Clinical Hypertension Guidelines and Social Determinants of Health: A Systematic Scoping Review

Na'amah Razon (Na'amah.razon@ucsf.edu)  
University of California, San Francisco  https://orcid.org/0000-0002-8785-3406

Danielle Hessler-Jones  
University of California San Francisco

Kirsten Bibbins-Domingo  
University of California San Francisco

Laura Gottlieb  
University of California San Francisco

Research article

Keywords: Hypertension, blood pressure, social determinants of health, guideline

DOI: https://doi.org/10.21203/rs.3.rs-59491/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License
Abstract

Background

Social and economic factors impact hypertension risk and control. We examined the integration of social determinants of health (SDH) guidance into adult US hypertension guidelines to explore how existing hypertension guidelines reference social care activities.

Objective

To explore how existing hypertension management guidelines reference social care activities.

Methods

Systematic scoping review of clinical guidelines (guidelines, protocols, and professional organization statements) for adult hypertension management. We employed a PubMed search strategy to identify all hypertension guidelines and protocols published in the US between 1977 and 2019. We reviewed all titles to identify the most updated versions focused on non-pregnant adults with essential hypertension. We extracted instances where included guidelines referred to social determinants of health or social care. The primary outcome was how guidelines covered topics related to social care, defined using a framework adapted from the National Academies of Sciences, Engineering and Medicine (NASEM).

Results

Search terms yielded 126 guidelines. Thirty-six guidelines met inclusion criteria. Of those 72% (26/36) recommended social care activities as part of hypertension management; 58% recommended clinicians change clinical care practice based on social risk information. These recommendations often lacked specific guidance around how to address SDH. When guidelines referred to specific social factors, patient financial security was the most common social determinant highlighted (n = 101). Ten guidelines (28%) did not reference social care activities.

Conclusion

Information about social determinants of health is included in many adult hypertension management guidelines, but few guidelines provide clear guidance for clinicians on how to identify and address actionable social risk factors in the context of care delivery.

Background
One third of US adults have hypertension, a major risk factor for mortality from heart disease and stroke(1). Despite the life threatening consequences of uncontrolled hypertension and numerous treatment guidelines for elevated blood pressure, hypertension control is achieved in only half of those diagnosed(1). Hypertension control in the US has improved over the last two decades (from 31.5% for 1999–2000 to 53.3% for 2009–2010), but significant disparities persist(2, 3). Lower income and absence of health insurance increase the risk of uncontrolled hypertension(4, 5). Disparities in blood pressure control likely contribute to higher cardiovascular morbidity and mortality among vulnerable and low socioeconomic groups(2, 6–8). Given the extent and consequences of uncontrolled disease, hypertension control is a central focus of public health, primary care, and several medical sub-specialties.

The rapidly evolving science around social determinants of health (SDH) is relevant to efforts to improve hypertension management. These SDH range from upstream political and social influences to more downstream, non-medical factors in patients’ physical and social environments that influence the ability to prevent hypertension and adhere to treatment recommendations. As examples, financial resources affect a patient’s ability to purchase medication and healthy food(5); housing stability and quality impact medication storage and access to primary and preventative care(9); restroom access may influence diuretic adherence(10); transportation availability improves clinic attendance(11–13); and both literacy and language can affect patients’ understanding medication use(14). As a result, over the last decade the health care sector’s interest in and activities around patients’ social conditions have expanded(15). We conducted a scoping review of published guidelines on adult hypertension to explore if and how existing guidelines direct clinicians to ask about and to address patients’ social conditions as part of hypertension management.

Methods

Data Sources and searches

We conducted a systematic scoping review of clinical guidelines and standards for essential hypertension management in adults. A systematic scoping review is the preferred review method “when a body of literature has not yet been comprehensively reviewed, or exhibits a large, complex, or heterogenous nature not amenable to a more precise systematic review,”(16) which is the case in this evolving area of SDH research. Our method was similar to prior scoping reviews (17,18), and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) recommendations.

We defined guidelines as published recommendations for the management of elevated blood pressure, typically in collaboration with a professional organization (for example, National Heart Lung and Blood Institute (NHLBI), American Heart Association (AHA), American College of Cardiology (ACC), American Society of Hypertension (ASH)). Our team worked with an academic medical librarian to develop our search protocol and solicit feedback from our research team. Protocol is available on request from the corresponding author. Using PubMed, we searched for publication type using: hypertension guidelines, clinical guidelines, and clinical recommendations published in the US including all dates up to our search.
(see Appendix 1 for search strategy and flow sheet of search in Table 1). Since the National Guidelines Clearinghouse closed in July 2018, we utilized PubMed to abstract titles. We also included additional hypertension guidelines found by searching references from other articles or that were recommended by experts in the field.

**Study Selection**

All guideline titles were reviewed to ensure they met inclusion criteria. We included all guidelines on adult hypertension diagnosis or management published between 1977, when the first Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure was published, and 2019. Guidelines addressing non-essential hypertension (pulmonary hypertension, portal hypertension, renovascular hypertension, intra-abdominal hypertension, or intracranial hypertension) were excluded. Pediatric and pregnancy related hypertension guidelines were also excluded. We only included the most recent version of guidelines (same title and organizational authors) with one exception: both JNC7 and JNC8 were included given the differences in scope between the two guidelines.

