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PATHWEIGH Tool for Chronic Weight Management Built into EPIC Electronic Medical Record: Methods, Pilot Results and Future Directions

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Abstract

Objective: Despite the overwhelming prevalence and health implications of obesity, it is rarely addressed in a health care setting. Providers and patients alike cite innumerable barriers as to the reasons why. The current study provides a framework to systematically address and deconstruct these barriers.

Methods: A pilot study was conducted to evaluate the feasibility of the PATHWEIGH weight loss intervention in primary care. The intervention consisted of staff team training, workflow system management and data capture from the electronic medical record (EPIC). Two family medicine clinics in the same health care system were compared in their approach to weight management: PATHWEIGH method *vs.* Standard of Care (SOC); matched for provider expertise. Statistical analyses examined patient demographics, weight-related comorbidities, baseline weight and weight loss over 18 months.

Results: Patients in the PATHWEIGH group (N = 109) *vs.* SOC (N = 338) were younger (45 *vs.* 54 years old, $p < 0.001$), more likely to be female (89% *vs.* 65%, $p < 0.01$) and be commercially insured (93% *vs.* 52%, $p < 0.001$). The groups were comparable with respect to the numbers of weight-related comorbidities ($p = 0.57$). Baseline weight was not different between the groups (103.8 *vs.* 101.5 kg, $p = 0.32$), but weight lost was significantly greater in the PATHWEIGH group (7.9 kg / 7.2% body weight *vs.* 2.4 kg / 2.1% body weight SOC, $p < 0.001$ for both) despite a similar percentage of patients receiving bariatric surgery (10% for both groups, $p = 0.99$). Anti-obesity medication was more commonly prescribed in PATHWEIGH *vs.* SOC (79.8 *vs.* 20.7%, $p < 0.001$).

Conclusion: These preliminary data demonstrate the feasibility and suggest superiority of using PATHWEIGH for weight loss in a primary care setting.

Keywords

PATHWEIGH, Weight management tool in EPIC, Electronic medical record

Abbreviations

SOC: Standard of Care; **CDC:** Centers for Disease Control and Prevention;

BMI: Body Mass Index; **U.S.:** United States; **EMR:** Electronic Medical Record; **MA:** Medical Assistant; **TSH:** Thyroid Stimulating Hormone; **ALT:** Alanine Transaminase; **AST:** Aspartate Aminotransferase; **HDL:** High-Density Lipid; **IBT:** Intensive Behavioral Therapy; **CME:** Continuing Medical Education

Introduction

As of 2016, the Centers for Disease Control and Prevention (CDC) estimated that 72% of United States (U.S.) adults have overweight (i.e. body mass index (BMI) ≥ 25 kg/m^2) and 40% have obesity (e.g. BMI ≥ 30 kg/m^2) with no sign of abatement [1]. Obesity is a well-established risk factor for innumerable diseases, collectively costing the U.S. $1.7 trillion in 2018 [2]. Importantly, however, obesity is being increasingly recognized not only as a risk factor for disease but also as a disease itself. Despite this fact, only ~ 50% of people with a BMI of 50 kg/m^2 have a diagnosis of obesity [3] and < 1% of people with any degree of overweight or obesity are offered anything other than lifestyle advice [4].

Reasons behind the lack of weight management prioritization are extensive and complex. Eighty-two percent of people with obesity believe they are responsible for their weight; a number highly corroborated by health care providers [5]. Health care providers cite lack of time and competing issues as the leading causes of why obesity is not prioritized [5], but poor reimbursement for care and lack of effective tools are also widely cited [5]. Employers providing commercial insurance to employees cite yet a different reason for why anti-obesity medication is rarely covered: lack of data on effectiveness, cost effectiveness, long-term benefits and safety [5]. While these are only a handful of the many reasons why weight management is rarely pursued in a clinical setting, suffice it to say, stigma and bias against obesity exist on every level [6].

