

Systolic Blood Pressure Control Among Individuals With Type 2 Diabetes: A Comparative Effectiveness Analysis of Three Interventions

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BACKGROUND

The relative effectiveness of 3 approaches to blood pressure control—(i) an intensive lifestyle intervention (ILI) focused on weight loss, (ii) frequent goal-based monitoring of blood pressure with pharmacological management, and (iii) education and support—has not been established among overweight and obese adults with type 2 diabetes who are appropriate for each intervention.

METHODS

Participants from the Action for Health in Diabetes (Look AHEAD) and the Action to Control Cardiovascular Risk in Diabetes (ACCORD) cohorts who met criteria for both clinical trials were identified. The proportions of these individuals with systolic blood pressure (SBP) <140 mm Hg from annual standardized assessments over time were compared with generalized estimating equations.

RESULTS

Across 4 years among 480 Look AHEAD and 1,129 ACCORD participants with baseline SBPs between 130 and 159 mm Hg, ILI (OR = 1.46; 95% CI = [1.18–1.81]) and frequent goal-based monitoring with pharmacotherapy (OR = 1.51; 95% CI = [1.16–1.97]) yielded higher rates

of blood pressure control compared to education and support. The intensive behavioral-based intervention may have been more effective among individuals with body mass index >30 kg/m², while frequent goal-based monitoring with medication management may be more effective among individuals with lower body mass index (interaction $P = 0.047$).

CONCLUSIONS

Among overweight and obese adults with type 2 diabetes, both ILI and frequent goal-based monitoring with pharmacological management can be successful strategies for blood pressure control.

CLINICAL TRIALS REGISTRY

clinicaltrials.gov identifiers NCT00017953 (Look AHEAD) and NCT00000620 (ACCORD).

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Adults who have type 2 diabetes and are overweight are increasing in number and frequently have hypertension.^{1,2} Weight loss and pharmacological management are 2 recommended strategies for controlling their hypertension.³ Two major clinical trials have reported results from 4 years of interventions on blood pressure in cohorts that contained many individuals with these co-morbidities. The Action for

Health in Diabetes (Look AHEAD) contrasted an intensive behavioral-based lifestyle intervention (ILI) targeting ≥10% weight loss with diabetes support and education (DSE); both interventions were combined with community-care blood pressure management.^{4,5} The Action to Control Cardiovascular Risk in Diabetes (ACCORD) blood pressure trial included an intervention of conventional pharmacologic

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blood pressure (CBP) control (its “standard” blood pressure control arm) that was managed by the study group. It targeted systolic blood pressure (SBP) <140 mm Hg, which included frequent clinic-based assessment.^{6,7}

We compare experience with these 3 treatment approaches through 4 years among the subset of individuals from both trials who were appropriate candidates for any of the three approaches: for whom ILI and CBP were judged to be safe and good adherence was expected. We hypothesized that, compared to DSE, the ILI, and the CBP interventions would both provide better long-term blood pressure control in this subset of treatment-eligible individuals.

METHODS

Enrollment

The Look AHEAD trial enrolled 5,145 overweight or obese (body mass index (BMI) ≥ 25 kg/m², or ≥ 27 kg/m² if on insulin) volunteers with type 2 diabetes who were aged 45–76 years and had blood pressures <160/100 mm Hg with or without treatment. The ACCORD Blood Pressure Trial enrolled 4,733 volunteers with type 2 diabetes (BMI ≤ 45 kg/m²). They may have had antihypertensive medications adjusted prior to randomization so that their SBP rose or fell to criteria: between 130 and 160 mm Hg on 0–3 medications, between 161 and 170 mm Hg on 0–2 medications, or between 171 and 180 mm Hg on 0 or 1 medications. Additional details appear elsewhere: Look AHEAD^{8–10} and ACCORD.^{6,11} Our analyses are limited to those eligible for either trial based on SBP ≥ 130 mm Hg (i.e., appropriate for ACCORD), <160 mm Hg (i.e., appropriate for Look AHEAD), and other criteria as described later.

