



The Impact of COVID-19 on Hypertension and Hypertension Medication Adherence Among Underrepresented Racial and Ethnic Groups: A Scoping Review

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Abstract

Purpose of Review To conduct a scoping review of articles which examined the impact of COVID-19 on HTN and HTN medication adherence among underrepresented racial/ethnic minorities.

Recent Findings Seven studies were included in this review and impact of COVID-19 was examined at 4 levels: patient, provider, health system and society. The results indicated that patient level factors, such as high unemployment and inequitable access to telemedicine due to society factors- lack of access to high-speed Internet and variation in the offering of telehealth by health systems, were most impactful on adherence. Additionally, provider level clinical inertia may have further impacted adherence to HTN medication.

Summary Our review showed that the COVID-19 pandemic did not introduce new barriers but exacerbated preexisting barriers. Ongoing efforts are needed to change policies at the state and local levels to dismantle inequities in underrepresented communities to ensure access to health care with telemedicine to promote health equity.

Keywords Hypertension · COVID-19 · Medication adherence · Ethnicity · Racial groups

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Introduction

Hypertension (HTN) is the most prevalent modifiable risk factor for cardiovascular disease morbidity and mortality [1]. Racial/ethnic groups, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, and Hispanics [2], have a significantly greater chance of developing HTN than White persons who live in neighborhoods with similar education levels [3, 4]. Under-represented racial/ethnic groups also have disparities in HTN outcomes [5]. Medications for HTN can substantially reduce morbidity and mortality, leading to better health outcomes and lower costs of medical care [6]. While medication adherence is a cornerstone of HTN disease self-management, the effectiveness of medications is limited in cases of medication non-adherence [7]. Nonadherence can be related to non-initiation (failure to start a new prescription), sub-optimal implementation (not taking medication(s) as ordered), or non-persistence (premature discontinuation of medication(s) by the patient) [8, 9]. Nonadherence can additionally be impacted by patient, health team, system, and socioeconomic factors [10, 11].

In the United States (US), the Coronavirus disease 2019 (COVID-19) pandemic disproportionately harmed historically racial/ethnic groups [12, 13]. It disrupted both daily life and routine medical care, including the treatment of chronic diseases, such as HTN [14]. Given the disparities in HTN outcomes in these groups and because racial/ethnic minority status is inextricably associated with lower socioeconomic status in the US, [15] it is important to understand how COVID-19 may have impacted HTN medication adherence. Pre-pandemic research studies suggest that only 50% racial/ethnic minorities diagnosed with HTN adhered to prescribed medication [16–18]. There have been several studies that have discussed how the pandemic has impacted HTN medication adherence [19, 20].

We performed a scoping review to present a global analysis of patient, provider, health system and societal factors that may have impacted HTN medication adherence among racial/ethnic minorities as a result of the COVID-19 pandemic. To our knowledge, no reviews have been published specifically on the impact of COVID-19 on HTN and HTN medication adherence among racial/ethnic minorities in the US. It is critical to understand the impact of COVID-19 on HTN and HTN medication adherence among racial/ethnic groups as such data can serve as a basis for development of interventions and policies to prevent the widening of HTN inequities.

Search Strategy and Data Extraction

Following the Arksey and O'Malley guidelines for Scoping Reviews [21] and the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA-ScR) criteria [22],

we reviewed available articles on HTN and HTN medication adherence among racial/ethnic groups during COVID-19. We searched the following databases, Embase, CINAHL, PubMed and the gray literature (ProQuest Dissertations & Theses Global) between April 2020 and December 2022 using the following terms: Hypertension OR High blood pressure OR Elevated blood pressure OR HTN OR Hypertensive or Blood pressure AND Medication compliance OR Medication adherence OR Initiation OR Implementation OR Discontinuation OR Primary nonadherence OR Secondary nonadherence OR Ethnicity OR Race OR Culture OR Minority OR Minorities OR Disparities AND COVID-19 OR Coronavirus OR 2019-NCov OR SARS-COV-2 OR COV-19. We hand-searched the reference lists of included studies, reviews, commentaries, and other relevant documents to identify eligible papers to include in our review.