To address these barriers and facilitate the practice of obesity medicine, PATHWEIGH was developed: a workflow and disease state prioritization tool for chronic weight management in primary care. The purpose of PATHWEIGH was to design a scalable, iterative clinical tool that effectively helps patients to lose weight and maintain weight loss. This paper describes data from the pilot analysis and discusses future directions.

Materials and Method

Participants

Participants in this pilot study were adults (age ≥ 18 years) with BMI ≥ 25 kg/m^2 seen in one of two primary care clinics in the Denver, Colorado metro area (~ 20 miles apart) between January 1, 2018 and June 15, 2019. Two providers at one site used the PATHWEIGH weight management method *vs.* two providers at the other site used standard of care (SOC) for weight management (i.e. discretional advice for diet, exercise, behavior change, use of anti-obesity medication and/or referral to bariatric surgery) [7]. Providers were purposefully selected to be matched on sex, type of training and specialty. Specifically, each clinic had one female endocrinologist and one male primary care physician of similar ages all of whom had been working in their respective clinic for 5-7 years. No additional training was given to the providers outside of their board-certified area and no differences existed with respect to the potential to refer to behavioral health, dieticians, bariatric, etc. Patients seen by the providers using the PATHWEIGH method (see below) were demarcated on a specific patient list (collected in a pre-specified fashion prior to the deployment of PATHWEIGH into the electronic medical record (EMR), specifically EPIC (EPIC; Verona, WI) whereas patients at the SOC clinic were extracted from the EMR based on a primary diagnosis of obesity, weight management or any obesity and/or weight-related ICD-10 codes (E66-E66.9; Z76.89). All data were de-identified and devoid of personal health information on extraction using a proprietary process developed by the COMPASS Data Warehouse Aurora, CO. The Colorado Multiple Institutional Review Board has deemed studies using this process exempt from informed consent and protocol review.

Interventions

PATHWEIGH

PATHWEIGH incorporates two general features that make it unique from other EMR systems that capture data around body weight: the workflow and the tool built into EPIC.

Workflow: There are two possible workflow scenarios. First, if the patient was known to be coming to the clinic for weight management, a message was sent to the medical assistant (MA) before the visit alerting him/her to use the PATHWEIGH flow sheet. The MA acquired vital signs, including height and weight (EPIC then calculates BMI), listed obesity or weight management as the diagnosis, chief complaint and reason for visit, and took a brief weight history in pre-determined fields. The process took approximately 10 minutes. Second, if the patient was not known to be coming to the clinic for weight management, but weight management became the priority during the visit, the provider transitioned their note into the PATHWEIGH flow sheet. The use of the PATHWEIGH method was 100% optional and conventional note formats were always available. In the initial scenario above (preferred), conventional workflow was optimized because 1: the diagnosis of overweight or obesity is automated, 2: linkage to the weight-related comorbidities (ICD-10 codes E66-E66.9; Z76.89) was automated to optimize reimbursement, 3: key historical information captured prior to the clinician entering the room left maximal time for the clinician-patient conversation.

The tool itself: PATHWEIGH was built to capture a broad array of weight-related data in discrete fields. The flow sheet prompts the medical assistant and/or clinician to ask about history of weight gain and loss, goals and impact of weight on their health and quality of life. Specific questions for the initial and follow-up visits are outlined in table 1. Labs of interest (i.e. A1c, liver function tests, lipids and thyroid stimulating hormone (TSH)) within the past year automatically import

Table 1: PATHWEIGH data capture at initial and follow-up visits.

Initial visit
Weight history (highest and lowest weights, weight change trajectory over time)
History of weight loss efforts (previous weight loss and duration of maintenance, what worked and what did not)
Other potential contributing factors (comorbidities listed < 1 year of visit, current medication usage, history of sexual, physical or emotional abuse)
Weight loss goal (in kg, health improvement or greater functionality)
Weight loss maintenance goal
Readiness for change and confidence in the process
Current level of physical activity (self-reported minutes/week) and caloric intake (self-reported calories / day)
History of using anti-obesity medication or bariatric surgery procedure
Confidence in the health care team and health care provider
Follow-up visit (can carry the information above forward, plus…)
Weight change since last visit
Change in calories, macronutrients (carbohydrate, fat and protein), activity
Adopted behavioral strategies
Adherence to and side effects of anti-obesity medications, if prescribed
Pursuit of referral to bariatric surgery
Readiness for change and confidence in the process
Confidence in the health care team and health care provider