Look AHEAD ILI

The Look AHEAD ILI was designed to induce and maintain $\geq 10\%$ weight loss.⁴ During the first 6 months, participants were seen weekly with 3 group meetings and 1 individual session per month. During months 7–12, participants were seen at least twice per month: group sessions every other week and a monthly individual session. During months 13–48, participants had a monthly individual on-site session followed approximately 2 weeks later by a second individual contact (phone or email), with optional monthly group sessions. Calorie goals were 1,200–1,500 for individuals weighing ≤ 250 lbs (114 kg) at baseline and 1,500–1,800 for individuals weighing >250 lbs. The physical activity component relied heavily on home-based exercise, with gradual progression toward a goal of 175 minutes of moderate intensity physical activity per week. Standard community-care management of blood pressure was left to participants and their medical providers, who were provided results of annual study blood pressure measurements and JNC VI recommendations for blood pressure <130/80 mm Hg. If measured blood pressures exceeded 160 mm Hg systolic or 100 mm Hg diastolic, participants were cautioned and their physicians were notified.

Look AHEAD DSE intervention

The Look AHEAD DSE intervention was designed to promote good health practices and retention. Its initial

session covered key aspects of diabetes self-care and safety.⁵ Subsequent 60–90 minute small group sessions, offered three times annually, provided basic information on nutrition and physical activity promotion, diabetes and stress management, and social support. Community-care of blood pressure was left to participants and the medical management offered by their health care providers. The same measurement schedule, feedback of blood pressure values, and standard recommendations were followed in DSE as in ILI.

ACCORD CBP management intervention

The ACCORD CBP intervention was designed to reach the SBP goal of <140 mm Hg. Drugs were available from all the major antihypertensive drug classes to achieve this goal.^{6,11} Antihypertensive medication down-titration was encouraged if SBP was <135 mm Hg on 2 successive visits or <130 mm Hg at any single visit. Participants were scheduled to attend blood pressure assessment visits at 1 and 4 months, and every 4 months thereafter, with additional visits as needed. Specific drug regimens were not mandated. Although the ACCORD CBP intervention was primarily based on pharmacological control, participants were also provided with dietary and lifestyle recommendations to optimize their glucose control, which included teaching on dietary principles and advice to engage in regular aerobic exercise (if medically fit to do so). The main focus of nutrition intervention was on monitoring carbohydrates, fat, sodium, and alcohol intake to achieve a healthy balanced diet. Participants were encouraged to accumulate ≥ 30 minutes of moderate-intensity aerobic activity for ≥ 5 days a week, which could be in 8–10 minute increments over 24-hour periods. The ACCORD trial also had an arm targeting SBP control <120 mm Hg; we do not consider this arm in our manuscript because there was not a comparable group in Look AHEAD.

Summary of the 3 interventions

In summary, the Look AHEAD DSE intervention combined annual monitoring, participant education, and community care. The Look AHEAD ILI intervention featured these 3 approaches added to ILI. The ACCORD CBP management intervention featured monitoring every 4 months, behavioral advice, and goal-based pharmacological blood pressure management.

Data collection protocols

In both trials, blood pressures were measured by certified staff after participants sat quietly for 5 minutes. Cuff sizes were determined by arm circumference. In Look AHEAD, 2 blood pressure measurements were taken 30 seconds apart with the Dinamap Monitor Pro 100 automated device. In ACCORD, 3 measurements were taken automatically at 1-minute intervals with the Omron HEM-907 device, which calculated and displayed their mean. We base our analyses on the averages of these replicate measures.

In both studies, weight and height were measured using a digital scale and stadiometer. Demographic and risk factor measures were based on self-report. Look AHEAD

participants brought current prescription medications to annual clinic visits for recording and classification, however, doses were not recorded. ACCORD recorded antihypertensive medication use at each visit. In our analyses, medications are classified as ACE-inhibitors, alpha-blockers, aldosterone receptor blockers, angiotensin receptor blockers, beta-blockers, calcium channel blockers, central alpha-2 agonists, reserpine, combined alpha-beta blockers, direct vasodilators, diuretics (thiazide), diuretics (loop), or diuretics (K-sparing).

