-336. doi: 10.1016/j.ihj.2020.10.001
  24. Guo T, Fan Y, Chen M. Cardiovascular implications of fatal outcomes of patients with Coronavirus disease 2019 (COVID-19). JAMA Cardiol 2020; 5(7): 811-818. doi: 10.1001/jamacardio.2020.1017.
  25. Krstic-Pavlovic N, Zamic RD, Jelacic S. Potassium contents in some medicinal plants. ActaHortic 1992; 306: 245-248. DOI: 10.17660/ActaHortic.1992.306.29
  26. Shree P, Mishra P, Selvaraj C, et al. Targeting COVID-19 (SARS-CoV-2) main protease through active phytochemicals of ayurvedic medicinal plants -*Withaniasomnifera* (Ashwagandha), *Tinosporacordifolia* (Giloy) and *Ocimum sanctum* (Tulsi) – a molecular docking study. J BiomolStrucDyn 2020; 1-14.
  27. Shimmi S, Jahan N, Sultana N. Effects of Ashwagandha (*Withaniasomnifera*) root extract against gentamicin induced changes of serum electrolytes in rats. J Bangladesh SocPhysiol 2012; 7(1): 29-35 https://doi.org/10.3329/jbsp.v7i1.11157 https://doi.org/10.1080/07391102.2020.1810778.
  28. Sharma AK, Kishore K, Sharma D, et al. Cardioprotective activity of alcoholic extract of *Tinosporacordifolia* (Willd.) Miers in calcium chloride-induced cardiac arrhythmia in rats. J Biomed Res 2011; 25(4), 280-286. doi: 10.1016/S1674-8301(11)60038-9.
  29. Jung W-S, Kwon S-W, Im J-W, et al. Influence of herbal complexes containing licorice on potassium levels: A retrospective study. Evidence-Based Complementary and Alternative Medicine, 2014; 2014: ID 970385.
  30. Williamson E, Driver S, Baxter K, et al. Stockley's Herbal Medicines Interactions (2009). 1st ed. London: Pharmaceutical Press; UK.
  31. Mohan A, Premanand R, Reddy LN. et al. Clinical presentation and predictors of outcome in patients with severe acute exacerbation of chronic obstructive pulmonary disease requiring admission to intensive care unit.BMC Pulm Med. 2006; 6: 27.doi: 10.1186/1471-2466-6-27.
  32. Telfer N, Weiner JM, Merrill Q. Distribution of sodium and potassium in chronic obstructive pulmonary disease Am Rev Respir Dis 1975; 111(2): 166-176. doi: 10.1164/arrd.1975.111.2.166.
  33. Das P, Bandyopadhyay M, Baral K, et al. Dyselectrolytemia in Chronic obstructive pulmonary diseases with acute exacerbation. Nig J PhysiolSci 2010; 25(1): 25-7.
  34. Maklad SF, Basiony FS. Electrolyte disturbances in patients with acute exacerbation of chronic

- obstructive pulmonary disease. The Scientific Journal of Al-Azhar Medical Faculty, Girls.2019; 3, 427–31.
35. Sparrow D, O'Connor GT, Rosner B, et al. Methacholine airway responsiveness and 24-hour urine excretion of sodium and potassium. The Normative Aging Study. *Am Rev Respir Dis* 1991; 144: 722-25.
  36. Gilliland FD, Berhane KT, Li YF, et al. Dietary magnesium, potassium, sodium, and children's lung function. *Am J Epidemiol* 2002; 155(2): 125-31.
  37. Gustafson T, Boman K, Rosenhall L, et al. Skeletal muscle magnesium and potassium in asthmatics treated with oral beta(2)-agonists. *EurResp J* 1996; 9(2): 237-240. <http://dx.doi.org/10.1155/2014/970385>.
  38. Fantidis P, Ruiz CJ, Marin M, et al. Intracellular (polymorphonuclear) magnesium content in patients with bronchial asthma between attacks. *J R Soc Med* 1995; 88(8): 441-445.
  39. Alamoudi OS. Electrolyte disturbances in patients with chronic, stable asthma: effect of therapy. *Chest* 2001; 120(2): 431-436. doi: 10.1378/chest.120.2.431.
  40. Awasthi A, Malik S, Khalili, H. Identification and characterization of a novel association between dietary potassium and risk of Crohn's disease and ulcerative colitis. *Front Immunol* 2017; 198(1): 554. doi: 10.3389/fimmu.2016.00554.
  41. Goyal S, Rampal R, Kedia S, et al. Urinary potassium is a potential biomarker of disease activity in ulcerative colitis and displays in vitro immunotolerant role. *Scientific Reports* 2017; 7, 18068. doi:10.1038/s41598-017-18046-x
  42. Kianifard T, Chopra A. A therapeutic role for potassium (K) to reduce pain and complications related to the cardiovascular system and bone in rheumatoid arthritis (RA): A clinical research perspective. 2918; 3(1): 1-12. doi; 10.22631/rr.2017.69997.1035
  43. Funder JW, Carey RM, Mantero F, et al. The management of primary aldosteronism: case detection, diagnosis, and treatment: an endocrine society clinical practice guideline. *J ClinEndocrinolMetab* 2016; 101(5): 1889–1916. doi: 10.1210/jc.2015-4061
  44. Nishiyama N, Takeshita M, Tanaka K. et al. A case of severe hypokalemia caused by a Chinese herbal remedy (Yokukansan) in an 81-year-old woman with dementia. *Nihon Ronen IgakkaiZasshi* 2011; 48(5), 553-57. doi: 10.3143/geriatrics.48.553.
  45. Garg RK, Malhotra HS, Verma R, et al. Etiological spectrum of hypokalemic paralysis: A retrospective analysis of 29 patients *Ann Indian AcadNeurol* 2013; 16(3): 365–370. doi: 10.4103/0972-2327.116934
  46. Afridi HI, Kazi TG, Talpur FN, et al. Evaluation of calcium, magnesium, potassium and sodium in biological samples of male human immunodeficiency virus patients with tuberculosis and diarrhea compared to healthy control subjects in Pakistan. *Clin Lab* 2013; 59(5-6): 539-550. doi: 10.7754/clin.lab.2012.120517.
  47. Khandelwal VG, Patil VC, Botre A, et al. Electrolyte disturbances in dengue infected patients. *Int J Contemp Med Res* 2019; 6(2): B5-B8. doi: <http://dx.doi.org/10.21276/ijcmr.2019.6.2.14>
  48. Peiris JSM, Chu CM, Cheng VCC. et al. Clinical progression and viral load in a community outbreak of coronavirus-associated SARS pneumonia: a prospective study. *Lancet* 2003; 361(9371): 1767–72. doi: 10.1016/s0140-6736(03)13412-5.
  49. Li Z, Wu M, Guo J. et al. Caution on kidney dysfunctions of 2019-nCoV patients 2020. 2020; MedRxiv. <https://doi.org/10.1101/2020.02>.
  50. Gitlin D. Hypokalemia and Hypomagnesemia, in *Handbook of Medicine in Psychiatry*. (2006). Edited by Manu P, Suarez RE, and Barnett BJ. Washington, DC, American Psychiatric Publishing, USA.
  51. Pfefferbaum B, North CS. Mental Health and the Covid-19 Pandemic. *N Engl J Med* 2020; 383: 510-512. doi: 10.1056/NEJMp2008017
  52. Kjeldsen K. Hypokalemia and sudden cardiac death. *ExpClinCardiol* 2010; 15(4): e96–e99.
  53. Kieneker LM, Gansevoort RT, Boer RA. et al. Urinary potassium excretion and risk of cardiovascular events. *Am J ClinNutr* 2016; 103(5): 1204-12. doi: 10.3945/ajcn.115.106773.
  54. Tanaka T, Okamura T, Miura K, et al. A simple method to estimate populational 24-h urinary sodium and potassium excretion using a casual urine specimen. *Journal of Human Hypertension* 2002; 16: 97–103. doi: 10.1038/sj/jhh/1001307
  55. Kawasaki T, Itoh K, Uezono K, et al. A simple method for estimating 24 h urinary sodium and potassium excretion from second morning voiding urine specimen in adults. *ClinExpPharmacolPhysiol* 1993; 20(1): 7–14. doi: 10.1111/j.1440-1681.1993.tb01496.x.
  56. Brown IJ, Dyer AR, Chan Q, et al. Estimating 24-hour urinary sodium excretion from casual urinary sodium concentrations in Western populations: the INTERSALT study. *Am J Epidemiol* 2013; 177: 1180–92. doi: 10.1093/aje/kwt066.
  57. Godkar P. Determination of ions and automation. (2004). *Clinical Biochemistry: principles and practices*; Godkar P, 2nd edition". Bhalani Publishing House, pp 57-68.
  58. Burtis CA, Brunts DE. (2008). *Teitz Fundamentals of Clinical Chemistry*; 6th edition". Elsevier Saunders publishers. pp. 432.
  59. Pistelli R, Forastiere F, Corbo GM. et al. Respiratory symptoms and bronchial responsiveness are related to dietary salt intake and urinary potassium