**Data extraction and assessment**

Guidelines meeting inclusion criteria were charted in full. Using natural language processing (NLP), we searched the text of a randomly selected 15 guidelines using SDH search terms developed for a previously published systematic review(18). One author (NR) compared search results with a detailed manual review of these 15 guidelines. We then iteratively added additional SDH search terms to the NLP strategy. After establishing a final list of terms, we applied the NLP search terms to the remaining guidelines to locate text referring to SDH topics (see Appendix 1).

We coded all guidelines using categories established in a recent National Academies of Sciences, Engineering, and Medicine (NASEM) framework(15). In that report, *Integrating Social Care into Health Care Delivery to Improve the Nation’s Health*, the committee defined five social care activities foundational to improving care integration at both individual and population levels (5A Framework; see Table 2). To our knowledge, this is the only published framework to classify health care activities related to social care. The report’s patient-oriented activities include: 1. Increasing care team *Awareness* of social conditions that influence health; 2. Making *Adjustments* to clinical decision-making based on contextual data; and 3. Providing *Assistance* in the health care setting to link patients with available social resources. The Committee also underscored two community-oriented activities: 4. Those that facilitate *Alignment* of resources between health and social services sectors; and 5. A complementary set of activities that engages the health care sector in *Advocacy* to improve community conditions. We added a sixth category, *Acknowledgement*, to capture guideline content in which the influence of socioeconomic status on health was described outside of the context of specific social care activities.

All SDH-relevant text in the guidelines was then charted by two members of the research team (NR and LG) using the enhanced NASEM definitions of health care activities (see Table 2). We held multiple sessions to address intercoder discrepancies and achieve agreement.
Race and socioeconomic status are often intertwined in the US. Since social care interventions in the NASEM report were not defined by race, for the purposes of this review we did not extract guideline text related to race. The 2019 Healthy People 2020 report similarly excludes race as an SDH category(19).

Data synthesis and analysis

We summed types of recommendations by social care category. Additionally, within each social care category, we included the frequency of each type of SDH mentioned within guidelines (see Appendix 2).

Results

We screened 126 titles and reviewed 120 guidelines after excluding 6 duplicates. Thirty-six guidelines met our inclusion criteria (see Table 1 for PRISMA diagram). Of the 36 guidelines reviewed, 10 guidelines (28%) included awareness activities. Twenty-one guidelines (58%) made adjustment recommendations. Six guidelines (17%) mentioned assistance strategies. Five (14%) guidelines mentioned alignment strategies, and eight guidelines (22%) included advocacy recommendations. One guideline acknowledged SDH without referencing any social care activities. Of all reviewed guidelines, 28% (n=10) neither acknowledged SDH nor referenced health activities related to SDH (See Table 2 for summary and Appendix 2 for breakdown of results). Guidelines published in 2019 were more likely to include multiple categories of social care activities than guidelines published in 1991 (the earliest guideline included).

1. Awareness

Ten guidelines (28%) recommended activities to identify or screen for social risks and assets of defined patients and populations. This included screening for patients’ ability to pay for medication, health literacy, food access, and transportation availability. As example, a 2004 guideline discussed screening for financial security, health literacy, and insurance status(20); a 1993 guideline on mild hypertension, suggested screening for health literacy(21); the 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure encouraged clinicians to inquire about care affordability(5). Only the 2019 Clinical Performance and Quality Measures report recommended the use of a standardized social risk screening tool(22).

2. Adjustment

Twenty-one guidelines (58%) recommended activities to adjust clinical care based on patients’ social risks. The NASEM report underscores that these activities (to accommodate care to patients’ social circumstances) differ from assistance interventions in that they do not intervene on the social risk itself, but instead change care planning based on the social risk. Of the total 63 specific care adjustments mentioned across the 21 guidelines, over half (57% n=36/63) focused on adjustments to accommodate patients’ financial security. In these cases, authors acknowledged that cost is a barrier to medication adherence (and therefore hypertension control) and in various ways suggested changing care to reduce medication cost burdens(21,23). Specific examples included prescribing generic alternatives(5,24–27),
once daily dosages(5,25), combination pills(28), long-acting medication formulations(5,27), and increasing the number of pills dispensed in each prescription to minimize pharmacy visits and co-payments(5). The 2017 *Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure* also recommended providing patients with scored tablets or pill cutters to reduce costs(5).

Guidelines also included other strategies to accommodate access barriers. For instance, guidelines described efforts to limit the number and frequency of medical visits(29); increase telehealth(22); utilize electronic health record to tailor health advice to patients based on their social risk(22); use remote blood pressure monitoring(26,30,31); or offer medication home delivery(22). Two highlighted opportunities to minimize laboratory tests(23,31). Three others suggested addressing patients’ transportation barriers through reducing frequency of office visits to minimize co-payments(5,31,32). A 2013 guideline recommended that emergency medicine physicians initiate blood pressure medications in asymptomatic patients when patients were in social circumstances that might prevent them from establishing primary care(33).

In addition to adjustments to reduce patient cost, several guidelines recommended adjusting care for patients based on education, literacy level, and cultural background(5,23). Specific examples included ensuring the presence of translators, improving providers’ cultural competency, and increasing the availability of linguistically-appropriate educational materials(5,23,34).

A 2019 *Clinical Performance and Quality Measures* report highlighted that health systems can omit patients from the denominator of some hypertension quality metrics if patients have economic or access barriers to medication adherence(22).

### 3. Assistance

Six guidelines (17%) described assistance strategies for health care teams to improve patients’ hypertension management by directly intervening on social risks themselves. These recommendations involved using clinic or community-based social service providers, e.g. community health workers, social workers, or case managers, to facilitate connections with community or government social services(22,29), including housing programs, food banks or other nutrition programs(23,35), insurance or medication access programs(35), or utility assistance programs(5).