Statistical analysis

Variables collected by the 2 trials were previously mapped onto a common set of definitions and formats as part of the Look AHEAD/ACCORD pooling project, which identified subsets of participants who were eligible for both the Look AHEAD and ACCORD trials.¹² It found that 21% of Look AHEAD participants were suitable candidates for the overall ACCORD trial and 72% of ACCORD participants were suitable candidates for Look AHEAD. Major reasons that Look AHEAD participants were not eligible for ACCORD were primarily due to better glycemic control and no history of early cardiovascular disease (CVD). Major reasons that ACCORD participants were not eligible for Look AHEAD were often linked to poorer health and BMI <25 kg/m². For our analyses, we applied the additional blood pressure criteria necessary for ACCORD participants to be enrolled in its hypertension control trial to the Look AHEAD cohort, which reduced the percentage of suitable Look AHEAD participants to 10% (*N* = 248 ILI; *N* = 232 DSE) to compare with 1,129 ACCORD CBP participants.

We compared characteristics at trial enrollment of these subsets of Look AHEAD and ACCORD participants using chi-square tests and analyses of variance. We define our primary measure of SBP control as <140 mm Hg, as all 3 intervention groups targeted meeting or exceeding this goal. We used generalized estimating equations models to compare the rates of SBP control over time among intervention groups. We compared the consistency of differences among intervention groups across subgroups of participants, using tests of interaction to assess whether some may differentially benefit from one of the interventions.

RESULTS

Within Look AHEAD, reasonable balance between the ILI and DSE groups was achieved for the subsets of participants we describe (Table 1). Many differences reached statistical significance among the 3 groups, however, primarily due to differences between the Look AHEAD and ACCORD cohorts. Compared to ACCORD participants, the Look AHEAD cohort contained greater numbers of women, college graduates, and Hispanics and fewer nondrinkers, current smokers, insulin users, and individuals with history of CVD. Their mean BMI, SBP, and HbA1c, were higher; their mean years of diabetes duration was lower. The 2 trial cohorts had markedly different profiles of hypertension treatment, with ACCORD participants receiving more antihypertensive therapy than Look AHEAD participants at baseline.

Follow-up of Look AHEAD participants was similar between intervention groups: 97.2% and 94.8% at year 1, 94.0% and 90.0% at year 2, 92.0% and 91.1% at year 3, and 91.2% and 89.3% at year 4 for the ILI and DSE groups, respectively. Follow-up of ACCORD CBP participants was 91.9% at year 1, 89.9% at year 2, 87.4% at year 3, and 71.2% at year 4.

Figure 1A portrays the mean number of antihypertensive medication classes used over time among the 3 intervention groups. During follow-up, the ILI cohort used slightly fewer classes than the DSE participants (*P* = 0.07) and substantially fewer classes than CBP (*P* < 0.001). There was little difference between the DSE and CBP cohorts (*P* = 0.22). Covariate-adjustment did not materially affect these findings.

Figure 1B portrays weight changes from baseline in the 3 cohorts. The ILI cohort had greater weight losses over time than the DSE (*P* < 0.001) and CBP (*P* < 0.001) cohorts; the DSE cohort had modest weight losses, compared to some gain among CPB participants (*P* < 0.001). These were not altered with extensive covariate adjustment.

Figure 2 portrays the percentage of participants with SBP <140 mm Hg over time for the 3 intervention groups. Overall, these were stable across 4 years (*P* = 0.77). Both the ILI (*P* = 0.004) and CBP (*P* = 0.003) yielded higher rates of blood pressure control compared to the DSE. With adjustment for baseline SBP and number of antihypertensive medicines, the odds ratios for control relative to DSE were OR = 1.48 [95% CI = 1.14–1.93] for ILI and OR = 1.40 [1.12–1.72] for CBP. Covariate adjustment for all factors in Table 1 that differed among groups did not materially alter these relationships: the adjusted odds ratios for control relative to DSE were OR = 1.46 [1.18–1.81] (*P* < 0.001) for ILI and OR = 1.51 [1.16–1.97] (*P* = 0.002) for CBP.