into the tool. The weight changes are graphed in the tool for patient and provider viewing. Medication chronology can be placed under the weight graph. The current version requires the provider to enter the weight-related comorbidities at the initial visit. Currently, PATHWEIGH is not prescriptive so as to gain a wide array of practice patterns to see what works for who and when. Generally, advice was aligned with the current Obesity Society guidelines and standards of care (see below) [7]. Planned iterations will use these data to derive probability estimates for successful weight loss and weight maintenance based on the data captured above. According to EPIC User Web- the online library where alterations to EPIC can be viewed and shared- this has been done to date. Patients are seen 6 weeks after their initial visit for weight management, then every 2-3 months thereafter. Visits are 20-30 minutes in duration.

Current standards of care recommend lifestyle counseling for patients with a BMI > 25 kg/m^2 focusing on increasing physical activity, caloric restriction and the avoidance of trans and saturated fats. Instruction on behavioral modification to achieve these goals is an essential, highly personalized aspect of weight management. Anti-obesity medication may be considered for those with a BMI > 30 kg/m^2 or > 27 kg/m^2 with weight related comorbidities. Bariatric surgery may be considered for those with a BMI > 40 kg/m^2 or > 35 kg/m^2 with weight-related comorbidities [7].

Outcomes

The primary outcomes of interest for the pilot analyses were 1: weight loss, defined by the change in weight from the first (baseline) encounter of the patient to the last encounter of the patient during the study period, and 2: percent of patients losing > 5% weight loss, > 10% weight loss or > 15% weight loss (not mutually exclusive groups). Examination of the > 15% weight loss was exploratory as compared to > 5% and > 10% which are conventional for the approval of anti-obesity pharmacotherapy.

The secondary outcomes of interest were absolute and percent change in BMI, which used similar processes as the weight loss outcomes. Baseline values are defined as the first encounter for the patient during the data extraction period (January 1, 2018 through June 15, 2019).

Additionally, differences in baseline data were compared between groups including weight-related comorbidities (0 comorbidities, 1-2 comorbidities, 3-4 comorbidities, and ≥ 5 comorbidities; as well as specific comorbidities); labs of interest (hemoglobin A1c, alanine transaminase (ALT), aspartate aminotransferase (AST), high-density lipid (HDL) cholesterol, triglycerides, and thyroid stimulating hormone (TSH)); and percent using anti-obesity medication (full list of medication included in Supplementary table 2) or referred to bariatric surgery.

Because of the relatively short duration of the pilot, change in labs, comorbidities, medication use for comorbidities, quality of life, weight loss goals achieved or success with respect to weight loss maintenance were not analyzed.

Statistical analysis

Statistics

Following extraction from EPIC, data were managed in SAS 9.4 (Cary, NC). Descriptive statistics were used to compare baseline demographics, weight-related comorbidities, labs of interest, weight and BMI for the PATHWEIGH *vs.* SOC groups. T-tests and chi-square analyses were used to compare demographic and clinical characteristics between groups. Multiple linear regression was used to examine the differences between the two groups, adjusting for insurance, age at current encounter and sex. All results (mean ± standard deviation (SD)) are preliminary and intended to support feasibility of PATHWEIGH for weight management in a primary care setting.

Results

A total of 471 patients (110 PATHWEIGH and 361 SOC) were included in the pilot study; however, 24 patients were removed due to only having one encounter during the specified study period. Hence, a total of 447 total patients were included in this analysis (109 PATHWEIGH and 338 SOC).