### 4. Alignment

The 2019 NASEM framework also defined health care sector activities outside of clinical care related to strengthening community SDH resources and supports. Five (14%) guidelines raised topics related to alignment strategies. For example, a 2005 publication on cardiovascular disease and minority health recommended several community education strategies, such as dissemination of physical activity and nutrition information to marginalized communities(34). JNC7 and the 2017 *Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure* elevated community organizations as
liaisons to bridge cultural and language barriers and establish community-based HTN screening and referral programs(5,35). A 2019 report highlighted ways to strengthen community partnerships that provide healthy food and enroll individuals in federal nutrition assistance programs(22).

5. Advocacy

Eight guidelines (22%) described ways that health care organizations can promote policies or societal investments that increase the availability of social resources as part of a strategy for reducing hypertension prevalence and morbidity. Seven of these described ways health systems can work with insurers to improve incentives and/or lower costs of care. In the 2017 *Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure*, the authors wrote: “Greater attention is being paid to the influence of health insurance coverage and benefit designs focused on reducing patient copayments for antihypertensive medications”(5). Beyond copayments and coverage, several guidelines referenced specific activities that if reimbursable, could improve hypertension control, including obesity treatments(34) and home blood pressure monitors (HBPM)(36); one emphasized the importance of developing quality measures related to SDH to standardize blood pressure management(22).

Five guidelines surfaced the importance of healthy food access as a key area for societal interventions(5,34,35,37,38). These guidelines emphasized the need for policy changes to increase the availability of healthy foods and access to physical activity. A 2017 guideline called on food manufacturers to reduce “the amount of sodium in food processing, as well as in fast food and restaurant food preparation”(5). This echoes earlier guidelines’ suggestions to reduce marketing of “high-calorie, low-nutrient-density products to young children or people of color”(34) and to lobby the food industry “to progressively reduce the salt added to foods by 50% over the next 10 years”(38).

Four guidelines called for increased research funding to improve evidence on the social and economic aspects of blood pressure control(5,22,23,34). This included advocating for researchers, clinicians, and research subjects from diverse backgrounds(34) and increased focus on care in low socioeconomic settings(5).

6. Acknowledgement

Of the 36 guidelines, 10 did not reference social determinants of health or related search terms. Of the remaining 26, one guideline described the relevance of SDH to hypertension management but did not refer to any NASEM action categories (awareness, assistance, adjustment, alignment, or advocacy) in the rest of the guideline sections. Seventeen guidelines included text acknowledging that SDH influence hypertension management in sections that did not otherwise recommend a specific social care activity. In these seventeen guidelines, authors referred to at least one NASEM action category in another section. Economic constraints (described in 36 of the 84 references to acknowledgement activities) were the most common social domain mentioned without explicit social care recommendations. In these instances, financial status was generally linked with hypertension risk factors and care(5,21,22,26,29,34,35,39) or to
more specific hypertension treatment barriers, such as medication affordability(5,22–24,26,29,35,40), lack of health insurance coverage(5,23,29,34,41), or otherwise limited access to care(25–27,29,34,35,39). Beyond financial risk, multiple guidelines referred to language and education barriers to prevention and treatment (5,22,23,25,26,29,35), absence of safe space for physical activity(5,35), and lack of adequate healthy food(5,27,31,34,35,38).

**Conclusion**

Across the US there is growing recognition that patients’ social conditions affect disease risk, severity, and treatment. In hypertension, there is strong and compelling evidence that SDH such as education, financial stability, and access to healthcare impact blood pressure control and other cardiovascular disease(42). In this review of 36 adult hypertension management guidelines, 3/4 of guidelines acknowledged these associations between SDH and hypertension management and outcomes. Not surprisingly, references to SDH were more common in more recent publications. Nearly 1/3 of the guidelines, however, did not include recommendations for health care clinical teams or health care systems regarding actions to address SDH to improve hypertension prevention or treatment. When they were made, recommendations were inconsistent across different guidelines. Review findings suggest that there are ongoing translational gaps between the impact of social care on hypertension management and how equipped clinicians and health systems are to use that information to improve patient and population health.

What else do these findings tell us about hypertension-related social care? First, in cases where guidelines did make social care recommendations, there is an incongruence between screening and intervention recommendations. Of the 27 guidelines that recommended clinical care changes (whether adjustment or assistance) based on patients’ social risk, only 10 recommended some form of social risk screening. Of those, only one suggested using a standardized social risk assessment tool(22). This may reflect the fact that more evidence is needed on social risk screening, including measure validity, implementation feasibility, and relevance for informing subsequent interventions(43). Prior research not limited to hypertension suggests patients find social risk screening acceptable(44,45) and that clinicians are unlikely to accurately gauge patients’ social risks without those assessments(46). Without robust social risk assessments, targeting patients with hypertension who could benefit from social care programs will be more difficult and any effective interventions will be underutilized.

