Public Health and Primary Care

Clinical Practice

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Conquering diabetes therapeutic inertia: practical tips for primary care

https://doi.org/10.1515/jom-2022-0058
Received March 18, 2022; accepted August 23, 2022;
published online September 20, 2022

Abstract: Diabetes is a complex condition that is largely self-managed. Decades of scientific evidence has proved that early glycemic control leads to improved microvascular and macrovascular outcomes in people with diabetes mellitus. Despite well-established management guidelines, only about half of the patients with diabetes achieve glycemic targets, and only one in five patients achieve metabolic control (blood pressure, lipid, and glucose targets), and both patients and physicians find themselves stuck in a rut called therapeutic inertia (TI). The authors present several practical strategies that can be tailored to different practice settings and facilitate reducing TI.

Keywords: diabetes; primary care; team-based care; technology; therapeutic inertia.

Inertia is defined as a tendency to do nothing or to remain unchanged. This meaning was initially applied to the healthcare setting as clinical inertia to describe the significant delay on the part of physicians with intensifying treatment plans in a timely fashion. Phillips and colleagues [1] first coined the term in 2001 and specifically described as the inaction of the healthcare provider (HCP) to initiate or intensify treatment when health-related parameters (i.e., blood pressure, lipids, A_{1c}) are not met despite the appropriate targets being clearly defined, the benefits of achieving those targets being well established, effective therapies being widely available, and evidence-based clinical guidelines/algorithms being widely disseminated. Phillips and colleagues [1] summed it up as the "recognition of the problem, but failure to act" and encompasses screenings, preventive treatments, referral to appropriate specialists, and identifying/addressing patient barriers to care. Over the years, the term has been interchanged with therapeutic inertia (TI), which is specific to delays with intensifying pharmacotherapy and is actually a subset of clinical inertia.

While TI can be applied to the management of any chronic disease, it seems to be a particular area of concern among diseases that involve significant lifestyle therapy in addition to pharmacological agents—as is the case with the treatment of diabetes mellitus. The addition of oral antihyperglycemic agents after the failure of metformin monotherapy was a median of 14 months in a study of 12,566 people with type 2 diabetes mellitus [2]. Similar TI was demonstrated in an earlier longitudinal study (n=3,891) in which despite the failure to obtain an A_{1c} goal, insulin or oral agents were delayed for an average of 3 years [3]. Intensification of therapy, especially insulin for individuals with type 2 diabetes mellitus, is slow to initiate, according to a retrospective study by Khunti et al. [4], who demonstrated in a large study population (n=81,573) that the median time for initiation of insulin was over 6 years. After 6 months of monotherapy with metformin alone, higher A_{1c}s are more likely to be addressed than lower A_{1c}s that are above target. Another study (n=7,389) similarly demonstrated that 71.6% of participants had no evidence of intensification in their antihyperglycemic therapy during the 6 months following a hemoglobin A_{1c} (HbA_{1c}) of 7–7.9% [5]. However, perhaps even more concerning is that among participants with the highest A_{1c} (greater than 9%), 44% did not receive intensification treatment. Among the same study population, adding insulin or glucagon-like peptide-1 receptor agonists to those with an A_{1c} greater than 9% resulted in the trend toward greater glycemic control [6].

Although there has been a significant increase in medications and technologies over the last 20 years, research demonstrates that people with diabetes are not any more successful at meeting established targets for glycemic control than they were over a decade ago [7]. Unfortunately, despite the advent of numerous new

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antidiabetes therapies, a recent analysis of trends in diabetes treatment and control among US adults from 1999 to 2018 (n=6,653) demonstrated that over 50.5% of people with diabetes are still not at target despite the advent of numerous new antidiabetes therapies [8].