- excretion in male children. *EurRespir J* 1993; 6(4): 517-22.
60. Wang W, Xu Y, Gao R, et al. Detection of SARS-CoV-2 in different types of clinical specimens. *JAMA* 2020; 323(18): 1843–1844. doi: 10.1001/jama.2020.3786
  61. Bwire GM, Majigo MV, Njiro BJ, et al. Detection profile of SARS-CoV-2 using RT-PCR in different types of clinical specimens: A systematic review and meta-analysis. *J Med Virol* 2021; 93: 719–725. doi: 10.1002/jmv.26349
  62. Peng L, Liu J, Xu W. et al. SARS-CoV-2 can be detected in urine, blood, anal swabs, and oropharyngeal swabs specimens. *J Med Virol* 2020; 92(9): 1676-80. Doi:10.1002/jmv.25936.
  63. Ling Y, Xu S-B, Lin Y-X. et al. Persistence and clearance of viral RNA in 2019 novel coronavirus disease rehabilitation patients. *Chin Med J (Engl)* 2020; 133(9): 1039–1043. doi: 10.1097/CM9.0000000000000774
  64. Singh S, Maan NS, Rana V, et al. Effect of dietary inclusion of Giloy (*Tinosporacordifolia*) stem powder on growth performance and metabolizability in broilers. *J EntomolZoolStud* 2018; 6(5): 36-40.
  65. Oburai NL, Rao VV, Bonath RBN. Comparative clinical evaluation of *Boerhaviadiiffusa* root extract with standard Enalapril treatment in canine chronic renal failure. *J Ayurveda Integr Med* 2015; 6(3): 150–57. doi: 10.4103/0975-9476.166390
  66. Alnafiey MO, Alangari AM, Alarifi AM, et al. Persistent Hypokalemia post SARS-coV-2 infection, is it a life-long complication? Case report *Ann Med Surg (Lond)*. 2021; 62: 358-61. doi: 10.1016/j.amsu.2021.01.049
  67. Kashi AH, Rosette JDL, Amini E, et al. Urinary viral shedding of covid-19 and its clinical associations: A systematic review and meta-analysis of observational studies. *Urol J* 2020; 17(5): 433-441. doi: 10.22037/uj.v16i7.6248.
  68. Luther T, Bülow-Anderberg S, Larsson A. et al. COVID-19 patients in intensive care develop predominantly oliguric acute kidney injury. *ActaAnaesthesiolScand* 2021; 65(3), 364–72.doi: 10.1111/aas.13746.
  69. Burns AR, Ho KM. Urinary potassium excretion and its association with acute kidney injury in the intensive care unit. *J Crit Care* 2018; 46: 58-62. doi: 10.1016/j.jcrr.2018.04.009.
  70. Cheng Y, Luo R, Wang K, et al. Kidney disease is associated with in-hospital death of patients with COVID-19. *Kidney Int*2020; 97(5): 829-38. doi: <https://doi.org/10.1016/j.kint.2020.03.005>
  71. de Souza SP, Silveira MAD, de FreitasSouza BS,et al. Evaluation of urine SARS-COV-2 RT-PCR as a predictor of acute Kidney Injury and disease severity in critical COVID-19 patients. 2020; Medrxivdoi: <https://doi.org/10.1101/2021.01.13.21249576>
  72. Taheri M, Bahrami A, Habibi P, et al. A review on the serum electrolytes and trace elements role in the pathophysiology of COVID-19. *Bio Trace Elem Res* 2020; 2020: 1-7. <https://doi.org/10.1007/s12011-020-02377-4>.
  73. Goudouris ES. Laboratory diagnosis of COVID-19. *J Pediatr (Rio J)* 2021; 97(1): 7–12. doi: 10.1016/j.jped.2020.08.001
  74. Tang Y-W, Schmitz JE, Persing DH, et al. Laboratory diagnosis of COVID-19: current issues and challenges. *J ClinMicrobiol* 2020; 58: e00512-20. <https://doi.org/10.1128/JCM.00512-20>
  75. Sun J, Zhu A, Li H, et al. Isolation of infectious SARS-CoV-2 from urine of a COVID-19 patient. *Emerg Microbes Infect* 2020; 9(1): 991-93. doi: 10.1080/22221751.2020.1760144
  76. Frithiof R, Bergqvist A, Jarhult J, et al. Presence of SARS-Cov-2 in urine is rare and not associated with acute kidney injury in critically ill COVID-19 patients. *Critical Care* 2020; 24:587–588. <https://doi.org/10.1186/s13054-020-03302-w>
  77. Liu Y, Yang Y, Zhang C. et al. Clinical and biochemical indexes from 2019-nCoV infected patients linked to viral loads and lung injury. *Sci China Life Sci* 2020; 63 (3): 364-374. doi: 10.1007/s11427-020-1643-8.
  78. Zhang L, Jackson CB, Mou H, et al. SARS-CoV-2 spike-protein D614G mutation increases virion spike density and infectivity. *Nat Commun* 2020;11: 6013. <https://doi.org/10.1038/s41467-020-19808-4>
  79. Laha S, Chakraborty J, Das S. Characterizations of SARS-CoV-2 mutational profile, spike protein stability and viral transmission. *Infect Genet Evol* 2020; 85, 104445. <https://doi.org/10.1016/j.meegid.2020.104445>.
  80. European Centre for Disease Prevention and Control. (December 2020). Rapid increase of a SARS-CoV-2 variant with multiple spike protein mutations observed in the United Kingdom, ECDC: Stockholm.
  81. Afzal A. Molecular diagnostic technologies for COVID-19: Limitations and challenges. *J Adv Res* 2020; 26: 149–159. doi: 10.1016/j.jare.2020.08.002
  82. Alfano G, Ferrari A, Fontana F, et al. Hypokalemia in patients with COVID-19. *Clin Exp Nephrol* 2021; 25: 401–409. <https://doi.org/10.1007/s10157-020-01996-4>
  83. Chen D, Li X, Song Q, et al. Assessment of hypokalemia and clinical characteristics in patients with coronavirus disease 2019 in Wenzhou, China. *JAMA Network Open*. 2020; 3(6): e2011122. doi:10.1001/jamanetworkopen.2020.11122



GLOBAL JOURNAL OF MEDICAL RESEARCH: K  
INTERDISCIPLINARY  
Volume 21 Issue 4 Version 1.0 Year 2021  
Type: Double Blind Peer Reviewed International Research Journal  
Publisher: Global Journals  
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

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

By Liliana Acero

*Federal University of Rio de Janeiro (UFRJ)*

**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*



*Strictly as per the compliance and regulations of:*



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## Brazilian Patient Organizations Reg Medicine

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.

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

### 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 knowledges' 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

*Author:* Visiting Senior Foreign Professor at the Postgraduate Program on Public Policies, Strategies and Development (PPED), at the Institute of Economics (IE), of the Federal University of Rio de Janeiro (UFRJ). e-mail: lilianaacero2009@gmail.com

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.<sup>1</sup>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<sup>2</sup> 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,<sup>3</sup> 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

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

Source: Reformulated by the author, following Jasanoff (2005, p. 259).

### 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,<sup>4</sup> 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 publics 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](http://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](http://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, Agreli 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 substantively 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" (Dominguez 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>).<sup>5</sup> 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/Abrasta 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. Abrale 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; McMahan, 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. *Revista Jeito 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.<sup>6</sup> (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 Lebercongenital 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 an experiment with stem cells for the retina to treat pigmentary retinopathy. . . . 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”<sup>7</sup>(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 GBECF).

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 vacuums 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 'biosociabilities' 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.

## ACKNOWLEDGEMENTS

Many thanks are due to Prof. Maria Tereza Leopardi and Prof. Ana Celia Castro, Coordinator and Vice-coordinator of the Postgraduate Program on Public Policies, Strategies and Development (PPED), at the Institute of Economics (IE), of the Federal University of Rio de Janeiro (UFRJ), for their support of my work as Senior Foreign Visiting Professor and to the National Institute of Science and Technology on Public Policies, Strategies and Development (INCT/PPED) as Coordinator of a research project of the research program "Disarticulation and Reconstruction of State Policies and Capacities in a Post Pandemic World" (INCT-PPED/IPEA). I would also like to thank the IE/UFRJ graduate-level student Leonardo Bueno, for conducting most of the interviews with patient organization representatives and transcribing their responses.