Second, though there are instances where adjustment and assistance recommendations were described in hypertension guidelines, there is little consistency or evidence-based information in the guidelines about how clinicians can intervene on social risk to improve hypertension outcomes. For instance, only nine of the 36 guidelines suggested changes to medication regimens to address hypertension treatment barriers for low-income patients(5,21,23,25,26,28,29,31,39). There is considerable evidence on this topic that could be reflected in future guideline development. One recent review found that use of brand name antihypertensive medications resulted in higher costs for patients and lowered adherence(47). Other studies found that combination pills, which include two or more medications in a single pill, improved
adherence, likely both because combination pills lower costs and reduce regimen complexity\textsuperscript{(48,49)}. Medication adherence decreases consistently with each additional antihypertensive medication prescribed\textsuperscript{(50)}. A multi-pronged approach to hypertension intended to decrease health disparities across Kaiser Permanente involved SDH-related adjustment strategies, including standardized treatment algorithms to encourage combination pills as first line treatment (therefore reducing the number of pills, frequency of dosing, and costs)\textsuperscript{(51–53)}. Several studies have documented improved blood pressure medication adherence with reduced co-payments\textsuperscript{(54–56)}.

Only five guidelines described SDH adjustment strategies related to care cost and coverage not specific to medications (this included recommending home blood pressure monitors, longer medication refills to reduce pharmacy trips, and increasing telehealth options). Similarly, future guidelines should review related evidence in this area. A review of international health systems found that having health insurance coverage, a regular physician, and minimal copayments improved hypertension management\textsuperscript{(57)}. In addition, a study offering free care to low-income individuals with hypertension improved diastolic blood pressure and reduced CVD risk\textsuperscript{(56,58)}. This evidence underscores that while low cost medications could improve hypertension control for all individuals, they are particularly important for vulnerable groups.

Other adjustment strategies that rarely appeared in the guidelines involve using multi-disciplinary care teams to provide care concordant with patients' language, literacy, and cultural norms or to bridge patients to community or government programs that provide social services. But here, too, there is a growing evidence base specific to hypertension on which to draw in future guideline development. For example, health education programs for patients with poor literacy have improved systolic blood pressure\textsuperscript{(14,59)}. Community health worker-delivered counseling and education around cardiovascular risk prevention improved both systolic and diastolic blood pressure\textsuperscript{(60–62)}. Peer education and increased workforce diversity both maximized language concordance between patients and providers and reduced hypertension disparities between different patient groups in Kaiser's southern California region\textsuperscript{(53)}. And a 2017 primary care based study found that social screening and assistance-type navigation services modestly improved blood pressure and lipid levels\textsuperscript{(63)}. Overall, future guidelines might better incorporate emerging, multi-disciplinary research on interventions that can mitigate the impacts of socioeconomic risks on blood pressure control and adherence\textsuperscript{(49,50,66,51,52,54–56,63–65)}—including adjustments to medication, cost of care, and team-based care.

Finally, 22% of the treatment guidelines included advocacy recommendations as a strategy to improve hypertension care, but these recommendations were rarely accompanied by evidence about the effective roles for health care professionals in those advocacy activities. Since some health professionals are hesitant to embrace advocacy roles\textsuperscript{(67)} and others lack skills and/or opportunities to participate in advocacy, operationalizing these recommendations is likely to require dedicated training and supports for health professionals\textsuperscript{(68)}.

Our study has several limitations. Given that the National Guideline Clearinghouse closed in 2018, it is difficult to ensure that we identified all relevant adult essential hypertension guidelines. We consulted
with a medical librarian to design our search strategy, however, and there is no reason that omitted guidelines should systematically differ from those included in the review. Our review also was limited to published guidelines in the United States. Countries with different health care infrastructure and payment models may better address patients’ social contexts as part of care delivery. We did not include race in our SDH-related search strategy. Yet we recognize that race, racism, and discrimination are inextricably tied to SDH in the US. Future reviews should explore how hypertension guidelines acknowledge and recommend interventions related to race, racism, discrimination, and distrust. Lastly, in some cases, the guidelines did not provide sufficient detail to understand all aspects of a given recommendation. We used an iterative two-reviewer process to discuss recommendations that were challenging to categorize using the NASEM framework, but it is possible that some of the 243 references to SDH may have been miscategorized. We do not believe that this would change overall findings of this review.

Despite these limitations, to our knowledge, this is the first scoping review to use the NASEM framework on social care activities to gauge the translation of SDH science into clinical care disease guidelines. We found a wide range of social care recommendations in clinical guidelines on the prevention, treatment, and management of hypertension in adults. But the lack of consistency in these guidelines about social care signals that the evidence on these activities is not yet sufficiently developed or mainstream. More attention should be paid to strengthening research in this area, including efforts to assess patients’ social risks and to intervene on identified risks to improve hypertension prevention and treatment. As this evidence grows, future guidelines will need to ensure both specificity and actionability of new recommendations about social care to facilitate implementation.

In a recent article highlighting gaps between hypertension guidelines and clinical practice, Jennifer DeVoe writes, “Where was the evidence-based guideline to answer [the patient’s] questions about whether spending money to buy this medication was more important than buying the healthy foods [the care team] had also recommended?”(69) Our review underscores DeVoe’s point: existing guidelines fail to provide clinicians with comprehensive, actionable, evidence-based guidance on how to integrate our growing knowledge about SDH into patient care. Attending to a patient’s housing, financial situation, and food security should not leave clinicians feeling like they are providing suboptimal hypertension care. Improving hypertension outcomes and decreasing hypertension disparities will require that the health care delivery system more systematically incorporate SDH-related interventions into hypertension management; the what, when, and how of those interventions will need to be more explicitly incorporated into future guidelines to help scale effective programs.

**Abbreviations**

SDH- Social Determinants of Health

NASEM- National Academies of Sciences, Engineering and Medicine

NHLBI- National Heart, Lung and Blood Institute
AHA- American Heart Association
ACC- American College of Cardiology
ASH- American Society of Hypertension
JNC- Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure
NLP- Natural Language Processing

Declarations

Ethics approval and consent to participate:
Not applicable

Consent for publication:
Not applicable

Availability of data and material:
No dataset was used for this manuscript. Included guidelines are available in appendix 2.