Table 2 describes the overall success rates of participants grouped by baseline factors in achieving blood pressure control. Results from tests of interactions are reported to identify subgroups that may differentially benefit from one of the interventions. Overall, better success in controlling blood pressure occurred among women, non-Hispanic whites compared to African-Americans, those using fewer antihypertensive medications at baseline, younger participants, those with lower baseline SBP, and those with shorter histories of diabetes. For only 2 subgroups was there some evidence of differential response to the interventions (*P* < 0.10). The strongest evidence was for BMI (*P* = 0.047). The success rates of CBP did not vary greatly by BMI, but were slightly higher among participants with baseline BMI <30 kg/m². The Look AHEAD interventions had the least success in this BMI group: the odds of successful control for the ILI participants were 1.64 [0.99–2.72] and 1.69 [0.87–3.27] times higher among those with baseline BMI of 30–39 kg/m² and >40 kg/m², respectively, compared to those with BMI 25–29 kg/m². There was also a more modest trend (*P* = 0.07) for individuals without a history of CVD to benefit differentially across the interventions. Among CBP participants there was slightly worse control among those without a history of CVD: OR = 0.85 [0.71–1.02]; for ILI and DSE participants there was slightly better control among those without a history of CVD:

Table 1. Characteristics at baseline of participants grouped by study and intervention assignment

Baseline characteristic	Look AHEAD, N (%) or Mean (SD)		ACCORD, N (%) or Mean (SD)	Chi-squared or analysis of variance, P value
	DSE, N = 248	ILI, N = 232	CBP, N = 1129	
Females	136 (54.8%)	127 (54.7%)	533 (47.2%)	0.02
Education				
Less than high school	19 (7.8%)	19 (8.3%)	162 (14.6%)	<0.001
High school or GED	48 (19.8%)	33 (14.5%)	326 (28.9%)	
Post high school	84 (34.7%)	77 (33.8%)	375 (33.2%)	
College graduate	91 (37.6%)	99 (43.2%)	265 (23.5%)	
Race/ethnicity				
African-American	46 (18.6%)	38 (16.4%)	275 (24.8%)	<0.001
Hispanic	21 (8.5%)	30 (12.9%)	67 (6.0%)	
Non-Hispanic white	174 (70.2%)	148 (63.8%)	690 (62.3%)	
Other/multiple	7 (2.8%)	16 (6.9%)	75 (6.7%)	
Alcohol use				
None	168 (67.7%)	161 (69.7%)	869 (77.0%)	<0.001
1–7/week	69 (27.8%)	55 (23.8%)	231 (20.5%)	
>7/week	11 (4.4%)	15 (6.5%)	28 (2.5%)	
Smoking				
Never	127 (51.4%)	99 (42.7%)	511 (45.4%)	<0.001
Past	111 (44.9%)	118 (50.9%)	489 (43.4%)	
Current	9 (3.6%)	15 (6.5%)	128 (11.4%)	
Insulin users	62 (25.0%)	73 (31.5%)	416 (36.8%)	0.001
History of CVD	51 (20.6%)	47 (20.3%)	356 (32.3%)	<0.001
Antihypertensive medication classes				
0	45 (18.2)	60 (25.9)	94 (8.3)	<0.001
≥1	91 (36.7)	68 (29.3)	284 (25.2)	
≥2	112 (45.2)	104 (44.8)	751 (66.5)	
Age, years	61.4 (5.2)	61.4 (4.8)	62.2 (6.9)	0.09
BMI, kg/m ²	35.1 (4.3)	35.0 (4.6)	33.1 (4.9)	<0.001
Systolic blood pressure				
130–139 mm Hg	111 (44.8)	96 (41.4)	523 (46.3)	0.62
140–149 mm Hg	89 (35.9)	86 (37.1)	372 (33.0)	
150–159 mm Hg	48 (19.4)	50 (21.6)	234 (20.7)	
Diabetes duration, years	9.2 (7.2)	9.0 (6.7)	10.9 (8.2)	<0.001
HbA1c, %	8.40 (0.79)	8.36 (0.81)	8.21 (0.98)	0.006

Abbreviation: GED, Completion of the General Educational Development test.

OR = 1.36 [0.86–2.17] and OR = 1.31 [0.82–2.10] respectively. We note, however, that all 95% confidence intervals for these subgroup comparisons include 1.