The criteria for inclusion in the review were as follows: (1) addressed HTN medication adherence during the COVID-19, (2) racial/ethnic groups with HTN, and (3) were US-based. We included studies that targeted HTN and HTN medication adherence across multilevel factors of influence (i.e., patient, provider, health system, society). We also included studies that targeted chronic disease and medication adherence that included HTN. We excluded studies that included participants less than 18 years old. Only English language articles were included.

Two reviewers (MF and AE) applied the inclusion and exclusion criteria to all the citations. Screening was performed using Covidence, [23] anagement system, which automatically removed duplicate articles. Screening of titles and abstracts and full text were independently reviewed by two reviewers (MF and AE). The two reviewers also screened the reference lists of the included studies to identify additional relevant publications. In case of eligibility disagreements, the studies were re-read and discussed, and a third researcher (CP) served as an arbitrator. MF and AE independently extracted data from the seven included studies and discussed the data table and whether data extraction was consistent with the inclusion and exclusion criteria. The data table (see Table 1) was developed containing bibliometric variables: author(s), year, study title, aims or purposes, methodology, sample size, age, race and income from each of the studies.

Results

In total, 1067 articles were identified from the various databases for potential screening (see Fig. 1 PRISMA-ScR diagram). After duplicates were removed, the title and abstracts of 655 unique articles were screened, of which 621 were deemed ineligible. Thus, a total of 42 were extracted for full review, 34 articles plus 8 additional articles found through hand searches. Thirty-five of these articles were excluded for the following reasons: study did not discuss hypertension medication adherence during COVID-19 (n = 26) study began in 2019 and finished prior to

Table 1 Characteristics of the studies

Author(s)	Year	Study Title	Aims or purposes	Methodology	Sample size	Age	Race	Income
Alexander et al.	2020	Use and content of primary care office-based vs telemedicine care Visits during the COVID-19 pandemic in the US	To quantify national changes in the volume, type, and content of primary care delivered during the COVID-19 pandemic	Cross-sectional	161063	19-66+	Black & White	Not reported
Bress et al.	2021	Inequities in hypertension control in the US exposed and exacerbated by COVID-19 and the role of home blood pressure and virtual health care during and after the COVID-19 pandemic	Identify key areas in the domains of public health, clinical care, health policy, and implementation science to focus future work aimed at reducing existing disparities.	Report	N/A	N/A	NA	NA
Gotanda et al.	2022	Changes in blood pressure outcomes among individuals with HTN during the COVID-19 pandemic: A time series analysis in three US healthcare organizations	Examine the impact of the pandemic on BP among individuals with HTN.	Time series analysis	137593	66.2 (13.3) mean (SD)	Black, White, Asian, Other, & Unknown	27572
Heinert et al.	2022	Emergency department management of hypertension in the context of COVID-19	Describes the relationship between COVID-19 and HTN	Clinical review	N/A	N/A	N/A	N/A
James et al.	2021	Demographic and socioeconomic characteristics of COVID-19 patients treated in the emergency department of a New York city hospital	Describe the demographics, socioeconomic disparities, and geolocation of COVID-19 patients who were discharged from the ED of a New York City hospital.	Retrospective	634	50 (38- 60) median (IQR)	White Hispanic White Black Hispanic Black Caribbean Black Caribbean Indian Asian Indian Asian	Not reported
McCarthy et al.	2020	Early clinical and sociodemographic experience with patients hospitalized with COVID-19 at a large American healthcare system	Describe the creation of a registry to evaluate inpatients with COVID-19 within an integrated healthcare network	Case series	247	61 (50-76) Median (IQR)	Black, White, Hispanic, Asian, Unknown	66,701 (50,336-86,601)

Table 1 (continued)

Author(s)	Year	Study Title	Aims or purposes	Methodology	Sample size	Age	Race	Income
Patel et al.	2021	Optimizing the potential for telemedicine in cardiovascular care (in the era of COVID-19): Time will tell	The potential of telemedicine to improve cardiovascular health and enhance access to care with equity	Clinical review	N/A	Not reported	Not reported	Not reported