Competing Interests:
None

Funding source:
No funding sources were used for this article. Dr. Razon is a research fellow at the Philip R. Lee Institute for Health Policy Studies at UCSF funded by the Agency for Healthcare Research and Quality (5T32HS022241-07).

Author contribution:
NR and LG designed and conducted the analysis and writing of the manuscript. DH and KB contributed to the interpretation of data and critical revisions of the manuscript. All authors have approved the contents of this paper.

Acknowledgment: None
References

1. High Blood Pressure | cdc.gov [Internet]. [cited 2020 Jan 10]. Available from: https://www.cdc.gov/bloodpressure/index.htm

2. Holmes HM, Luo R, Hanlon JT, Elting LS, Suarez-Almazor M, Goodwin JS. Ethnic Disparities in Adherence to Antihypertensive Medications in Medicare Part D Beneficiaries.

3. Sug S, Yoon S, Fryar CD, Carroll MDH. NCHS Data Brief, Number 220, November 2015. 2011.

4. Stringhini S, Carmeli C, Jokela M, Avendaño M, Muennig P, Guida F, et al. Socioeconomic status and the 25x25 risk factors as determinants of premature mortality: a multicohort study and meta-analysis of 1.7 million men and women. www.thelancet.com. 2017;389.

5. Whelton PK, Carey RM, Aronow WS, Casey DE, Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults a report of the American College of Cardiology/American Heart Association Task Force on Clinical pr. Vol. 71, Hypertension. American College of Cardiology Foundation; 2018. 13–115 p.

6. Mensah GA, Cooper RS, Siega-Riz AM, Cooper LA, Smith JD, Brown CH, et al. Reducing Cardiovascular Disparities through CommunityEngaged Implementation Research: A National Heart, Lung, and Blood Institute Workshop Report. Circ Res. 2018;122(2):213–26.

7. Ferdinand KC, Yadav K, Nasser SA, Clayton-Jeter HD, Lewin J, Cryer DR, et al. Disparities in hypertension and cardiovascular disease in blacks: The critical role of medication adherence HHS Public Access. J Clin Hypertens. 2017;19(10):1015–24.

8. Redmond N, Baer HJ, Hicks LS. Population Science/Epidemiology Health Behaviors and Racial Disparity in Blood Pressure Control in the National Health and Nutrition Examination Survey. Hypertension. 2011;57:383–9.

9. Martin P, Liaw W, Bazemore A, Jetty A, Petterson S, Kushel M. Adults with housing insecurity have worse access to primary and preventive care. J Am Board Fam Med. 2019;32(4):521–30.

10. Adapting your practice: Treatment and Recommendations for Homeless Patients with Hypertension, Hyperlipidemia & Heart Failure. 2009.

11. Thomas L V, Wedel KR. Nonemergency medical transportation and health care visits among chronically Ill urban and rural medicaid beneficiaries. Soc Work Public Health. 2014;29(6):629–39.

12. Tierney WM, Harris LE, Gaskins DL, Zhou XH, Eckert GJ, Bates AS, et al. Restricting medicaid payments for transportation: Effects on inner-city patients’ health care. Am J Med Sci. 2000;319(5):326–33.

13. Chaiyachati KH, Hubbard RA, Yeager A, Mugo B, Shea JA, Rosin R, et al. Rideshare-Based Medical Transportation for Medicaid Patients and Primary Care Show Rates: A Difference-in-Difference Analysis of a Pilot Program. J Gen Intern Med. 2018;33(6):863–8.

14. Williams M V, Baker DW, Parker RM, Nurss JR. Relationship of functional health literacy to patients’ knowledge of their chronic disease: A study of patients with hypertension and diabetes. Arch Intern
15. National Academies of Sciences, Engineering and M. Integrating Social Care into the Delivery of Health Care. Integrating Social Care into the Delivery of Health Care. 2019.

16. Peters MDJ, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. Int J Evid Based Healthc. 2015;13(3):141–6.

17. Berkowitz SA, Aragon K, Hines J, Seligman H, Lee S, Sarkar U. Do clinical standards for diabetes care address excess risk for hypoglycemia in vulnerable patients? A systematic review. Health Serv Res. 2013;48(4):1299–310.

18. Gottlieb LM, Wing H, Adler NE. A Systematic Review of Interventions on Patients’ Social and Economic Needs. Vol. 53, American Journal of Preventive Medicine. Elsevier Inc.; 2017. p. 719–29.

19. Healthy People 2020- Social Determinants of Health [Internet]. [cited 2020 Jan 10]. Available from: https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

20. Levey AS, Salem W, Anderson S, Greene JH. K/DOQI Clinical Practice Guidelines on Hypertension and Antihypertensive Agents in Chronic Kidney Disease. Am J Kidney Dis. 43AD;5(2004):s16–41.

21. 1993 Guidelines for the Management of Mild Hypertension. Hypertension. 1993 Sep;22(3):392–403.

22. Casey DE, Thomas RJ, Bhalla V, Commodore-Mensah Y, Heidenreich PA, Kolte D, et al. 2019 AHA/ACC clinical performance and quality measures for adults with high blood pressure: A report of the american college of cardiology/american heart association task force on performance measures. Circ Cardiovasc Qual Outcomes. 2019 Nov 1;12(11).