## REFERENCES RÉFÉRENCES REFERENCIAS

1. Acero, L (2010 a) Debatendo as pesquisas com células-tronco no Brasil e no Reino Unido *Revista DADOS* 54(4): 120-135.
2. Acero, L, (2010 b) Science, public policy and engagement: Debates on stem cell research in Brazil. *Genomics, Society and Policy* 6 (3): 1–17.
3. Acero, L, (2011a) Pesquisas e Terapias com Células-Tronco: Visões Sociais e o Debate no Brasil. Rio de Janeiro: E-Papers.
4. Acero, L (2011b) Pesquisas com Células-Tronco no Brasil: Perspectivas do Progresso Científico e dos

- Conhecimentos Especializados e Leigos. *Revista Brasileira de Ciência, Tecnologia e Sociedade* 2 (2): 100–129.
5. Acero, L (2019) Regulação internacional e governança na medicina regenerativa: trajetórias do Reino Unido e a União Europeia e repercussões para a saúde coletiva global. *OIKOS* 18(2): 82–95.
  6. Acero, L (2020 a) Uma análise de matérias televisivas em ciência: o caso da medicina regenerativa no Brasil. *Revista Tecnologia e Sociedade* 16 (45): 76-91.
  7. Acero, L (2020 b) Enquadramentos na medicina regenerativa: os relatos recentes na imprensa brasileira *Revista Eletrônica de Comunicação, Informação e Inovação em Saúde (RECIIS)* 14(4): 942-959.
  8. Acero, L (2020 c) Qualidade das notícias em ciência e medicina: a imprensa na medicina regenerativa no Brasil. *Desenvolvimento em Debate* 8(1):195–213.
  9. Agreli, H., Peduzzi, M and Silva MC. (2016) Atenção centrada no paciente na prática interprofissional colaborativa. *Interface-Comunicação* 20 (59). <https://doi.org/10.1590/1807-57622015.0511>
  10. Araujo Aureliano, W. (2018) Trajetórias Terapêuticas Familiares: doenças raras hereditárias como sofrimento de longa duração. *Ciência e Saúde Coletiva* 23 (2). <https://doi.org/10.1590/1413-81232018232.21832017>
  11. Biernack, P. and Waldorf, D.(1981) Snowball Sampling: Problems and techniques of Chain Referral Sampling. *Sociological Methods & Research* 2: 141-163.
  12. Blume, S. (2000). Land of hope and glory. Exploring cochlear implantation in the Netherlands. *Science, Technology & Human Values*, 25(2), 139–166.
  13. Bonfada D, Cavalcante, J., Araujo, D. and Guimarães, J. (2012) A integralidade da atenção à saúde como eixo da organização tecnológica nos serviços. *Ciência e Saúde Coletiva* 2012; 17(2): 555-60.
  14. Bonnie, R., Shirk, J. Phillips, T. Wiggins, A. et.al. (2014) Next Steps for Citizen Science. *Policy Forum. Science* 343: 1436-1437.
  15. Borkman, T. (1976). Experiential knowledge: A new concept for the analysis of self-help groups. *Social Science Review*, 50, 445–455.
  16. Borkman, T. (1997). A selective look at self-help groups in the United States. *Health and Social Care in the Community*, 5, 357–364.
  17. Brasil (2014) Política Nacional de Atenção Integral às Pessoas com Doenças Raras, Portaria nº 199, Diário Oficial da União, 12 February.
  18. Bussu, S., Davis, H. and Pollard, A. (eds.) (2014) *The best of Sciencewise reflections on public dialogue*. London: Sciencewise.
  19. Callon, M., Lascoumes, P. and Barthe, Y. (2001). *Agir dans un monde incertain. Essai sur la démocratie technique !*. Paris: Seuil.
  20. Callon, M. (2003). The increasing involvement of concerned groups in R&D policies: What lessons for public powers? In Geuna, A., Salter, A., & Steinmueller, E. (eds.), *Science and innovation: Rethinking the rationales for funding and governance*. pp. 30–68. Aldershot: Edward Elgar.
  21. Callon, M., Lascoumes, P. and Barthe, Y. (2011) *Acting in an Uncertain World: An Essay on Technical Democracy*. Cambridge, MA: MIT Press.
  22. Caulfield, T. and McGuire, A. (2012) Athletes’ use of unproven stem cell therapies: Adding to inappropriate media hype? *Molecular Therapy* 20 (5) 1656-1658.
  23. Cavalcante, R., Calixto, P. and Pinheiro, M. (2014) ANÁLISE DE CONTEÚDO: considerações gerais, relações com a pergunta de pesquisa, possibilidades e limitações do método. *Informação & Sociedade* 24 (1) 13-18.
  24. Collins, H.M. and Evans, R. (2002) *The Third Wave of Science Studies: Studies of Expertise and Experience*. *Social Studies of Science*, 32 (2): 25-96.
  25. Collins, HM., Evans, R. and Winel, M.(2017) STS as science or politics? *Social Studies of Science* 47 (4): 580-586.
  26. Cribb, A. (2011) *Involvement, Shared Decision-Making and Medicines*. London: Royal Pharmaceutical Society.
  27. Dickenson, D. and Darnovsky, M. (2019) Did a permissive scientific culture encourage the ‘CRISPR babies’ experiment? *Nature Biotechnology* 37: 355–357.
  28. Dominguez de Lima, M., Gilbert, A. and Horovitz, D. (2018) Redes de tratamento e as associações de pacientes com doenças raras *Ciência e Saúde Coletiva* 23 (10) <https://doi.org/10.1590/1413-812320182310.14762018>
  29. Dresser, R. (2001). *When science offers salvation. Patient advocacy and ethics*. Oxford: Oxford University Press.
  30. Dubbin, L.A., Chang, JS. and Shim, JK. (2013) Cultural health capital and the interactional dynamics of patient-centered care. *Social Science & Medicine* 93: 113–120.
  31. Epstein, S. (1995). The construction of lay expertise: AIDS activism and the forging of credibility in the reform of clinical trials. *Science, Technology & Human Values* 20: 408–437.
  32. EGE (2015) *The ethical implications of new health technologies and citizen participation Opinion* 29. Bruselas: European Union.
  33. European Organization for Rare Disease – EORD (2005) *Rare diseases: understanding this Public Health Priority*. Available at: <https://www.eurordis>.