HTN hypertension, BP blood pressure, US United States, ED emergency department, SBP systolic blood pressure, COVID-19 Coronavirus disease 2019, IQR interquartile range, SD standard deviation

the pandemic ($n = 6$) or did not collect race/ethnicity data for disparities ($n = 3$). Thus, seven articles were included in this review. Table 1 shows the characteristics of the included articles. The methodology used in these studies consisted of quantitative techniques: cross-sectional, [24] a retrospective only, [25] a time series analysis study, [26] and qualitative techniques: two clinical reviews, [27, 28] a case series, [29] and a report [30]. Sample sizes ranged from 247 to 137593 (median: 80849). Please see Table 2 for the extraction of the multilevel factors that impacted HTN and HTN medication adherence.

Study Population

The average age of the population included in the studies ranged from 38 to 76 years. Three of the seven studies included in this review reported on the type of insurance the participants were enrolled in, with majority having some form of insurance [24, 25, 29]. Similarly, income was also reported in two of the seven studies, median income was \$48,000 per year [26, 29]. Racial minority groups made up more than half the study population for this review. Two of the seven studies included White, African American, Asian and Latino/Hispanic, [26, 29] one study included African Americans and White [24]. Finally, one of the seven articles included eight or more racial groups [25].

Multilevel Factors That Impact HTN and HTN Medication Adherence

Patient

All 7 studies discussed patient factors that may have impacted HTN and HTN medication adherence. Factors included inequitable access to telemedicine visits, [24, 27, 28, 30] unemployment, [25, 27, 29] uninsurance, [25] food insecurity, [25] fear of contracting COVID-19, [26, 27] stress and life chaos [26, 30]. For some, increased loss of health insurance with resultant reduced income led to cost-related HTN medication non-adherence [26, 27, 29, 30]. The most common factors were increased unemployment and its resultant impact (food insecurity, cost-related nonadherence), and inequitable access to telemedicine.

Provider

Four out of the 7 studies cited provider factors that may impact non-adherence [24, 27, 28, 30]. Provider factors included the conversion of office-based visits to telemedicine visits [27, 28]. There was also a decrease in new prescription