Percent change in BMI, as a time-varying covariate, was related to SBP control in each intervention group in a fairly uniform manner (interaction $P = 0.09$). The odds of SBP control associated with a 5% loss in BMI were increased by a factor of 1.08 [1.02–1.13] among CPB participants, 1.23 [1.07–1.42] among DSE participants, and 1.19 [1.04–1.34] among ILI participants.

DISCUSSION

The Look AHEAD ILI and the ACCORD pharmacologic intervention including frequent goal-based monitoring both provided better overall success in meeting blood pressure goals than the Look AHEAD DSE intervention. The Look AHEAD ILI accomplished this with weight loss even with less use of antihypertensive medications. The ACCORD CBP did this with comparable levels of antihypertensive medication, even with a slight gain in weight. Overall, the relative effects on

blood pressure control provided by the ILI and CBP interventions were fairly consistent across subgroups of participants formed by a number of risk factors for hypertension. While not statistically significant, there was some evidence that the CBP outperformed the ILI intervention for individuals with BMI <30kg/m² and those with a history of CVD while the ILI intervention may have outperformed the CBP for heavier individuals and those free from CVD. While the groups of participants assigned to these interventions differed across a number of factors that were related to successful blood pressure control, our comparative effectiveness analysis is bolstered by the ability to confirm that all individuals included in our analyses were appropriate candidates for any of the three interventions. Nevertheless, we cannot rule out whether the relative benefits we observed for CBP compared to DSE could be attributable to unmeasured differences between the Look AHEAD and ACCORD study groups. The CBP cohort included the greatest proportion of African-Americans, a group for which the overall rate of blood pressure control was lower: including race/ethnicity subgroups as a covariate might be expected to enhance the difference between CBP and DSE.

Look AHEAD has examined the relative safety of ILI compared to DSE for serious adverse events potentially related to

weight loss. Among events reported, there was a slight increased rate of fractures among the ILI group: 2.5 vs. 2.2 per 100 pyrs.¹¹ ACCORD has reported that CBP compared to intensive blood pressure lowering (goal < 120 mm Hg) has lower rates of several serious adverse events potentially related to antihypertensive treatments (e.g., hypokalemia, elevations of serum creatinine).¹¹ Within the relatively few Look AHEAD participants included in these analyses, these events were rare and differences between protocols make cross-trial comparisons difficult.

Weight loss

Weight loss is recommended for overweight and obese individuals with type 2 diabetes.¹³ As expected, the Look AHEAD ILI group achieved the greatest weight losses: these individuals were provided behavioral tools and extensive training in strategies to effect lifestyle changes. These weight losses conferred greater blood pressure control than DSE, even with less use of antihypertensive medications and lower medication costs.¹⁵

Individuals with greater weight loss in all 3 interventions experienced greater blood pressure control, as might be expected,^{16,17} thus it appears that it may be additive to the benefit of pharmacologic approaches.

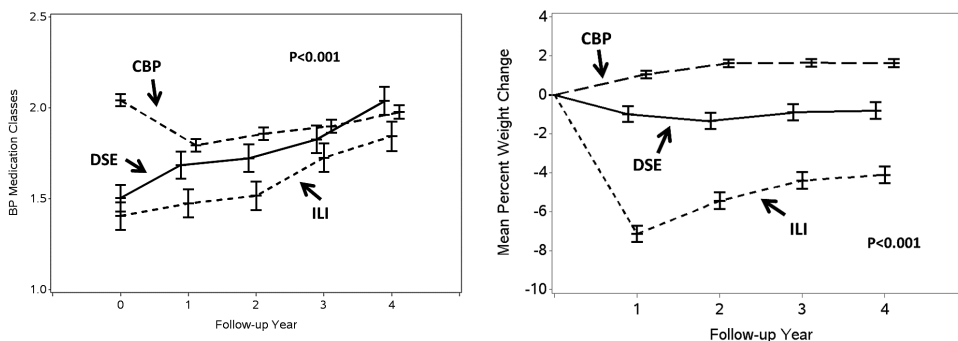


Figure 1. (a) Mean number of antihypertensive medication classes over time by intervention group. Classes are ACE-inhibitors, alpha-blockers/agonists, aldosterone receptor blockers, angiotensin II receptor blockers, beta-blockers, calcium channel blockers (non-DH), calcium channel blockers (DH), central alpha-2 agonists, combined A-B blockers, direct vasodilators, diuretics (thiazide), diuretics (loop), and diuretics (K-sparing). (b) Mean percent changes in weight over time by intervention group.