- org/pt-pt/publication/rare-diseases-understanding-public-health-priority, accessed 10 January 2021.
34. Farmer, P. (2005) *Pathologies of power: Health, Human Rights and the New War on the Poor*. Berkeley: University of California Press.
  35. Faulkner, A. (2016) Opening the gateways to market and adoption of regenerative medicine? The UK case in context. *Journal of Regenerative Medicine and Tissue Engineering* 11 (3): 321-330.
  36. Gardner, J. (2017) Patient-centered medicine and the broad clinical gaze: Measuring outcomes in pediatric deep brain stimulation. *BioSocieties* 12: 239–256.
  37. Haraway, D. (1988) Situated knowledges: the science question in feminism and the privilege of partial perspective. *Feminist Studies* 14 (3): 575-599. Available at: <https://doi.org/10.2307/3178066>, access 15 June 2019.
  38. Horovitz D et al (2013) Genetic services and testing in Brazil. *Journal of Community Genetics* 4(3): 355-375.
  39. Horst, M. and Michael, M. (2011) On the shoulders of idiots: Re-thinking science communication as 'event'. *Science as Culture* 20 (3): 283–306.
  40. Irwin, A. (1995), *Citizen Science: A Study of People, Expertise and Sustainable Development*, Londres: Routledge (Environment and Society).
  41. Irwin, A. and Wynne, B. (eds.) (2003) *Misunderstanding Science?: The Public Reconstruction of Science and Technology* Cambridge: Cambridge University Press.
  42. Irwin, A. Jensen, T. and Jones, K. (2013) The good, the bad and the perfect: Criticizing engagement practice. *Social Studies of Science* 43: 118–135.
  43. Keating, P. and Cambrosio, A. (2003). *Biomedical Platforms. Realigning the Normal and the Pathological in Late-Twentieth-Century Medicine*. Cambridge MA: MIT Press.
  44. Kobori, H., Dickinson, J., Washitani, I. and Sakurai, R. et.al. (2016) Rushing Citizen science: a new approach to advance ecology, education, and conservation *Ecological Research* 31: 1–19.
  45. Leach, M., Scoones, I. and Wynne, B. (eds.) (2005), *Science and Citizens: Globalization and the Challenge of engagement*, London: Zed Books.
  46. Liberati, E.G., Gorli, M. Moja, L. and Galuppo, L. et.al. (2015) Exploring the practice of patient centered care: The role of ethnography and reflexivity. *Social Science & Medicine* 133: 45–52.
  47. MacGowan, M., Choudhury, S., Juengst, E. and Lambrix, M. (2016) Let's pull these technologies out of the ivory tower: The politics, ethos, and ironies of participant-driven genomic research. *BioSocieties* 12: 494–519.
  48. Macnaghten, P. and Chilvers, J. (2013) The future of science governance: Publics, policies, practices. *Environment and Planning C: Government and Policy* 32:530-548. doi: 10.1068/c1245j
  49. Mazanderani, F., Kelly, J. and Ducey, A. (2018) From embodied risk to embodying hope: Therapeutic experimentation and experiential information sharing in a contested intervention for Multiple Sclerosis. *Biosocieties* 13 (1): 232–254.
  50. McMahon, D. (2014) The global industry for unproven stem cell interventions and stem cell tourism *Tissue Engineering and Regenerative Medicine* 11: 1–9.
  51. Mead, N. and Bower, P. (2000) Patient-centredness: a conceptual framework and review of the empirical literature. *Social Science & Medicine* 51: 1087- 1110.
  52. Meira, J. and Acosta, A. (2009) Políticas de saúde pública aplicadas à genética médica no Brasil. *Revista de Ciência médica e biológica* 8(2):189-197
  53. Ministério da Saúde (MS) (2009). Política Nacional de Atenção Integral em Genética Clínica. Portaria nº 81, Diário Oficial da União; 21 January.
  54. Ministério da Saúde (MS) (2015) Priorização de Protocolos e Diretrizes Terapêuticas para Atenção Integral às Pessoas com Doenças Raras. Comissão Nacional de Incorporação Tecnologias no SUS. Relatório 142. Brasília: MS.
  55. NHS (2013) *The NHS Constitution: The NHS Belongs to Us All*. London: Crown.
  56. Novas, C. (2008) Patients, profits and values: myozyme as an exemplar of biosociality. In: Gibbon, S. , Novas, C. (eds.) *Biosocialities, genetics and the social sciences.: making biologies and identities*. London: Routledge.
  57. Novas, C (2012) Orphan Drugs, Patient Activism and Contemporary Healthcare, *Quaderni* 68 (online) Available at: <http://quaderni.revues.org/262>, accessed 24 January 2021.
  58. Nowotny, H., Scott,I. and Gibbons,S.(2001). *Re-thinking science: Knowledge and the public in an age of uncertainty*. Cambridge: Polity Press, Blackwell Publishers.
  59. Nunez Moreira, M, Nascimento, M. Horovitz, D. and Martins, A. et.al. (2018)Quando ser raro se torna um valor: o ativismo político por direitos das pessoas com doenças raras no Sistema Único de Saúde. *Cadernos de Saúde Pública* 34 (1) 05 • <https://doi.org/10.1590/0102-311X00058017>
  60. Pierret, J. (2003). The illness experience. *State of knowledge and perspectives for research. Sociology of Health & Illness*, 25(3), 4-22.
  61. Pinto,D. et. al. (2018) Chasing cures: Rewards and risks for rare disease patient organizations involved in research. *Biosocieties*, 13 (1):123–147.
  62. Rabeharisoa, V. (2003) The struggle against neuromuscular diseases in France and the emergence of the "partnership model" of patient

- organization. *Social Science & Medicine* 57: 2127–2136.
63. Rabeharisoa, V., Moreira, T. and Akrich, M. (2014) 'Evidence-based activism: patients' organizations, users' and activist's groups in knowledge. *BioSocieties.*, 9 (2). pp. 111-128.
  64. Rabinow, P.(1996) Artificiality and enlightenment: From sociobiology to biosociality. In: Rabinow, P.(ed.) *Essays on the anthropology of reason*. Princeton, NJ, Princeton University Press, pp. 91-107.
  65. Savaget, P. and Acero, L. (2017), Plurality in understandings of innovation, sociotechnical progress and sustainable development. An analysis of OCDE expert narratives. *Public Understanding of Science* 46: 1-18.
  66. Salter, B., Zhou,Y. and Datta, S. (2015) Hegemony in the marketplace of biomedical innovation: consumer demand and stem cell science. *Social Science & Medicine* 131: 156–163.
  67. Souza C. (2006) Políticas públicas: uma revisão da literatura. *Sociologias*; 8: 20-45.
  68. Souza Soares, J. andDeprá, A. (2012) Ligações perigosas: indústria farmacêutica, associações de pacientes e as batalhas judiciais por acesso a medicamentos *Physis, Revista de Saúde Coletiva* 22(1): 311-329.
  69. Stirling, A (2008) 'Opening up' and 'closing down': Power, participation, and pluralism in the social appraisal of technology. *Science, Technology & Human Values* 33: 262–294.
  70. Van Zwanenberg, P. and Millstone, E. (2005) *BSE: risk, science, and governance*. Oxford: Oxford University Press.
  71. Webster, A. and Wyatt, S. (eds.) (2020) *Health, Technology and Society: Critical Enquiries*. Basingstoke: Palgrave Macmillan.
  72. Wicks, P., Thorley, E. and Simacek, K. et.al. (2018) Scaling Patients LikeMe via a "Generalized Platform" for Members with Chronic Illness: Web-Based Survey Study of Benefits Arising. *Journal of Medical Internet Research* 20 (5)e175.
  73. Williams, S. and Calnan, M. (1996), 'The "Limits" of Medicalization?: Modern Medicine and the Lay Populace in " Late" Modernity,' *Social Science and Medicine*, 42 (12): 1609-20.
  74. Wynne, B. (1993) Public uptake of science: A case for institutional reflexivity. *Public Understanding of Science* 2(4): 321–337.
  75. Wynne, B. (1995), 'Public Understanding of Science', in Jasanoff, S., Markle, G. Perterson, J. and Pinch, T. (eds.), *Handbook of Science and Technology Studies*, Thousand Oakes, CA: Sage.

<sup>1</sup> In contractual projects, communities ask professionals to develop a specific project and report on its results; contributive projects are designed by scientists together with members of the lay public who contribute data; in collaborative projects, lay publics participate with information, design refinement, analysis, and dissemination of results; co-created projects are designed jointly by researchers and lay people, the latter actively engaging in all project aspects; in collegiate projects, individuals without recognized scientific credentials develop research independently.

<sup>2</sup> This is defined as the act of tertiarization to a big group of undefined people; this is work that used to be carried out by a specifically defined agent.

<sup>3</sup> This perspective anticipates and evaluates the potential social implications of and expectations concerning research and innovation with the aim of promoting the design of sustainable and inclusive research and innovation. [Available at: <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>, accessed 18 January 2021].

<sup>4</sup> The identification of the patient organizations concerned with rare diseases was carried out by the NGO Cure Tay-Sachs Brasil (<https://curetay-sachsbrasil.org>) and developed by the researcher Hannah Ramos with the National Institute of Science and Technology (INCT/ PPED).

<sup>5</sup> The Brazilian Association of Muscular Dystrophy (ABDIM), which is not part of the Latin Alliance, carries out some of the most important activities related to RM among patient associations in Brazil.

<sup>6</sup> The public agencies mentioned here – the National Commission for the Incorporation of Technologies to SUS (CONITEC), the National Agency of Supplemental Health (ANS), the National Council of Health (CNS) and the Consultation Council of the National Institute of Cancer (INCA) (Consinca) – reserve seats for patient participation.

<sup>7</sup> This refers to the clinical resolution of ANVISA from 2012 (RDC 36), which established that the institution responsible for the clinical trial must offer financial assistance to the trial subjects even after the clinical research has ended; assistance with expenses, notably a transport and a per diem allowance, was often previously provided by patient organizations.



GLOBAL JOURNAL OF MEDICAL RESEARCH: K  
INTERDISCIPLINARY

Volume 21 Issue 4 Version 1.0 Year 2021

Type: Double Blind Peer Reviewed International Research Journal

Publisher: Global Journals

Online ISSN: 2249-4618 & Print ISSN: 0975-5888

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

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**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 HFs (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



REACHINGWOMENANDNEWBORNSWITHMULTIDISCIPLINARYSPECIALIZEDCAREVIAWHATSAPPINTERACTIONADONEYEARSEXPERIENCEFROMTANZANIA

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

Ahmad Mohamed Makuwani <sup>α</sup>, Dr. Regine Unkels <sup>σ</sup>, Zamoyoni Julius <sup>ρ</sup>, Habibu Ismail <sup>ω</sup>, Rachel Nathaniel Manongi <sup>¥</sup>, Martin Kaunda Magogwa <sup>§</sup>, Naibu Mkongwa <sup>x</sup>, Faraja Mgeni <sup>v</sup>, Grace Mariki <sup>θ</sup>, Jacquelline Ndashau <sup>ζ</sup>, Leonard Maduhu Subi <sup>£</sup>, Abel Makubi <sup>€</sup>, Muhammad Bakari Kambi <sup>ƒ</sup> & Ulisubisya Mpoki Mwasumbi <sup>ē</sup>

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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.