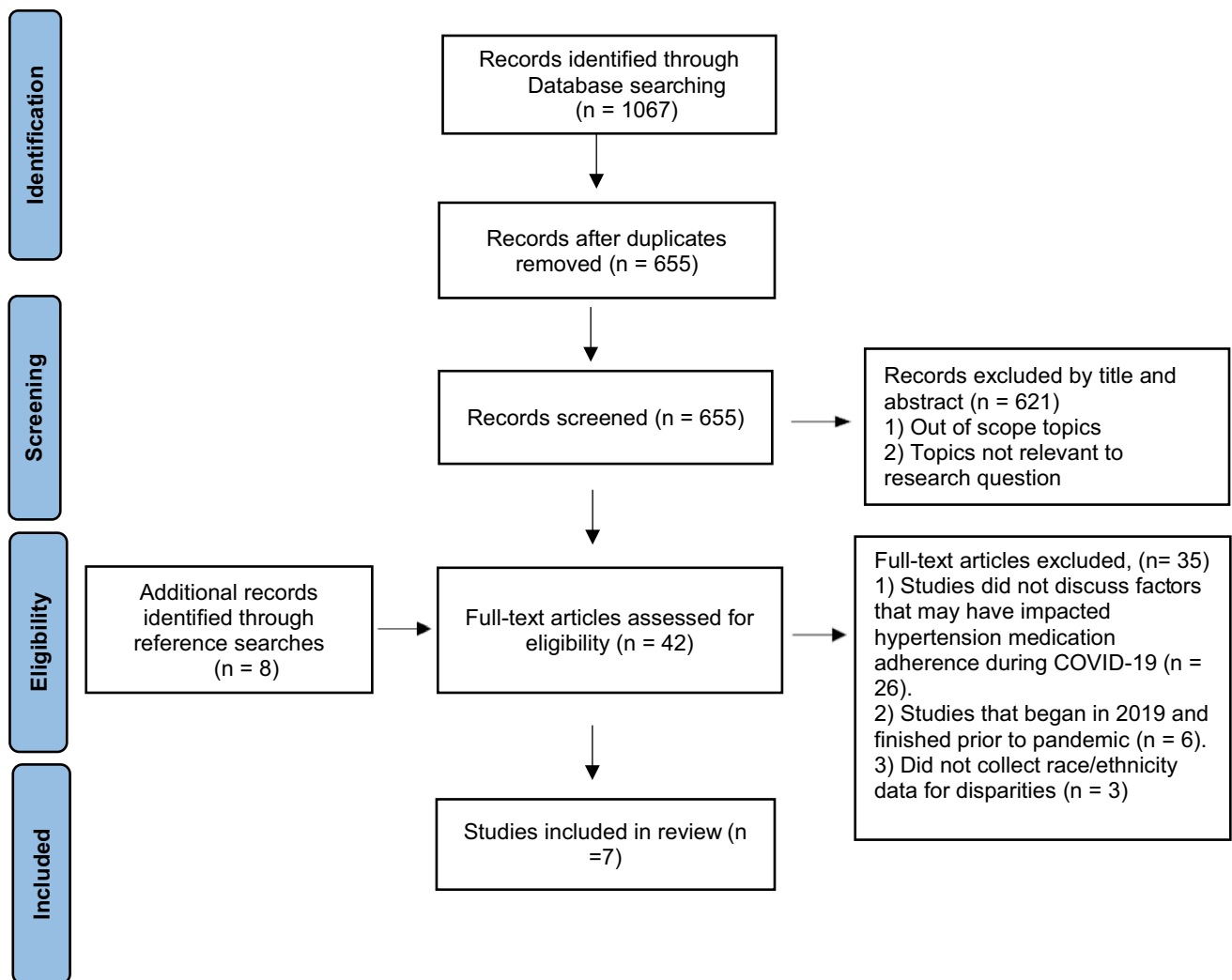


Fig. 1 PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Review) flow chart [22]

medications initiated for HTN as well as a reduction in clinician monitoring of blood pressure (BP) [24]. Additionally, Heinert et al. [27] noted that early pandemic confusion related to possible worsened clinical outcomes in patients with COVID-19 who used angiotensin-converting enzyme inhibitors (ACEi) and angiotensin receptor blockers (ARBs) (HTN medications) may have affected providers' decisions to prescribe and/or discourage the use of these medications for patients with HTN. Also, Bress et al. [30] noted that clinical inertia was a key driver to inadequate HTN medication management prior to the pandemic and during the COVID-19 pandemic. Clinical inertia refers to the underuse of therapy that is efficacious and effective in preventing serious endpoint clinical outcomes such as, in the case of HTN, death, nonfatal myocardial infarction, and stroke [31, 32].

Health System

One study cited health system factors [26]. Gotanda et al. [26] found that the availability of telemedicine visits varied by health system and many health systems were not prepared to manage the increased need for telemedicine.

Society

Five studies cited society factors [25–28, 30]. The COVID-19 pandemic highlighted unequal access to telemedicine due to inadequate broadband infrastructure among racial/ethnic groups which resulted in unequal access to providers and HTN care [26, 28, 30]. In addition, disruption in supply chains led to decreased availability of commonly prescribed medications (including HTN medications) [27].