23. Kidney Disease Outcomes Quality Initiative (K/DOQI). K/DOQI clinical practice guidelines on hypertension and antihypertensive agents in chronic kidney disease. Am J Kidney Dis. 2004 May;43(5 Suppl 1):S1-290.

24. Qaseem A, Wilt TJ, Rich R, Humphrey LL, Frost J, Forciea MA, et al. Pharmacologic Treatment of Hypertension in Adults Aged 60 Years or Older to Higher Versus Lower Blood Pressure Targets: A Clinical Practice Guideline From the American College of Physicians and the American Academy of Family Physicians. Ann Intern Med. 2017 Mar 21;166(6):430–7.

25. Carey RM, Calhoun DA, Bakris GL, Brook RD, Daugherty SL, Dennison-Himmelfarb CR, et al. Resistant hypertension: Detection, evaluation, and management a scientific statement from the American Heart Association. Hypertension. 2018 Nov 1;72(5):E53–90.

26. Aronow WS, Fleg JL, Pepine CJ, Artinian NT, Bakris G, Brown AS, et al. ACCF/AHA 2011 expert consensus document on hypertension in the elderly: A report of the american college of cardiology foundation task force on clinical expert consensus documents. Circulation. 2011;123(21):2434–506.

27. Weber MA, Schiffrin EL, White WB, Mann S, Lindholm LH, Kenerson JG, et al. Clinical practice guidelines for the management of hypertension in the community: a statement by the American Society of Hypertension and the International Society of Hypertension. J Clin Hypertens (Greenwich). 2014 Jan;16(1):14–26.

28. Gradman AH, Basile JN, Carter BL, Bakris GL. Combination therapy in hypertension. J Am Soc Hypertens. 2010 Jan;4(1):42–50.
29. Merz CNB, Alberts MJ, Balady GJ, Ballantyne CM, Berra K, Black HR, et al. ACCF/AHA/ACP 2009 competence and training statement: A curriculum on prevention of cardiovascular disease: A report of the american college of cardiology foundation/american heart association/american college of physicians task force on competence and tra. Vol. 120, Circulation. 2009.
30. Muntner P, Shimbo D, Carey RM, Charleston JB, Gaillard T, Misra S, et al. Measurement of blood pressure in humans: A scientific statement from the american heart association. Hypertension. 2019 May 1;73(5):E35–66.
31. National Education Programs Working Group Report on the Management of Patients with Hypertension and High Blood Cholesterol. Ann Intern Med. 1991;114(3):224–37.
32. Carey RM, Calhoun DA, Bakris GL, Brook D, Daugherty SL, Dennison-himmelfarb CR, et al. Resistant Hypertension: Detection, Evaluation, and Management: A Scientific Statement From the American Heart Association. Vol. 72, Hypertension. 2018. 53–90 p.
33. Burton JH, Godwin SA, Hahn SA, Lo B, Mace SE, Melnick ER, et al. Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients in the Emergency Department With Asymptomatic Elevated Blood Pressure. 2013;(1).
34. Smith SC, Clark LT, Cooper RS, Daniels SR, Kumanyika SK, Ofili E, et al. Discovering the Full Spectrum of Cardiovascular Disease Minority Health Summit 2003 Report of the Obesity, Metabolic Syndrome, and Hypertension Writing Group. 2005;134–9.
35. Chobanian A V. The Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. 2004.
36. Pickering TG, Miller NH, Ogedegbe G, Krakoff LR, Artinian NT, Goff D. AHA / ASH / PCNA Scientific Statement Call to Action on Use and Reimbursement for Home Blood Pressure Monitoring: Executive Summary A Joint Scientific Statement From the American Heart Association, American Society of Hypertension, and Preventive Cardi. 2008;
37. Elijovich F, Weinberger MH, Anderson CAM, Appel LJ, Bursztyn M, Cook NR, et al. Salt sensitivity of blood pressure: A scientific statement from the American Heart Association. Hypertension. 2016 Sep 1;68(3):e7–46.
38. Appel LJ, Brands MW, Daniels SR, Karanja N, Elmer PJ, Sacks FM. Dietary Approaches to Prevent and Treat Hypertension A Scientific Statement From the American Heart Association. 2006;296–308.
39. Go AS, Bauman MA, Coleman King SM, Fornarow GC, Lawrence W, Williams KA, et al. An Effective Approach to High Blood Pressure Control A Science Advisory From the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention. Hypertension. 2013;63:878–85.
40. Dennison-himmelfarb C, Handler J, Lackland DT. 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC 8). JAMA. 2014;1097(5):507–20.
41. Egan BM, Bland VJ, Brown AL, Ferdinand KC, Hernandez GT, Jamerson KA, et al. Hypertension in african americans aged 60 to 79 years: Statement from the international society of hypertension in
blacks. J Clin Hypertens. 2015 Apr 1;17(4):252–9.

42. Carey R, Paul M, Bosworth H, Whelton P. Prevention and Control of Hypertension: JACC Health Promotion Series. J Am Coll Cardiol. 2018;72(11):1278–93.

43. Henrikson NB, Blasi PR, Dorsey CN, Mettert KD, Nguyen MB, Walsh-Bailey C, et al. Psychometric and Pragmatic Properties of Social Risk Screening Tools: A Systematic Review. Am J Prev Med. 2019;57(6):S13–24.