Approximately 10% of eligible patients (i.e. BMI > 25 kg/m^2) had their weight prioritized at the time of their visits and this was not different between the PATHWEIGH and SOC clinics. The baseline demographic data are shown in table 2. Patients in the PATHWEIGH group were younger, more likely to be female and be commercially insured compared to the SOC group. There were no differences between the groups with respect to self-reported race or ethnicity. The groups were also comparable with respect to the number of self-reported

Table 2: Patient demographics.

	PATHWEIGH	SOC	
	N = 109	N = 338	p-value
Age (yrs)	45.0 (11.4)	53.9 (14.9)	< 0.001
Sex (%, Female)	89 (82%)	219 (65%)	< 0.01
Race (%)			0.11
Caucasian	85 (78%)	236 (70%)	
Black	5 (5%)	42 (12%)	
Other	10 (9%)	42 (12%)	
Unknown	9 (8%)	18 (5%)	
Ethnicity (%)			0.10
Non-Hispanic	84 (77%)	284 (84%)	
Hispanic	15 (14%)	37 (11%)	
Unknown	10 (9%)	17 (5%)	
Insurance (%)			< 0.001
commercial	101 (93%)	176 (52%)	
government	7 (6%)	161 (48%)	
none	1 (1%)	1 (< 1%)	
Anti-obesity medication (%, yes)	87 (80%)	70 (21%)	< 0.001

weight-related comorbidities with the majority of patients in both groups diagnosed with 1-2 weight-related comorbidities (67% *vs.* 64%, PATHWEIGH *vs.* SOC, p = 0.57). Some differences were seen in the type of weight-related comorbidity reported (Table 3). Baseline A1c levels were statistically higher in the SOC *vs.* PATHWEIGH groups (Table 4) with no such

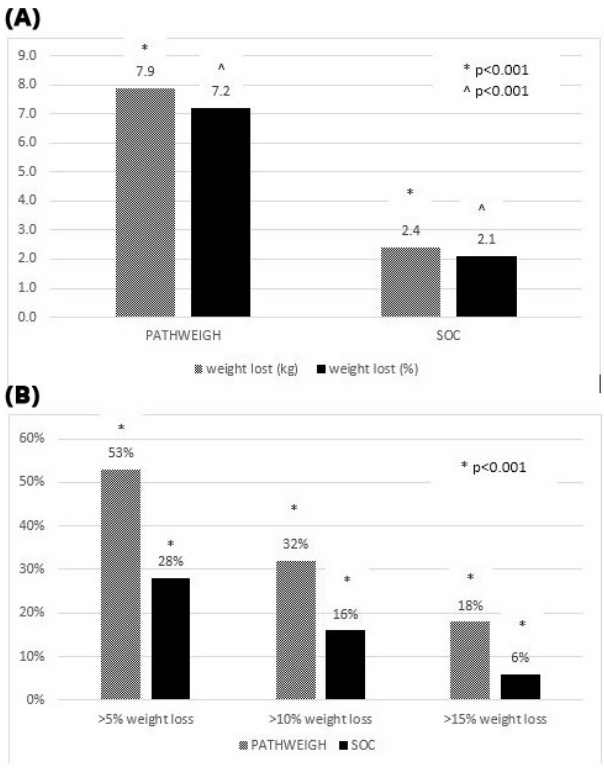

Figure 1: Average weight loss **(A)** and percent losing >5%, >10% and >15% of baseline body weight **(B)** over an average follow-up of one year.

Table 3: Weight-related comorbidities reported at initiation of weight loss.

	PATHWEIGH	SOC	p-value
	N = 109	N = 338	
			0.57
no comorbidities	10 (9%)	31 (9%)	
1-2 comorbidities	73 (67%)	217 (64%)	
3-5 comorbidities	25 (23%)	90 (27%)	
> 5 comorbidities	1 (1%)	0	

*Comorbidities include all diagnoses per participant between 2018 and 2019

	PATHWEIGH	SOC
	N = 109	N = 338
Skin (e.g. cellulitis)	1 (1%)	0
Type 2 diabetes	2 (2%)	13 (4%)
Vitamin/Mineral deficiency	19 (17%)	100 (30%)
Reproductive (e.g. PCOS)	15 (14%)	31 (9%)
Behavior	5 (5%)	2 (1%)
Sleep Apnea	8 (7%)	41 (12%)
Hypertension	32 (29%)	176 (52%)
Liver-related diseases	4 (4%)	15 (4%)
Osteoarthritis	13 (12%)	7 (2%)
Eating Disorder	7 (6%)	2 (1%)

*Comorbidities include all diagnoses per participant between 2018 and 2019.