Table 2 Overall study findings and level factors found in studies

Author(s)	Year	Overall Study findings	Patient	Provider	Health System	Society
Alexander et al.	2020	Treatment visits for HTN and new prescription medications were decreased by 26% from 2018/2019.	Middle-aged individuals and those commercially insured more likely to adopt telemedicine than their counterparts with other or no insurance.	Reduced number of new medications prescribed for HTN	Not reported	Not reported
Bress et al.	2021	COVID-19 exacerbated the preexisting inequities in HTN management and control in the US.	Limited access to validated home BP monitors when clinics were shut down. Limited access to healthcare facilities and out-of-pocket medication cost	Clinical inertia or clinicians' failure to initiate or intensify antihypertensive therapy when BP goals were unmet, based on beliefs and stereotypes about minority patients.	Not reported	Unequal access to high-speed internet and digital literacy to engage in virtual care to get support for HTN medication adherence. Medication costs.
Gotanda et al.	2022	The first 8 months of the pandemic were associated with worsening outcomes among individuals with HTN.	Increased psychosocial stress Limited access to telemedicine Fear of exposure to COVID-19 led to cancellation or postponement of follow-up face-to-face visits.	Not reported	Variable ability to transition to telemedicine visits. Limited access to health care	The economic impact of the pandemic made it difficult for patients to afford their anti-HTN medications.
Heinert et al.	2021	The COVID-19 pandemic has been a major stressor and barrier to effective chronic disease management for those with a history of HTN or newly elevated BP.	Loss of health insurance and job loss led to cost-related HTN medication non-adherence. Barriers to accessing primary care appointments for post-ED HTN follow-up care. Delay of health care due to fear of contracting COVID-19	Confusion over the use of ACEi/ARBs and worsened outcomes in COVID-19 patients Reduced access to in person primary care visits for patients with HTN due to COVID-19.	Follow-up care challenges for those seen in ED with HTN Limited access to telemedicine for those who were lower income/less socially disadvantaged, Black, Hispanic, Asian and non-English speaking	Inequitable access to high-speed internet
James et al.	2021	Ongoing racial disparities --lack of access to healthcare and lack of insurance were reported as factors that led to patients going without medical care.	High unemployment and food insecurity Limited health insurance Living in a medically underserved area	Not reported	Not reported	Not reported
McCarthy et al.	2020	Socioeconomic vulnerability and existing racial disparities may have impacted patients' ability to self-manage.	Lower median incomes among Blacks and Hispanics. High unemployment.	Not reported	Not reported	Not reported
Patel et al.	2021	Disparities in digital health technologies affected attendance to health visits to support medication changes.	Using non-commercial insurance was associated with fewer telemedicine visits. Lower usage of telemedicine among those with lower incomes.	Providers converted office-based visits to virtual visits to limit COVID-19 spread.	Adaptations of clinical care using telemedicine varied leading to digital health inequities.	Lack of universal access to high-speed internet contributed to digital health inequities.

HTN hypertension, ED emergency department, COVID-19 Coronavirus disease 2019, ACEi angiotensin-converting enzyme inhibitors, ARBs angiotensin receptor blockers

Discussion

This scoping review was conducted to summarize the literature on the impact of COVID-19 on HTN and HTN medication adherence among underrepresented racial/ethnic groups. To the best of our knowledge, this is the first scoping review which has summarized and analyzed the literature on COVID-19 related factors—patient, provider, health system and society that may have impacted HTN medication adherence among underrepresented racial/ethnic groups. Previous research has found that several categories of factors including demographic, socioeconomic, concomitant medical-behavioral conditions, therapy-related, healthcare team and system-related factors, and patient factors are associated with adherence to HTN medications [18, 33]. In this scoping review of 7 studies, the findings suggest the COVID-19 pandemic may have introduced new barriers to patients' adherence to HTN medication treatment and exacerbated pre-COVID-19 disparities among mostly Black and Hispanic groups. Results of our review also suggest that a gap remains between our understanding of COVID-19 impact on HTN medication adherence among Asian Americans and Alaska Native and American Indians (ANAI). Asian Americans are one of the fastest-growing racial/ethnic groups in the US, [34, 35] and they report lower awareness and knowledge about HTN than other racial/ethnic groups in the US [36, 37]. Asian Americans have poor control of their HTN and have high HTN medication non-adherent rates [38–40]. In addition, the prevalence of self-reported HTN is also high among ANAI individuals than in the majority US population [41, 42]. This gap in the literature is a limiting factor to achieve better HTN medication adherence among all racial/ethnic groups.

Patient

With respect to patient-level factors, COVID-19 related job loss, and loss of health insurance exacerbated financial difficulties for those managing HTN. Job loss and subsequent loss of health insurance due to COVID-19 disproportionately impacted racial/ethnic groups [43]. The COVID-19 pandemic exposed the imprudence of tying health insurance to employment and highlights the need for more thoroughgoing reform [44]. Uninsured individuals were less likely to maintain medication adherence and to seek medical care to aid them in supporting their condition [45]. Previous research found that HTN medication adherence for Medicare beneficiaries aged 65 years and older remained high during the pandemic, but disparities in HTN medication adherence persisted for Black, Hispanic, and ANAI beneficiaries [46]. The use of telemedicine to guide and support HTN management has been recommended by both the American Heart Association and American Medical Association for patients

[47, 48]. Our findings indicated that there was disparate telemedicine use among racial/ethnic groups who were more in need of health access to support manage HTN [49, 50].