44. De Marchis EH, Hessler D, Fichtenberg C, Adler N, Byhoff E, Cohen AJ, et al. Part I: A Quantitative Study of Social Risk Screening Acceptability in Patients and Caregivers. 2019;

45. Byhoff E, De Marchis EH, Hessler D, Fichtenberg C, Adler N, Cohen AJ, et al. Part II: A Qualitative Study of Social Risk Screening Acceptability in Patients and Caregivers. Am J Prev Med. 2019;57:S38–46.

46. Tong ST, Liaw WR, Kashiri PL, Pecsok J, Rozman J, Bazemore AW, et al. Clinician Experiences with Screening for Social Needs in Primary Care. J Am Board Fam Med. 2018;31(3):351–63.

47. Choudhry NK, Denberg TD, Qaseem A. Improving adherence to therapy and clinical outcomes while containing costs: Opportunities from the greater use of generic medications: Best practice advice from the clinical guidelines committee of the American college of physicians. Ann Intern Med. 2016 Jan 5;164(1):41–9.

48. Gerbino PP, Shoheiber O. Adherence patterns among patients treated with fixed-dose combination versus separate antihypertensive agents. Am J Heal Pharm. 2007 Jun 15;64(12):1279–83.

49. Bangalore S, Kamalakkannan G, Parkar S, Messerli FH. Fixed-Dose Combinations Improve Medication Compliance: A Meta-Analysis. Vol. 120, American Journal of Medicine. 2007. p. 713–9.

50. Fung V, Huang J, Brand R, Newhouse JP, Hsu J. Hypertension treatment in a medicare population: adherence and systolic blood pressure control. Clin Ther. 2007 May;29(5):972–84.

51. Shaw KM, Handler J, Wall HK, Kanter MH. Improving blood pressure control in a large multiethnic California population through changes in health care delivery, 2004-2012. Prev Chronic Dis. 2014;11(10).

52. Jaffe MG, Lee GA, Young JD, Sidney S, Go AS. Improved blood pressure control associated with a large-scale hypertension program. JAMA - J Am Med Assoc. 2013;310(7):699–705.

53. Sim JJ, Handler J, Jacobsen SJ, Kanter MH. Systemic implementation strategies to improve hypertension: The Kaiser permanente southern california experience. Vol. 30, Canadian Journal of Cardiology. Pulsus Group Inc.; 2014. p. 544–52.

54. Taira DA, Wong KS, Frech-Tamas F, Chung RS. Copayment level and compliance with antihypertensive medication: Analysis and policy implications for managed care. Am J Manag Care. 2006 Oct;12(11):678–83.

55. Chernew ME, Shah MR, Wegh A, Rosenberg SN, Juster IA, Rosen AB, et al. Impact of decreasing copayments on medication adherence within a disease management environment. Health Aff (Millwood). 2008 Jan;27(1):103–12.
56. Shulman N, Tuttle E, Entwisle G, Apostolides A, Oberman A, Schnaper HW, et al. Persistence of Reduction in Blood Pressure and Mortality of Participants in the Hypertension Detection and Follow-up Program. JAMA J Am Med Assoc. 1988 Apr 8;259(14):2113–22.

57. Maimaris W, Paty J, Perel P, Legido-Quigley H, Balabanova D, Nieuwlaat R, et al. The influence of health systems on hypertension awareness, treatment, and control: a systematic literature review. PLoS Med. 2013 Jul;10(7):e1001490.

58. Brook RH, Ware JE, Rogers WH, Keeler EB, Davies AR, Donald CA, et al. Does free care improve adults’ health? Results from a randomized controlled trial. N Engl J Med. 1983 Dec 8;309(23):1426–34.

59. Fouad MN, Kiefe CI, Bartolucci AA, Burst NM, Ulene V, Harvey MR. A hypertension control program tailored to unskilled and minority workers. Ethn Dis. 1997;7(3):191–9.

60. Allen JK, Dennison Himmelfarb CR, Szanton SL, Bone L, Hill MN, Levine DM. COACH trial: A randomized controlled trial of nurse practitioner/ community health worker cardiovascular disease risk reduction in urban community health centers: Rationale and design. Contemp Clin Trials. 2011;32(3):403–11.

61. Becker DM, Yanek LR, Johnson WR, Garrett D, Moy TF, Stasia ;, et al. Impact of a Community-Based Multiple Risk Factor Intervention on Cardiovascular Risk in Black Families With a History of Premature Coronary Disease. 2005;

62. Hayashi T, Farrell MA, Chaput LA, Rocha DA, Hernandez M. Lifestyle Intervention, Behavioral Changes, and Improvement in Cardiovascular Risk Profiles in the California WISEWOMAN Project.

63. Berkowitz SA, Catherine Hulberg A, Standish S, Reznor G, Atlas SJ. Addressing unmet basic resource needs as part of chronic cardiometabolic disease management. JAMA Intern Med. 2017;177(2):244–52.

64. Claxton AJ, Cramer J, Pierce C. A systematic review of the associations between dose regimens and medication compliance. Clin Ther. 2001;23(8):1296–310.

65. Iskedjian M, Einarson TR, MacKeigan LD, Shear N, Addis A, Mittmann N, et al. Relationship between daily dose frequency and adherence to antihypertensive pharmacotherapy: Evidence from a meta-analysis. Clin Ther. 2002;24(2):302–16.

66. Schroeder K, Fahey T, Ebrahim S. How Can We Improve Adherence to Blood Pressure-Lowering Medication in Ambulatory Care? Systematic Review of Randomized Controlled Trials. Vol. 164, Archives of Internal Medicine. 2004. p. 722–32.