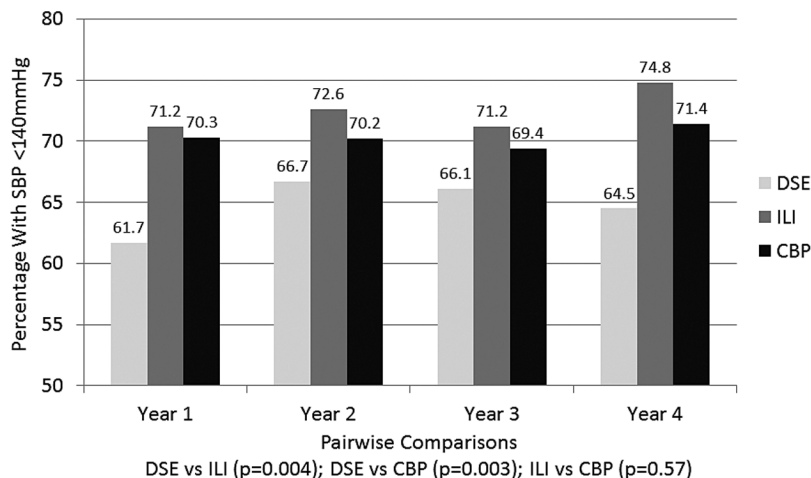


Figure 2. Percentage of participants with SBP <140 mm Hg over time by intervention group. Inference is based on generalized estimating equations with adjustment for baseline systolic blood pressure and number of medication classes.

Table 2. Relative odds for systolic blood pressure <140 mm Hg by baseline characteristics and results of tests for the consistency of effects across subgroups and an interaction between subgroups and the three intervention groups

Baseline characteristic	Odds ratio for SBP control	95% CI	Consistency between subgroups, <i>P</i> value	Subgroup by intervention group interaction, <i>P</i> value
Gender				
Female	1.21	[1.06, 1.40]	0.006	0.20
Male (ref)	1.00			
Education				
Less than high school	0.81	[0.64, 1.04]	0.13	0.95
High school or GED	0.92	[0.76, 1.12]		
Post high school	0.82	[0.69, 0.98]		
College graduate (ref)	1.00			
Race/ethnicity				
African-American	0.66	[0.48, 0.90]	0.01	0.49
Hispanic	0.95	[0.62, 1.46]		
Other/multiple	0.81	[0.60, 1.10]		
Non-Hispanic white (ref)	1.00			
Alcohol use				
None	1.00	[0.69, 1.45]	0.71	0.40
1–7/week	1.08	[0.73, 1.59]		
>7/week (ref)	1.00			
Smoking				
Never	0.89	[0.71, 1.12]	0.23	0.44
Past	1.01	[0.80, 1.27]		
Current (ref)	1.00			
Insulin user				
No	0.87	[0.75, 1.01]	0.06	0.14
Yes (ref)	1.00			
History of CVD				
No	1.05	[0.89, 1.23]	0.56	0.07 ^a
Yes (ref)	1.00			
Antihypertensive medication classes				
0	1.53	[1.22, 1.92]	<0.001	0.27
1	1.41	[1.20, 1.67]		
≥2 (ref)	1.00			
Age, years				
Ten years older	0.77	[0.69, 0.86]	<0.001	0.30
BMI				
5 kg/m ² greater	1.00	[0.93, 1.08]	0.91	0.047 ^b
Systolic blood pressure				
130–139 mm Hg	1.99	[1.66, 2.39]	<0.001	0.58
140–149 mm Hg	1.28	[1.06, 1.55]		

Table 2. Continued

Baseline characteristic	Odds ratio for SBP control	95% CI	Consistency between subgroups, P value	Subgroup by intervention group interaction, P value
150–159 mm Hg (ref)	1.00			
Diabetes duration				
5 years longer	0.91	[0.87, 0.95]	<0.001	0.10
HbA1c, %				
One unit higher	0.96	[0.89, 1.04]	0.28	0.93

Abbreviation: GED, Completion of the General Educational Development test.