**Corresponding Author α:** Ministry of Health, Community Development, Gender, Elderly and Children. e-mail: amakuwani@gmail.com

**Author ω § χ v θ ζ £ € ƒ ē:** Ministry of Health, Community Development, Gender, Elderly and Children.

**Author σ:** Ifakara Health Institute.

**Author ρ:** Muhimbili University of Health and Allied Science.

**Author θ:** Karolinska Institute.

**Author ¥:** Kilimanjaro Christian Medical University College.

## 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 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.

Anonymous clinical 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

Health zones	Regions for each zone	WhatsApp Consultation No. of words
North	Kilimanjaro, Arusha and Tanga	14,952
Southern	Mtwara and Lindi	127,635
Western	Kigoma and Tabora	14,650
Eastern	Pwani and Morogoro	70,165
Central	Dodoma, Manyara, Singida	91,522
Southern Highland	Iringa, Njombe and Ruvuma	23,039

South West	Mbeya, Songwe, Rukwa and Katavi	65,259
Lake	Mwanza, Shinyanga, Simiyu, Kagera, Mara, Geita	210,663
Dar Es Salaam	Kinondoni, Mwananyamala and Temeke Municipals	24,599
<b>Total</b>		642,484
No. of words	Median	65,259

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

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

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 2: 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 semiarid in my opinion, you may worsen the situation.

Obstetrician 2: You need to move fast for laparotomy 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 laparotomy 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 were at the health centre and life was saved.*

The MWG National Blood Transfusion Service (NBTS) program has been in the spotlight regarding management of patients through technical support on appropriate use of blood and blood products. The Program tirelessly ensures availability of highly needed expertise, blood and blood products to save lives.

**DZ 090718** *One morning an obstetrician in hospital shouted for support to have an adequate blood supply for a patient who had ruptured uterus. The request via WhatsApp group provided a good response with members offering technical support and supply of highly needed blood from neighbour health facilities to save life of the patient.*

The MWGs have observed improvement in the quality of referrals with multidisciplinary participation and joint decision making at various levels.

**SZ231218** *Through the group, the team further experienced a coordinated referral between RHTM, CHMT, Faith Based HFs, HCPs and with technical input from National Hospital for a patient with peripartum cardiomyopathy, enabling safe referral to National Medical Centre. The hospital offered human resource and ambulance while the CHMT supported with fuel for the ambulance and daily subsistence allowances for escorting medical staff and driver.*

b) *Mentoring of skilled HCPs in real cases*

In the developing world there is a huge challenge in mentoring and coaching 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).

**MPZ 170718:** *A patient was prescribed for an emergency Caesarean section due to eclampsia. Surgeon and other staff were ready for the procedure but the anaesthetist felt that the condition of patient required more expertise hence a need for referral to a regional referral hospital. Therefore, an Anaesthesiologist from Muhimbili National Hospital was consulted via MWG and then a conference call was set between the two. Through the call, the anaesthetist was supported in providing general anaesthesia under supervision of the anaesthesiologist from remote location. This CS ended uneventful with good outcome for both mother and newborn.*

MWGs demonstrated successful mentorship and coaching in management of complicated PPH with DIC, abruptio placentae, 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 crystalloid 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).



**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 fetus, 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, anaesthesiologists 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:-

#### Limitations

Use of MWGs were limited by 6 major issues;

- i. Lack of guidelines in clinically related telemedicine caused HCP to have some reservations on the use of the technology.
- ii. The experts, not belonging to the HFs, had little control of the execution of final decisions.
- iii. The intervention was voluntary and depended on personal motivation.
- 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.
- v. The MWGs were limited to 256 participants.
- vi. The importance of this unconventional way of consultation may not be considered as equally important by policy makers.

## 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

1. Trends in maternal mortality: 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2019.
2. Bailey P, Lobis S, Maine D, Fortney JA. Monitoring emergency obstetric care: a handbook: World Health Organization; 2009.
3. Bhandari T, Dangal G. Emergency obstetric care: Strategy for reducing maternal mortality in developing countries. *Nepal Journal of Obstetrics and Gynaecology*, 2014; 9, 8-16.
4. Ansari MS, Manzoor R, Siddiqui N, Ahmed AM. Access to comprehensive emergency obstetric and newborn care facilities in three rural districts of Sindh province, Pakistan. *Health Research Policy and Systems*. 2015; 13(1):S55.
5. Singh A, Mavalankar DV, Bhat R, Desai A, Patel SR, Singh PV, et al. Providing skilled birth attendants and emergency obstetric care to the poor through partnership with private sector obstetricians in Gujarat, India. *Bull World Health Organ*. 2009; 87(12):960-4.
6. Yakoob MY, Ali MA, Ali MU, Imdad A, Lawn JE, Van Den Broek N, et al. The effect of providing skilled birth attendance and emergency obstetric care in preventing stillbirths. *BMC Public Health*. 2011; 11(3): S7.
7. Hussein J, Kanguru L, Astin M, Munjanja S. The Effectiveness of Emergency Obstetric Referral Interventions in Developing Country Settings: A Systematic Review. *PLOS Medicine*. 2012; 9(7): e1001264.
8. Amani A, Nansseu JR, Mah EM, Vougmo CM, Moluh SM, Mbu R. Use of a social media network to reduce early neonatal mortality: a preliminary report from a quality improvement project in Yaoundé, Cameroon. *Matern Health Neonatol Perinatol*. 2017; 3:26-.
9. Othman M, Menon V. Developing a nationwide spine care referral programme on the WhatsApp messenger platform: The Oman experiment. *International journal of medical informatics*. 2019; 126:82-5.
10. Koparal M, Ünsal HY, Alan H, Üçkardeş F, Gülsün B. WhatsApp messaging improves communication in an oral and maxillofacial surgery team. *International journal of medical informatics*. 2019; 132:103987.
11. Bakshi SG, Bhawalkar P. Role of WhatsApp-based discussions in improving residents' knowledge of post-operative pain management: a pilot study. *Korean journal of anesthesiology*. 2017; 70(5): 542-9.
12. Clavier T, Ramen J, Dureuil B, Veber B, Hanouz JL, Dupont H, et al. Use of the Smartphone App WhatsApp as an E-Learning Method for Medical Residents: Multicenter Controlled Randomized Trial. *JMIR mHealth and uHealth*. 2019; 7(4):e12825.
13. Global Strategy for Women and Children (2016-2030)
14. United Republic of Tanzania, Ministry of Health, Community Development, Gender, Elderly and Children. Health Sector Strategic Plan IV (2015-2020).
15. United Republic of Tanzania, Ministry of Health, Community Development, Gender, Elderly and Children. The National Roadmap Strategic Plan to Improve Reproductive, Maternal, Newborn, Child and Adolescent Health (2016-2020).

16. United Republic of Tanzania, Ministry of Health, Community Development, Gender, Elderly and Children. Human Resource Information System Report, 2019.
17. Ueno E, Adegoke AA, Masenga G, Fimbo J, Msuya SE. Skilled birth attendants in Tanzania: a descriptive study of cadres and emergency obstetric care signal functions performed. *Maternal and child health journal*. 2015; 19(1):155-69.
18. Harvey SA, Blandón YC, McCaw-Binns A, Sandino I, Urbina L, Rodríguez C, et al. Are skilled birth attendants really skilled? A measurement method, some disturbing results and a potential way forward. *Bull World Health Organ*. 2007; 85(10):783-90.
19. Muganyizi PS, Maswanya E, Kilima S, Stanley G, Makuwani AM, et al. Availability, Coverage and Geographical Distribution of Emergency Obstetric and Neonatal Care Services in Tanzania Mainland. *Journal of Gynaecological and Obstetrics* 2017; 5(1): 1-8.
20. Crossman A. "Understanding Functionalist Theory." 2020, February 11 accessed August 12, 2020. Available from: <https://www.thoughtco.com/functionalist-perspective-3026625>.
21. Crossman A. "Definition and Overview of Grounded Theory." August 12, 2020. Available from: <https://www.thoughtco.com/grounded-theory-definition-3026561>.
22. Wilcox ME, Adhikari NKJ. The effect of telemedicine in critically ill patients: Systematic Review and Metaanalysis. *Crit Care*. 2012; 16: R27.
23. Vranas KC, Slatore CG, Kerlin MP. Telemedicine coverage of Intensive Care Units. A narrative review. *Ann Am Thoracic Soc*. 2018; 15: 1256 - 1264.
24. Kahn JM, Rak KJ. Determinants of Intensive Care Unit Telemedicine Effectiveness. An Ethnographic Study. *Am J Respir Crit Care Med*. 2019; 199: 970 - 979.
25. Singh A, Roy A, Goyal P. Telemedicine and telehealth- The Indian scenario. *Journal of Integrated Health Science*. 2016; 4: 3-8.
26. Woods J, Moorhouse M, Knight L. A descriptive analysis of the role of a WhatsApp clinical discussion group as a forum for continuing medical education in management of complicated HIV and TB clinical cases in a group of doctors in Eastern Cape, South Africa. *South Afr HIV Med*. 2019; 20: 982.
27. Benedicts AD, Lettieri E. WhatsApp in hospital? An empirical investigation of individual and organizational determinant to to use. *Plos One*. 2019; 14: e0209073