Legacy effect

The legacy effect is well described in the literature as a foundation for why patients should obtain euglycemia early in their disease course [9, 10]. Early-intervention diabetes treatment trials show that obtaining glycemic targets early in the disease course can provide a prolonged benefit in terms of the long-term maintenance of euglycemia and the prevention of microvascular complications [9, 10]. This has been shown in type 1 and diabetes (Diabetes Control and Complications Trial [DCCT]) [11] and in type 2 diabetes (UK Prospective Diabetes Study [UKPDS]) [12].

Clinical summary

In the face of the overwhelming evidence of the impact of hyperglycemia on the risk for developing microvascular and cardiovascular complications, as well as the associated exorbitant medical expenditures, the American Diabetes Association (ADA) has embarked on an Overcoming Therapeutic Inertia campaign to identify the barriers that patients, physicians, and healthcare systems encounter and to enable all physicians to pragmatically address them [13]. The campaign recognizes that the legacy effect that necessitates early action is crucially important for positive health outcomes. Moving from a stepwise treat-to-failure approach to a treat-to-target approach assists in overcoming TI [10, 13]. Figure 1 is from the ADA's Overcoming Therapeutic Inertia best practices framework, which is the foundation for this paper's recommendation. The suggestions below are ways for osteopathic physicians to actively address TI in their practice and impart real strategies that have been successful, and these suggestions may be implemented in busy primary care workplaces. These strategies recognize the tenets of osteopathic medicine, in which the person is a unit of body, mind, and spirit.

Discussion

Empower patients

The following approaches can be utilized to empower patients:

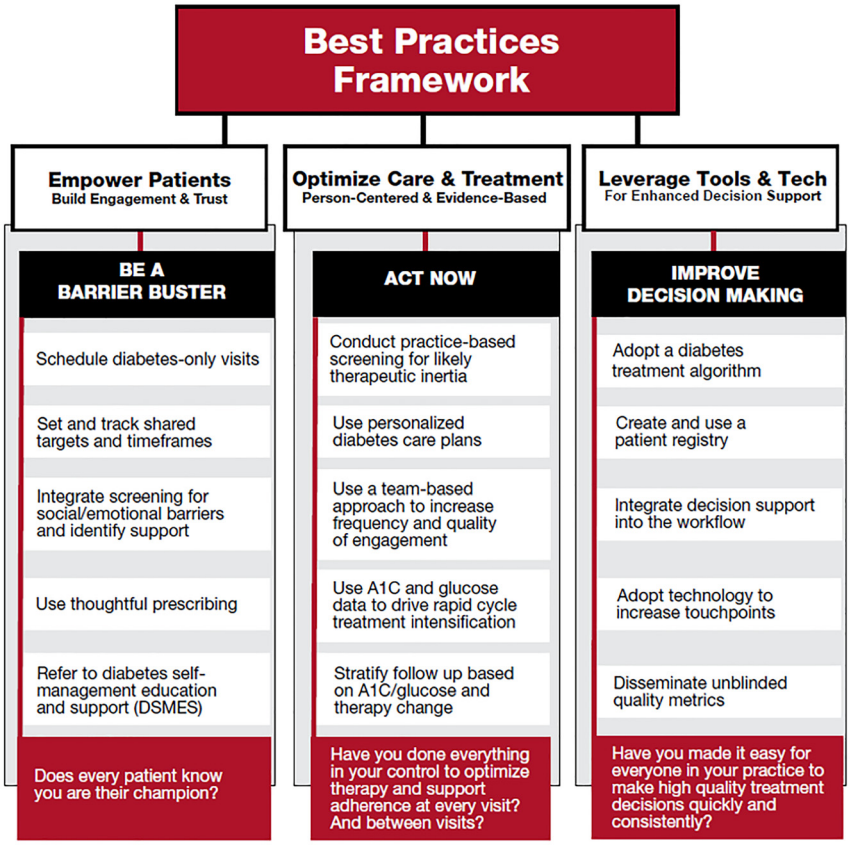

Figure 1: The American Diabetes Association (ADA) overcoming therapeutic inertia best practices framework.