Baseline systolic blood pressure and number of medication classes are included as covariates.

^aAmong CBP participants there was slightly worse control among those without a history of CVD: OR = 0.85 [95% CI: 0.71, 1.02]; Among ILI and DSE participants there was slightly better control among those without a history of CVD: OR = 1.36 [0.86, 2.17] and OR = 1.31 [0.82, 2.10], respectively.

^bCompared to participants with BMI > 40 kg/m², the odds of blood pressure control among CBP participants was 1.13 [0.84, 1.52] among those with BMI 25–29 kg/m² and 1.01 [0.77, 1.32] among those with BMI 30–39 kg/m². Compared to participants with BMI 25–29 kg/m², the odds of blood pressure control among DSE participants were 0.98 [0.54, 1.78] for BMI 30–29 kg/m² and 1.30 [0.62, 2.72] for BMI ≥ 40 kg/m². Among ILI participants, these were 1.64 [0.99, 2.72] for BMI 30–39 kg/m² and 1.69 [0.88, 3.27] for BMI ≥ 40 kg/m².

Of interest, the DSE approach of offering periodic educational and support sessions may have also been successful in promoting weight maintenance, and some overall mean weight loss, compared to the CBP intervention, which did not produce weight loss. This level was insufficient to match the blood pressure control provided by the CBP. However, individuals enrolled in Look AHEAD may have had more interest in weight loss than those in ACCORD and some weight gain among ACCORD participants may be attributable to its intensive glycemic control intervention.¹⁵

Frequent blood pressure monitoring

At enrollment, ACCORD CBP participants had been prescribed more antihypertensive medications than their Look AHEAD counterparts. Their prescription use was tapered during the first year of the CBP intervention and became comparable to that among DSE participants over time. Despite this, they were able to achieve better levels of blood pressure control. This suggests that the ACCORD frequent clinic-based monitoring, despite modest average increases in weight, was superior to participant education and community care (i.e., DSE). In addition, blood pressure medications were provided to ACCORD study participants as part of the study protocol. This may have improved compliance with prescribed therapy. While most treatment guidelines for individuals with diabetes recommend blood pressure monitoring 4 times annually and aggressive pharmacological control,^{14,18} the rates of blood pressure control provided by community care are often less than optimal.^{19,20}

Strengths and limitations

Strengths of this study include well-characterized cohorts, standardized assessments, and good retention. Analyses are limited by not having data on medication doses in Look AHEAD. While individuals included in analyses simultaneously met criteria to be good candidates for all 3 of interventions,

differences between the Look AHEAD and ACCORD cohorts existed and may have influenced findings. Participants were volunteers to the respective treatment approaches (e.g., pharmacotherapy vs. lifestyle change) and individual's preferences may have influenced findings. Cohorts were limited to those with baseline SBPs of 130–159 mm Hg. The clinical trials made considerable efforts to select participants and promote adherence to interventions among the volunteers: the intervention effects we describe may not be fully achieved in other settings. We have not examined the relative costs of delivering these interventions or patient treatment preferences.

Summary

Frequent goal-based blood pressure monitoring combined with pharmacological therapy and intensive lifestyle weight loss intervention combined with community care may provide comparable levels of blood pressure control among overweight and obese individuals with type 2 diabetes. We did not find strong evidence that either is preferentially effective across many subgroups of individuals based on risk factors, however there is some evidence that weight loss may be more effective among morbidly obese participants while the frequent monitoring in combination with pharmacotherapy approach may be more effective among overweight only participants. Both approaches may be superior to DSE combined with community care, however we cannot rule out that differences between the Look AHEAD and ACCORD groups may influence our findings. Future studies combining the ILI and frequent goal-based pharmacotherapy may be warranted.

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