Comorbidities	ICD10 Codes
Skin (i.e. cellulitis)	L03.019, L03.032, L03.116, L03.119, L03.818, L03.90
Type 2 diabetes	E11.22
Vitamin/Mineral deficiency	E55.9, E61.1
Reproductive (i.e. PCOS)	E28.2, E28.8, E29.1, N62
Behavior	F90.9, F98.8
Sleep Apnea	G47.33, R06.89
Hypertension	G93.2, I10
Liver-related	K74.60, K75.81, K76.0
Osteoarthritis	M19.079, M19.90
Eating Disorder	F50.81, R63.2

SOC = standard of care

differences observed for lipids, liver function tests, or TSH. The most common weight-related comorbidities reported are shown in table 5.

Baseline weight (103.8 ± 21.8 *vs.* 101.5 ± 19.4 kg, p = 0.30) and BMI (37.2 ± 5.9 *vs.* 35.6 ± 6.2 kg/m^2, p = 0.15) were comparable, but weight loss 8.0 ± 10.5 kg (7.3%) *vs.* 2.5 ± 10.7 kg (2.3%) was significantly greater in PATHWEIGH *vs.* SOC, respectively (p < 0.001). The percentage of patients losing > 5% (53 *vs.* 28%, p < 0.001), > 10% (32 *vs.* 16%, p < 0.001) or > 15% (18 *vs.* 6%, p < 0.001) body weight were greater in the PATHWEIGH patients *vs.* SOC patients (Figure 1). After adjusting for the patients' age, sex, number of weight-prioritized clinic visits and insurance type at baseline, the difference in absolute and percent weight loss remained

Table 4: Baseline labs of interest.

	PATHWEIGH	SOC	p-value
Triglycerides (mg/dL)	159.7 (101.1)	172.0 (100.9)	0.40
sample size	71	147	
A1c (%)	5.8 (0.9)	7.0 (1.7)	< 0.001
sample size	62	201	
HDL Cholesterol (mg/dL)	45.5 (10.0)	45.0 (13.0)	0.78
sample size	71	147	
TSH (mIU/L)	3.0 (5.2)	2.6 (2.5)	0.42
sample size	75	168	
ALT (U/L)	21.9 (12.2)	24.0 (13.0)	0.57
sample size	16	48	
AST (U/L)	20.4 (7.5)	25.5 (13.7)	0.16
sample size	16	48	

SOC = Standard of Care

significantly different (and not materially changed) between the PATHWEIGH and SOC groups ($p < 0.01$ for both analyses). Anti-obesity medication was used in 79.8% of PATHWEIGH and 20.7% of SOC patients ($p < 0.001$; types queried shown in table 6), whereas the number of patients receiving a bariatric procedure (~ 10% for both, $p = 0.99$), was similar between groups. The use of anti-obesity medication or bariatric surgery was solely at the discretion of the clinician without prompting. The average length of follow-up was 352 days in the PATHWEIGH group and 363 days in the SOC group, during which time the average number of visits was 6.7 in the PATHWEIGH group and 2.9 in the SOC group.

Discussion

Findings from the current preliminary pilot study demonstrate the feasibility, and illustrate the potential utility, of approaches like PATHWEIGH; a workflow and disease state prioritization tool for chronic weight management in primary care. A highly time-efficient, no additional cost, integrated data capture tool was associated with 7.2% *vs.* 2.1% total body weight loss in clinics matched for provider expertise and patient demographics, as much as possible.