GLOBAL JOURNAL OF MEDICAL RESEARCH: K  
INTERDISCIPLINARY  
Volume 21 Issue 4 Version 1.0 Year 2021  
Type: Double Blind Peer Reviewed International Research Journal  
Publisher: Global Journals  
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

# 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*



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

Ayo Osisanya <sup>α</sup>, Adewumi A. Ojetoyinbo <sup>ο</sup> & Olusola Olatunde <sup>ρ</sup>

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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. INTRODUCTION

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

*Corresponding Author α:* Speech Pathology and Audiology Unit, Department of Special Education, University of Ibadan, Ibadan, Nigeria.  
e-mail: ayoosisanya@gmail.com  
*Author ο ρ:* National Hospital, Abuja, Nigeria.

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. Moller (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, hyperlipidemia, 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, Brandloni, 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 Adegbenro, Amusa, Ijadunola 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 (Doeck 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 asides 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 Meddis (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 anxiety and depression is reported among those who are diagnosed with the condition (Zoger, Svedlund and Holgers, 2006; Falkenberg and Wie, 2012). Folmer, Griest and Martin (2001), Wilson and Henry (2001), Sweetow (2000), and Falkenberg and Wie (2012) have demonstrated that consequences of chronic pain and tinnitus are similar, as emotional effects, reduced work performance, interpersonal problems, and decreased opportunities to previously enjoyed activities. The psychosocial reactions to tinnitus are so common that the majority of the therapies which have become prominent and grown to be accepted usually infuse psychotherapy techniques so as to solve the comorbid psychological issues. A considerable number of tinnitus patients usually relate tinnitus to significant changes in their lives ranging from divorce, being laid off, sickness in the family, accidents or having surgery (Falkenberg, Tunglund and Skollerud, 2003).

Data regarding the psychosocial reactions to tinnitus vary across the globe. Findings from the research work of Zoger, Svedlund and Holgers (2006) show that 10 to 70% suffer from depressive disorder and 28 to 49% have anxiety symptoms while another study (Sullivan, Katon, Dobie, Sakai, Russo and Harrop-Griffiths, 1988) shows that 47 to 78% of the patients with chronic tinnitus met the criteria for one or more psychiatric disorders. Sleep disturbance is another condition which has been noticed among a considerable number of persons with tinnitus which might lead to distress in daily life and social function (Sanchez and Stephens, 1997; Jang and Yi, 2016). 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 Olatunde, 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 sensitise 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

### Answering Research Questions

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

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 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

Table 1: Prevalence of Elderly Individuals with Tinnitus

Variables	Frequency	Percentage
<b>Gender</b>		
Male	520	54.2%
Female	440	45.8%
Total	960	100%
Variables	Frequency	Percentage
<b>Age</b>		
50-60	418	43.5%
70 and above	542	56.5%
Total	960	100%

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 70years of age. This indicates that elderly with tinnitus who were above 70years 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

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
Conductive hearing loss	208	22
Sensorineural hearing loss	680	71
Mixed hearing loss	72	7
<b>Total</b>	<b>960</b>	<b>100</b>

<b>Degrees of hearing loss</b>		
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
Mild	86	9
Moderate	226	23
Moderately-severe	436	45
Severe	212	28
<b>Total</b>	<b>960</b>	<b>100</b>

<b>Patterns of Hearing loss</b>		
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
Flat	96	10
Sloping	88	9
Rising	116	12
NIHL	288	30
U shape	36	4
High Frequency	336	35
<b>Total</b>	<b>960</b>	<b>100</b>

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?

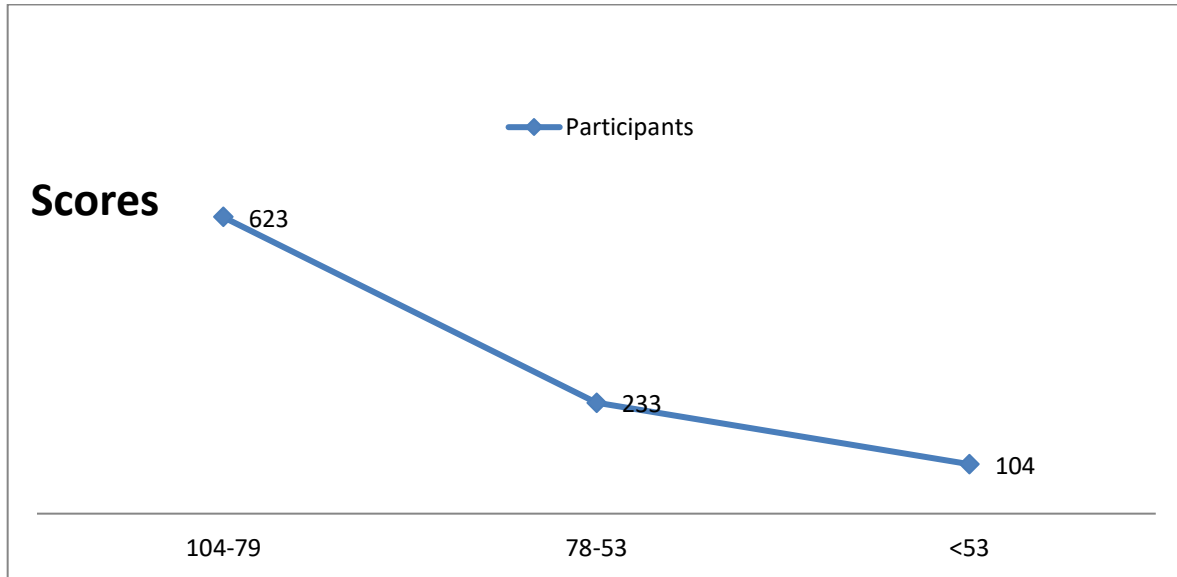


Figure 1: Tinnitus Reactions of Elderly Individuals with Tinnitus in Southwestern, Nigeria Using Tinnitus Reaction Questionnaire

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 223(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.

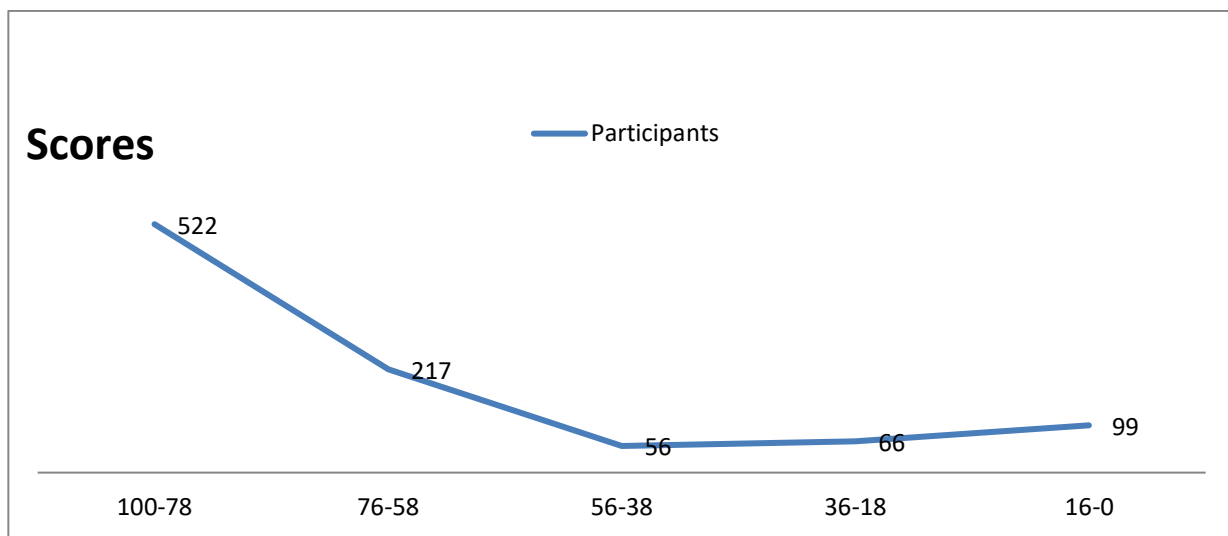


Figure 2: Showing psychosocial reaction of elderly individuals with tinnitus in Southwestern, Nigeria using tinnitus handicap questionnaire.