67. Goldfarb S. Med School Needs an Overhaul. Wall Street Journal. 2020;A15.

68. A Framework for Educating Health Professionals to Address the Social Determinants of Health. A Framework for Educating Health Professionals to Address the Social Determinants of Health. 2016.

69. DeVoe J. Bridging the Gap Between Where the Quality Metric Ends and Real Life Begins—A Trusting Relationship. JAMA Intern Med. 2020;180(2):177–8.

Appendix
Search Strategy and Search Terms

(guideline[Publication Type] OR Practice Guideline [Publication Type] OR Clinical Guideline[Publication Type]) AND hypertension [Title] AND United States [PI]

| Financial security | Transportation & Accessibility | Education & literacy | Food security | Housing security | Other |
|--------------------|-------------------------------|----------------------|---------------|------------------|-------|
| Cost               | Transportation                | Education            | Insecure      | Home/less        | Social determinants |
| Poverty            | Accessibility                 | Health literacy      | Food          | Homelessness     | Resource constrained |
| Poor               | Access                        | Language              | Hunger        | Housing          | Resources |
| Financial          | walkability                   | Training              |               | Neighborhood     | Disparities |
| Affordability      |                               |                      |               |                  | Socioeconomic |
| Discount           |                               |                      |               |                  | Socio-economic |
| Income             |                               |                      |               |                  | Sociodemographic |
| Employment         |                               |                      |               |                  | Primary Care |
| Debt               |                               |                      |               |                  | Health Coverage |
| Bill               |                               |                      |               |                  | Culture |
| Insurance          |                               |                      |               |                  | Cultural competency |
| Economic           |                               |                      |               |                  | Safety |
| Expense            |                               |                      |               |                  | Violence |

Tables

Table 2: Definitions of health care system activities that strengthen social care integration and number of guidelines including health care activities related to social care, by category
| Activity   | Definition                                                                                                                                                                                                 | Transportation related example                                                                 | N=36 (%) | Selected Example                                                                                                                                                                                                                                                                                                                                 |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Awareness  | Activities that identify the social risk and assets of defined patients and populations                                                                                                                   | Ask people about their access to transportation                                               | 10 (28)  | · “Learning how the patient financially supports and budgets for his or her medical care and medications offers the opportunity to share additional insight relating to cost reductions, including restructured payment plans”(5).                                                                                                                                         |
|            |                                                                                                                                                                                                          |                                                                                               |          | · “Utilization of a standardized tool, such as the Accountable Health Communities Screening Tool to screen health-related social needs in clinical settings”(22).                                                                                                                                |
| Adjustment | Activities that focus on altering clinical care to accommodate identified social barriers                                                                                                             | Reduce the need for in-person appointments by using other options such as telehealth appointments or reduce frequency of appointments. | 21 (58)  | · “Although higher-risk individuals should be treated pharmacologically, careful choice of drugs with increased emphasis on cost-effectiveness becomes particularly important with growing economic constraints”(21).                                                                                                                                                  |
| Assistance | Activities that reduce social risk by connecting patients with relevant social care resources                                                                                                             | Providing transportation vouchers so that patients can travel to health care appointments. Vouchers can be used for ride-sharing services or public transportation. | 6 (17)   | · “Referral to other members of the team with appropriate expertise should be considered when encountering barriers to regimen adherence such as cost”(20).                                                                                                                                                                      |
| Alignment  | Activities undertaken by health care systems to understand existing social care assets in the community, organize them to facilitate synergies, and invest in and                                               | Invest in community ride-sharing programs; offer home visits by community health workers to monitor blood pressure | 5 (14)   | · “Creation of partnerships with community organizations that provide healthy food and assist with enrollment in federal nutrition assistance programs”(22).                                                                                                                                                      |
deploy them to positively affect health outcomes

| Advocacy | Activities in which health care organizations work with partner social care organizations to promote policies that facilitate the creation and redeployment of assets or resources to address health and social needs. | Work to promote policies that fundamentally change the transportation infrastructure within the community or the location of clinics to improve accessibility. | 8 (22) |
|---|---|---|---|
| | | · “Lobby the food and entertainment industries for standards of conduct that limit the aggressive targeting of advertising and marketing of high-calorie, low-nutrient-density products to young children or people of color” (34).
| | | · “The recent recommendations by the American Public Health Association and the NHBPEP Coordinating Committee that the food industry, including manufacturers and restaurants, reduce sodium in the food supply by 50 percent over the next decade is the type of approach which, if implemented, would reduce BP in the population” (35). |
| Acknowledgement | Any mention the influence of socioeconomic status on health without reference to specific social care integration activities. | Mention that patients may face transportation barriers to reach their clinical appointments | 18 (50) |
| | | · “We are aware that there is great variability in access to medical care among communities” (27).
| | | · “The best treatments are of no use to a patient if he or she cannot access the healthcare system, has inadequate services, or obtains health care too late to change the outcome” (29). |
| Acknowledge Only | Guidelines includes only acknowledgement activities | 1 (3) |
| None | No mention of any social care activity | 10 (28) |

**Figures**
Figure 1

PRISMA inclusion flow diagram. Reasons for exclusion: Pediatric n=13; Non-essential hypertension (pulmonary hypertension, intracranial hypertension, portal hypertension, radiology findings, renal hypertension, intraabdominal hypertension n=37; Outside of US guidelines n= 6; Pregnancy n= 10) ;4 were not guidelines. † Unable to locate 3 guidelines; 11 excluded because a more updated guideline existed.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- PRISMAScRFillableChecklist10Sept2019.docx
- Appendix2HTNlistFinal8.5.20.xlsx