Though a high prevalence of obesity is seen in primary care, it remains undertreated and underdiagnosed [3]. To address these needs, PATHWEIGH was developed and tested the hypothesis that a simple flow sheet that prompts the clinician through a prioritized visit for weight management results in greater patient weight loss. Indeed, results support this hypothesis but likely relate to the higher use of anti-obesity medication in combination with lifestyle counseling rather than lifestyle counseling (or bariatric surgery) alone. Results are consistent with a systematic review that found physician counseling alone was unlikely to result in clinically meaningful weight loss without the addition of pharmacotherapy [8]. Importantly, patient contact was far more frequent in the PATHWEIGH group (6.7 *vs.* 2.9 visits over 1 year), which

Table 5: Most common weight-related comorbidities reported with ICD-10 codes.

Pulmonology
Obstructive sleep apnea- G47.33
Hypoventilation syndrome- R06.89
Asthma- J45
Restrictive obstructive pulmonary disease- Z87.09
Gastroenterology
NAFLD- K76.0
Steatosis- E76.0
steatohepatitis (NASH)- K75.81
Cirrhosis- K74.60
Cholelithiasis- K80
Cholecystitis- K81
GERD- K21
Hernias- K40, K41, K42, K43, K44, K45, K46
Pancreatitis- K85
Constipation- K59
Gynecology and Urology
Amenorrhea- N91
Infertility- N46, N97
PCOS- E28.2
Stress Urinary incontinence- N39
Gestational Diabetes- Q24
Hirsutism- L68
Erectile dysfunction- N52
Pelvic prolapse- N81- cystocele, rectocele, uterine prolapse, vault prolapse
Renal
Proteinuria- R80
CKD- N18
Neurology and Musculoskeletal
Meralgia Paresthetica- G57
Carpal Tunnel Syndrome- G56
Osteoarthritis- M17, M18, M19, M47
Gout- M10
Immobility- Z74.09
Low back pain- M54
Pes planus- M21
Knock knee deformity- M21
Migraines- G43
Skin
Striae Distensae- L90.6
Cellulitis- L02, L03, H60, N61, K12
Intertrigo- L30
Carbuncles- L02.93
Furunculosis- L02
Hidradenitis suppurative- L73.2

Cardiovascular
Idiopathic intracranial hypertension (pseudotumor cerebri)- G93.2
Pulmonary embolus- I26, z89.711
Stroke- I63
CAD- I25
Heart Failure- I50
Cor Pulmonale- I27
Dyslipidemia- hyperlipidemia, hypertriglyceridemia- E78, E11
Hypertension- I10, E11.22
Venous stasis- I87
Varicose veins- I83
Venous stasis ulcers- I83
Endocrine
Type 2 Diabetes- E11
Hyperandrogenism (in women)- E28.8
Hypoandrogenism (in men)- E66.8, E29.1
Gynecomastia- N62
Oncology
breast, uterus, cervix, colon, esophagus, pancreas, kidney, prostate- C00-D49
Psychiatric
Depression- F32
Body-image dissatisfaction- F45.22
Low libido- R68.82
Anxiety- F41
ADD/ADHD- F98.8, F90.9
Binge eating- R63.2, F50.81
Bulimia nervosa- F50.2

Table 6: Anti-obesity medications queried.

Obesity Medications	**Potential Trade Names**
Phentermine	Lomaira, Adipex, Fastin
Topiramate	Topamax
Orlistat	Xenical, Alli
Phentermine/topiramate	Qsymia
Lorcaserin	Belviq
Buproprion/naltrexone	Contrave
Buproprion	Wellbutrin IR/SR/XR
Naltrexone	Narcan
Liraglutide 3.0	Saxenda

was at the discretion of the providers and underscores the importance of consistent follow-up. Future analyses will utilize the data from PATHWEIGH to derive probability estimates as to which patients are more likely to respond to which anti-obesity medication, increasingly guiding its users to provide personalized weight management in the primary care setting.