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

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

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 interfere 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 also corroborates that of McCormack et. al (2014), which showed higher risk and prevalence of tinnitus as age increases. The finding of this study however negates Teixeira, Rosito, Gonçalves, Nunes, Dornelles and Olchik’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, Szczeppek (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 the tinnitus participants assessed 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 Sarafoleanu (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.

## VII. CONCLUSION

The study was carried out to examine psychosocial reaction and hearing profile of elderly tinnitus in Southwestern Nigeria. The study observed that a predominantly high frequency hearing diagnosis among the respondents hence supporting the findings of similar research. The study also established that tinnitus impacts the hearing perception of the affected person as the findings revealed decline in the hearing ability of the respondents. The study concluded that elderly individuals with tinnitus experience bouts of psycho-

social reaction to their condition hence necessitating the need for tinnitus therapy coupled with counseling.

## 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

1. Adegbenro, C. A., Amusa, Y.B., Ijadunola, I. K. T., Adeyemo, A. (2013). Prevalence of tinnitus among Nigerians. *Journal of Community Medical Health Education*, 3(200). doi:10.4172/2161-0711.1000200
2. Adoga, A. A., Adoga, A. S. and Obindo, J. T. (2008). Tinnitus and the prevalence of comorbid psychological stress. *Nigeria Journal of Medicine*. 17(1): 95-97.
3. American Tinnitus Association (2020). Understanding. Retrieved on May 15, 2020 from <https://www.ata.org/understanding-facts/causes>
4. Baguley D. M., Williamson, C. A. and Moffat, D. A. (2006). Treating tinnitus in patients with otologic conditions. In: Tyler R. S. Tinnitus treatment. New York: Thieme; 41-50.
5. Basaraba, S. (2020). Tinnitus in older people. What causes ringing in your ears as you age? Retrieved on May 15, 2020 from <https://www.verywellhealth.com/tinnitus-in-older-people-2223696>.
6. Borghi, C., Cosentino, E. R., Rinaldi, E. R., Brandloni, C., Rimondi, M. C... (2011). Tinnitus in elderly patients and prognosis of mild-to-moderate congestive heart failure: a cross sectional study with a long-term extension of the clinical follow-up. *BioMed Central*, 9:80.
7. Brunger K. (2008). Managing tinnitus. *Journal of Family Health Care*, 18:47-48.
8. Davis, A. and Davis, K. A. (2009). Epidemiology of aging and hearing loss related to other chronic illnesses. *Hearing Care for Adults*. London Whurr. 23-32.
9. Davis, A.C. (1989). The prevalence of hearing impairment and reported hearing disability among adults in Great Britain. *International Journal Epidemiology*; 18: 911-917.

10. Douek, E and Reid, J. (1968). The diagnostic value of tinnitus pitch. *Journal of Laryngology and Otolaryngology*; 82: 1039-1042.
11. Ehrenfeld, T. (2019). Tinnitus and hearing loss: what's the connection? Retrieved on May 15, 2020 from <https://www.healthyhearing.com/report/53029-Tinnitus-and-hearing-loss>
12. Engineer, N., Riley, J., Seale, J., Vrana, W. A., Shetake, J. A. (2011). Reversing pathological neural activity using targeted plasticity. *Nature*, 470, 101-104.
13. Falkenberg, E. and Wie, O. (2012). Anxiety and depression in tinnitus patients: 5-year follow-up assessment after completion of habituation therapy. *International Journal of Otolaryngology*, doi: 10.1155/2012/375460
14. Falkenberg, E. S., Tunglund, O. P. and Skollerud, S. (2003). Habituation therapy of chronic distressing tinnitus: a presentation of a treatment programme and an evaluation study of its effects. *Audiological Medicine*, 1, 2, 132–137.
15. Folmer, R. L. Griest, S. E. and Martin, W. H. (2001). Chronic tinnitus as phantom auditory pain," *Otolaryngology, Head and Neck Surgery*, 124, 4, 394–399.
16. Goh, J. O. and Park, D. C. 2009. Neuroplasticity and cognitive aging: the scaffolding theory of aging and cognition. *Restorative Neurology and Neuroscience*, 27: 391–403.
17. Haider, H. F., Flook, M. Aparacio, M. Ribeiro, D., Marilla, A Szczepek, A. J. (2017). Biomarkers of presbycusis and tinnitus in an older portugese older population. *Aging neuroscience*.
18. Han, B. I., Lee, H. W., Kim, T. Y., Lim, J. S. and Shin, K. S. (2009). Tinnitus: Characteristics, causes, mechanisms, and treatments, *Journal of clinical neurology*, 5(1), 11-19.
19. Hear-it. (2020). A connection between tinnitus and hearing loss. Retrieved on May 15, 2020 from <https://www.hear-it.org/Close-relationship-between-Tinnitus-and-Hearing-loss>
20. Huang, Q., and Tang, J. (2010). Age related hearing loss or presbycusis. *Archives of otorhinolaryngology*. 267, 1179-1191. doi:10.1007/s00405-010-1270-7
21. Jang, E. and Yi, J. (2016). The role of psychological factors in tinnitus. *Hanyang medical reviews*; 36: 92-98.
22. Jastreboff P. J. (1990). Phantom auditory perception (tinnitus): Mechanisms of generation and perception. *Neuroscience Research* 8: 221–54.
23. Langguth, B., Landgrebe, M., Schlee, W., Schecklemann, M., Vielsmeier, V... (2017). Different patterns of hearing loss among tinnitus patients: A latent class analysis of a large sample. *Frontier Neurology*, 8:46. doi:10.3389/fneur.2017.00046
24. McCormack, A., Edmondson-Jones, M., Fortnum, H., Dawes, P Middleton, H. (2014) The prevalence of tinnitus and the relationship with neuroticism in a middle-aged UK population. *Journal of Psychosomatic research* 56-60
25. Moller, A. (2006). *Hearing: Anatomy, Physiology, and disorders of the auditory system*, 2nd Edition. Burlington, Michigan; Academic Press
26. Møller, A. R. (2011). Introduction. In *Textbook of tinnitus* Møller, A.R., Berthold L., Ridder, D., Kleinjung, T (Eds). New York, Springer
27. National Institute of Health (2017). Tinnitus. Retrieved on May 15, 2020 from <https://www.nidcd.nih.gov/health/tinnitus>
28. Negrila-mezei, A., Enache, R., and Sarafoleanu, C. (2011). Tinnitus in elderly population-clinic correlations and impact upon QoL. *Journal of Medicine*, 4(4) 412-146.
29. Negrilla-Mezei, A., Enache, R., and Sarafoleanu, C. (2011). Tinnitus in elderly population: clinic correlations and impact upon QoL. *Journal of Medical Life*, 4(4): 412-416.
30. Nodar, R.H. (1996). Tinnitus reclassified; new oil in an old lamp. *Otolaryngology Head Neck Surgery*, 114:582-585.
31. Osisanya, A., Ojetoyinbo, A. A, and Olatunde O. (2014). Determination of pulse-synchronous tinnitus and personalogical factors among elderly individuals with idiopathic intracranial hypertension in Nigeria. XI International Tinnitus Seminar Deutsche Tinnitus-Stifung Charite at Berlin, Germany; May 21–24,2014.
32. Osisanya, A. (2019). Audiological Tinnitus Management: An Essential Audiological Protocol for Elderly with Commorbidity of Hypertension and Tinnitus. In *Management of Tinnitus – The Enriching Views of Treatment Options*. Intechopen. Doi: <http://dx.doi.org/10.5772/intechopen.81854>
33. Sanchez L and Stephens D. (1997). A tinnitus problem questionnaire in a clinic population. *Ear Hear*; 18: 210-7.
34. Scott B, Lindberg P: Psychological profile and somatic complaints between help-seeking and non-help-seeking tinnitus subjects. *Psychosomatics* 2000, 41: 347-352.
35. Seimetz, B. M., Teixeira, A. R. Rosito, L. R. S. Flores, L. S. Pappen, C. H., and Dall'igna, C. (2016). Pitch and Loudness Tinnitus in Individuals with Presbycusis *International archive otolaryngology* 20: 321-326
36. Sullivan M. D., Katon, W., Dobie, R., Sakai, C., Russo, J. and Harrop-Griffiths, J. (1988). Disabling tinnitus: association with affective disorder. *General Hospital Psychiatric*; 10: 285-91.
37. Sweetow, R. (2000). Cognitive-behavior modification," in *Tinnitus Handbook*, R. S. Tyler, Ed. 297–311.
38. Sweetow, R. W., Fehll, M., Ramos, P. M. (2015). Do tinnitus patients continue to use amplification and

sound therapy post habilitation? *Hearing review*, 19: 20-7.