Provider

The shift away from in-person office visits to telemedicine visits by providers may have led many to defer routine HTN care management visits [51]. Many telemedicine visits did not include assessment of BP which may have contributed to the decrease in new HTN prescriptions as well as lack of intensifying (adjusting) HTN medications adherence [24]. Delays in HTN medication adjustment due to clinical inertia or the COVID-19 pandemic are likely to lead to increases in CVD events [26, 27]. Another finding from our study that may have led to a drop in HTN medication adherence early in the pandemic was the confusion related to individuals with pre-existing conditions, such as HTN. It was believed that the use of ACEi/ARBs might increase these individuals' risk of contracting the virus [52].

Health System

The COVID-19 pandemic revealed the many ways in which the US health system fails to provide equitable care. Our results suggest that variation in the access to telemedicine may have impacted routine HTN care for racial/ethnic groups. Access to telemedicine is important not just for HTN assessments but medication adjustments and patient education [28]. Thronson et al. 2020 found that access to care, such as telemedicine and/or home blood pressure monitoring tools, were not available to all patients of safety-net clinics, leading to disparities in care and health care inequity [24, 53]

Society

Equitable access to high-speed Internet was a key focus during the pandemic to provide HTN support to racial/ethnic communities who are not only disproportionately afflicted by HTN, but also have less access to broadband infrastructure needed for telemedicine care [30, 54].

Implications

Findings from this scoping review have health system and society level implications. First, while our findings showed that health systems provided access to telemedicine, access to these services varied based on type of insurance and which health system patients belonged to. Health systems should ensure that telemedicine is equitably accessible to all patients. Not only the content and quality of telemedicine visits should be examined for those with limited English proficiency but

also the technology needs to ensure that they can engage in telemedicine visits [53].

With respect to society level implications, many racial/ethnic groups need multipronged efforts to address and mitigate these disparities. Currently, there are ongoing efforts through federal programs aimed at expanding telehealth availability by funding high-speed Internet services in underserved communities [55]. However, efforts are also needed at the state and local levels to facilitate high-speed Internet and telemedicine expansion.

Limitations

This scoping review has some noteworthy strengths. The PRISMA-ScR checklist was followed, and the search strategy was developed in collaboration with a research librarian at VA Boston Healthcare System, resulting in a search that spanned four research databases and included reference list scanning to help minimize publication bias. Although the results presented were based on a small number of studies, they reflect the current state of research on the impact of COVID-19 on HTN medication adherence for underrepresented racial and ethnic groups within the US. This scoping review is not without its limitations. Publication bias is also possible due to the inclusion of studies that began or reported results during the 2020–2022-time frame. In addition, studies varied in terms of their population size and composition, the geographical areas, and methodology used. However, the goal of a scoping review is to determine what range of evidence (quantitative and/or qualitative) is available on a topic and to represent this evidence visually as a mapping or charting of the located data [56]. Lastly, we did not search all of the gray literature, which could have inadvertently led to the omission of additional potential studies. It is, therefore, important to interpret our findings with these limitations in mind.

Conclusion

This review provides consideration for health systems and policy makers on opportunities to ensure ongoing access to health care for racial/ethnic groups to support HTN management. Ensuring equitable access to telemedicine and home blood pressure monitoring may alleviate factors that potentiate non-adherence to treatment regimens, such as medication adherence. Thus, intensified investment in programs and policies at the state and local levels are needed to dismantle inequities of underrepresented communities to promote health equity and reduce the burden of HTN.

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Data Availability Data analyzed during the study are available from the corresponding author by request.

Compliance with Ethical Standards

Consent to Participate Not applicable

Consent for Publication Not applicable

Conflict of Interests None to declare

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

Disclaimer All tables in this review are original and have never been published before anywhere.

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