Unlike most other prescription medications, however, utilization of anti-obesity medication must be accompanied by lifestyle changes for their positive benefits to be seen. Increasing evidence supports the feasibility of performing intensive behavioral therapy (IBT) in primary care [9-11]. Behavioral health providers integrated into primary care clinics are ideally positioned to support patients with overweight or obesity in making behavioral modifications that are necessary for sustained weight loss [12] and are an integral part of the PATHWEIGH program. Psychosocial factors that impact weight gain are often complex and multifaceted [12]. Behavioral health providers working alongside primary care providers can help in uncovering idiographic mechanisms that led to or have maintained overweight or obesity for patients [12], as well as tailor individualized health behavior goals to support lifestyle changes. Behavioral health is also equipped to manage comorbid conditions which can impact the success of traditional weight loss treatments, including: insomnia, depression, anxiety, binge eating, chronic pain, attention deficit hyperactivity disorder (ADHD) or other serious mental illnesses (e.g. bipolar, post-traumatic stress disorder) [12]. Inclusion of these comorbid conditions was integrated midway through this pilot analysis and will be carefully examined for their impact on weight in the evolution of PATHWEIGH (see mental health diagnoses table 3).

The results of the pilot analyses are promising in that patients were able to lose weight during the early test phase of PATHWEIGH. The most unique aspect of PATHWEIGH is the ability to have a data capture system that will increasingly guide care, making obesity management viable for time-constrained clinicians. EPIC is a widely utilized EMR in the U.S., thus the PATHWEIGH tool has great potential for easy dissemination to other medical practices that use EPIC could have great potential for dissemination. Further study is warranted to confirm the tool's efficacy in a larger sample of practices with diverse patient and provider characteristics. Additionally, understanding how PATHWEIGH could be disseminated and implemented into different clinical and community contexts is needed. Nevertheless, PATHWEIGH was designed to be scalable and it overcomes the most basic barriers to weight management including documenting obesity as a disease, linking it to its comorbidities to address billing issues, utilizing medical assistant time to conserve clinician time and asking specific questions whose answers direct the weight management strategy. Future iterations of PATHWEIGH will include learning modules for clinic staff to understand the workflow and continuing medical education (CME)-accredited modules for clinicians to learn how to practice comprehensive obesity medicine. EPIC will be optimized to prompt clinicians and offer suggestions as to what may work for which patients, as well as include animations and video content relevant to specific patients and their barriers. Collectively, the approach will iterate to address the current barriers that exist.

Several limitations of the current work should be noted. First, this was a pilot study conducted in a single health care system in the Denver metro area. Therefore, the patients and providers may not necessarily represent patients and providers elsewhere. Second, the two clinics were matched for

provider characteristics rendering some differences in patient characteristics, such as insurance status which could have led to healthy user bias. It should be noted however, ~ 80% of commercial insurance does not cover anti-obesity medication [4]. Sample size differed between groups (which could have been due to differences in patient volume between the clinics, total patients with BMI > 25 kg/m^2, weight prioritization or other) and patients at each site could have been at very different stages of their weight management. Comprehensive data on socioeconomic status was not collected. Additionally, baseline laboratory tests were not completed on everyone; however, the proportions of labs for each group (PATHWEIGH and SOC) were similar suggesting non-differential missingness (data not shown). Nevertheless, lack of patient randomization may have led to systematic differences affecting the results. Lastly, providers delivering the PATHWEIGH program may not be representative of like providers at large. Collectively, these limitations have led us to not over-interpret the current results, but rather view them as hypothesis-generating. A pilot study conducted in a different patient population may have led to entirely different results. Future studies will address these limitations to ensure generalizability of the results.

Conclusion

In conclusion, results from the current study support the notion that weight management can be done efficiently and effectively in primary care. Patients in the current study lost > 5% more body weight in PATHWEIGH *vs.* SOC with roughly half of the PATHWEIGH patients losing > 5% body weight, one-third losing > 10% body weight and nearly one-fifth losing > 15% body weight. Most importantly, the same flow sheet that leads clinicians through a patient visit for weight management captures data that will guide improvement in this process. Further, future analyses will examine predictors of weight loss maintenance, resolution of obesity-related complications and cost effectiveness, in addition to further validating the approach.

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