39. Tan, C. M. Lecluyse, W., McFerran, D. and Meddis, R. (2013). Tinnitus and Patterns of Hearing Loss. *Journal of the association of research in otolaryngology*. 14: 275–282.
40. Teixeira, A. R. Rosito, L. R. S., Gonçalves, A K., Nunes, M. G. P., Dornelles, S., Olchik, M. R. (2017). Tinnitus in Elderly Individuals: Discomfort and Impact in the Quality of Life. *International archive otolaryngology* 21: 66-71.
41. Vangerwua, B. B. (2019). Widex zen and tinnitus retraining therapies on auditory performance and psychological well-being of persons with tinnitus in Lagos State, Nigeria. University of Ibadan, Unpublished Doctoral Thesis.
42. Wang, T. and Ho, Y. (2019). Introductory Chapter. Management of Tinnitus – The Views of Various Disciplines. In Management of Tinnitus – The Enriching Views of Treatment Options. Intechopen. Doi: [http:// dx.doi.org/10.5772/intechopen.81854](http://dx.doi.org/10.5772/intechopen.81854).
43. Wilson, H. and Henry, J. L. (2000). Psychological management of tinnitus,” in Tinnitus Handbook, R. S. Tyler, Ed. 263–280, Singular Thomsen Learning.
44. Zoger S, Svedlund J, and Holgers K. M. (2006). The effects of sertraline on severe tinnitus suffering, a randomized, double-blind, placebo-controlled study. *Journal of Clinical Psychopharmacology*; 26: 32-9.
45. Zoger, S., Svedlund, J. and Holgers, K. M. (2006). Relationship between tinnitus severity and psychiatric disorders,” *Psychosomatics*, 47, 4, 282–288.





GLOBAL JOURNAL OF MEDICAL RESEARCH: K  
INTERDISCIPLINARY  
Volume 21 Issue 4 Version 1.0 Year 2021  
Type: Double Blind Peer Reviewed International Research Journal  
Publisher: Global Journals  
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

# 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.<sup>1</sup> 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.<sup>2</sup>

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.<sup>3</sup> 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.<sup>4</sup>

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# Progression to Universal Health Coverage- Need for Enhanced Monitoring

Hari Teja Avirneni <sup>α</sup>, Anugraha John <sup>σ</sup>, Sinthu Sarathamani Swaminathan <sup>ρ</sup>

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.<sup>1</sup> 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.<sup>2</sup>

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.<sup>3</sup> 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.<sup>4</sup>

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.<sup>4,5</sup>

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.<sup>6</sup>

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.<sup>7</sup> 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.<sup>8</sup>

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

1. Frenk J and De Ferranti D. Universal health coverage: good health, good economics. *The Lancet* 2012; 380: 4-862.
2. Savedoff WD, De Ferranti D, Smith AL, et al. Political and economic aspects of the transition to universal health coverage. *The Lancet* 2012; 380: 32-924.
3. Xu K, Evans DB, Kawabata K, et al. Household catastrophic health expenditure: a multi-country analysis. *The lancet* 2003; 362: 7-111.
4. Lagomarsino G, Garabrant A, Adyas A, et al. Moving towards universal health coverage: health insurance reforms in nine developing countries in Africa and Asia. *The Lancet* 2012; 380: 43-933.
5. Bennett S, Ozawa S and Rao KD. Which Path to Universal Health Coverage? Perspectives on the World Health Report 2010. *PLoS Med* 2010; 7: e1001.
6. Xu K, Evans DB, Carrin G, et al. Protecting households from catastrophic health spending. *Health affairs* 2007; 26: 83-972.
7. McIntyre D, Thiede M, Dahlgren G, et al. What are the economic consequences for households of illness and of paying for health care in low and middle-income country contexts? *Social Science Medicine* 2006; 62: 65-858.

Corresponding Author <sup>α</sup>: Department of Community Medicine, NRI Institute of Medical Sciences, Visakhapatnam, India.  
e-mail: haritejaavirneni26@gmail.com

Author <sup>σ ρ</sup>: Department of Community Medicine, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, Pondicherry, India.



- World Bank, Washington DC and World Health Organization, Geneva. Tracking universal health coverage: 2017 global monitoring report, <https://www.worldbank.org/en/topic/universalhealthcoverage/publication/tracking-universal-health-coverage-2017-global-monitoring-report> (2017, accessed 5 October 2019)



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All fellows receive the early invitations to all the symposiums, seminars, conferences and webinars hosted by Global Journals in their subject.

Exclusive





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ASSOCIATE OF MEDICAL RESEARCH COUNCIL is the membership of Global Journals awarded to individuals that the Open Association of Research Society judges to have made a 'substantial contribution to the improvement of computer science, technology, and electronics engineering.

The primary objective is to recognize the leaders in research and scientific fields of the current era with a global perspective and to create a channel between them and other researchers for better exposure and knowledge sharing. Members are most eminent scientists, engineers, and technologists from all across the world. Associate membership can later be promoted to Fellow Membership. Associates are elected for life through a peer review process on the basis of excellence in the respective domain. There is no limit on the number of new nominations made in any year. Each year, the Open Association of Research Society elect up to 12 new Associate Members.



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Global Journals sends a letter of appreciation of author to the Dean or CEO of the University or Company of which author is a part, signed by editor in chief or chief author.



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Career

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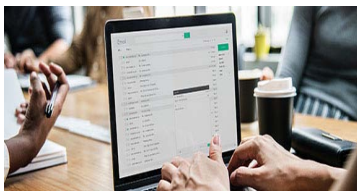
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Career

Financial



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Career

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Reputation



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Associates are authorized to organize symposium/seminar/conference on behalf of Global Journal Incorporation (USA). They can also participate in the same organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent. Additionally, they get free research conferences (and others) alerts.

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Credibility

Financial

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ASSOCIATE	FELLOW	RESEARCH GROUP	BASIC
<p>\$4800 lifetime designation</p> <hr/> <p>Certificate, LoR and Momento 2 discounted publishing/year Gradation of Research 10 research contacts/day 1 GB Cloud Storage GJ Community Access</p>	<p>\$6800 lifetime designation</p> <hr/> <p>Certificate, LoR and Momento Unlimited discounted publishing/year Gradation of Research Unlimited research contacts/day 5 GB Cloud Storage Online Presense Assistance GJ Community Access</p>	<p>\$12500.00 organizational</p> <hr/> <p>Certificates, LoRs and Momentos Unlimited free publishing/year Gradation of Research Unlimited research contacts/day Unlimited Cloud Storage Online Presense Assistance GJ Community Access</p>	<p>APC per article</p> <hr/> <p>GJ Community Access</p>



# PREFERRED AUTHOR GUIDELINES

## **We accept the manuscript submissions in any standard (generic) format.**

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

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Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at [submit@globaljournals.org](mailto:submit@globaljournals.org) or get in touch with [chiefeditor@globaljournals.org](mailto:chiefeditor@globaljournals.org) if they wish to send the abstract before submission.

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Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct*, along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
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Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

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- Ideas
- Findings
- Writings
- Diagrams
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- Illustrations
- Lectures



- Printed material
- Graphic representations
- Computer programs
- Electronic material
- Any other original work

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2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

### Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

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### Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

### Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

### Declaration of funding sources

Global Journals is in partnership with various universities, laboratories, and other institutions worldwide in the research domain. Authors are requested to disclose their source of funding during every stage of their research, such as making analysis, performing laboratory operations, computing data, and using institutional resources, from writing an article to its submission. This will also help authors to get reimbursements by requesting an open access publication letter from Global Journals and submitting to the respective funding source.

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

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



### ***Manuscript Style Instruction (Optional)***

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

### ***Structure and Format of Manuscript***

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

A research paper must include:

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

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

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

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

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



## FORMAT STRUCTURE

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

All manuscripts submitted to Global Journals should include:

### **Title**

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

### **Author details**

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

### **Abstract**

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

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

### **Keywords**

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

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

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

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

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

### **Numerical Methods**

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

### **Abbreviations**

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

### **Formulas and equations**

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

### **Tables, Figures, and Figure Legends**

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



## Figures

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

### PREPARATION OF ELETRONIC FIGURES FOR PUBLICATION

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

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

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

### TIPS FOR WRITING A GOOD QUALITY MEDICAL RESEARCH PAPER

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

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

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

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

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





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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

**23. Upon conclusion:** Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium 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:**

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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.

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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.

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- 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.

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<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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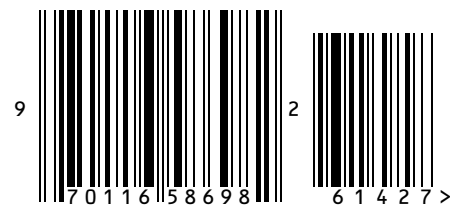
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ISSN 9755896



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