(1) *Make diabetes the priority of the visit*. When scheduling appointments, identify at least one appointment every year as being specific to their diabetes management [14]. A diabetes-focused appointment conveys the importance that you and your staff are placing on facilitating optimal diabetes management with the patient. It allows the time needed to better identify and address the concerns and barriers patients may have that are interfering with their ability to optimally participate in the self-management of diabetes. These appointments also foster a trusting patient/physician relationship that is critical to shared decision making and patient-centered care.
(2) *Utilize shared decision making to set and track targets and time frames*. Creating personalized goals that incorporate cultural and personal preferences is important to obtain acceptance and willingness from the patient for optimizing glucose levels [15]. In addition, creating a realistic timeframe for obtaining these goals is important for the positive legacy effect [10].
(3) *Integrate screening for social or emotional barriers and identify support*. Upon identification of these patients with suboptimal glycemic levels, physicians should reach out and attempt to discern if there are any barriers impacting the ability to keep appointments. Social determinants of health affect the ability for patients to make and keep appointments. Issues surrounding cost, transportation, day care, and time off from work can all affect the ability to seek care [16]. Additionally, psychosocial considerations including diabetes distress, depression, and anxiety can impact the achievement of glycemic goals [17]. In addition, diabetes literacy, numeracy, and food insecurity can impact the achievement of glycemic goals and should also be assessed [18, 19]. The ADA's Overcoming Therapeutic Inertia initiative recommends leveraging support staff, locating support services, and making referrals to help patients overcome any barriers [20].
(4) *Utilize thoughtful prescribing*. The choice to take medication can be impacted by many factors including cost, fear of injection, and personal preference [10, 17]. The ADA's algorithm for medication selection considers cost as a major barrier for people with diabetes and offers recommendations to help mitigate cost [21]. As previously mentioned, shared decision making is central to the Overcoming Therapeutic Inertia initiative.
(5) *Refer to diabetes self-management education and support (DSMES) services*. Equate DSMES and medical nutrition therapy (MNT) to be as important as medication therapy and refer your patients. Too often, busy physicians treat diabetes alone and do not utilize the additional resources that can help our patients. Just as physicians require ongoing continuing education to remain current on the management of illness, health, and wellness, it is equally important for patients to be knowledgeable about the management of diabetes. Encourage your patients to attend diabetes self-management education (DSME) when initially diagnosed, with changes in their therapy, when their health status changes, and at least once yearly for annual assessment [22].

Optimize care and treatment

(1) *Conduct practice-based screening for likely TI*. Two systematic reviews [23, 24] demonstrated that organization-directed workplace interventions that improve processes, optimize electronic health records (EHRs), and implement team-based care can optimize the coordination and communication of patient care and health information. Another way to optimize your EHR is to utilize the data-mining ability available literally at your fingertips [25]. Periodically, and at least once a year, you should access the EHR to identify patients that are at risk for or are potentially experiencing TI. This would include patients who have not had a visit in at least 6 months and/or have an A_{1c} above target such as over 8.0%. In addition, many EHRs can assign patient-related tasks to specific members of the healthcare team and can therefore track the progress of accomplishing them. In doing so, this enhances the accountability of all staff members and reduces the possibility that something may be overlooked.
(2) *Utilize personalized diabetes care plans*. Employ motivational interviewing with your patients. At the beginning of every visit, you should ask open-ended questions that will prompt your patient to identify their successes, challenges, and concerns. This will allow the patient to help set the agenda for the visit and be engaged during the appointment [26]. After setting goals, you should continue to utilize shared decision making to create care plans that consider cultural and personal preferences, the impact of social determinants of health, and psychosocial needs [20].
(3) *Utilize a team-approach to increase the frequency and quality of engagement*. There is good evidence that an increased number of touchpoints can help people improve glucose control [15]. There are many other people who can assist in care, and those individuals vary based on what is available in your area. Team members could include the primary care clinician,

health educator, diabetes care and education specialist (DCES), clinical pharmacist, community health worker, mental health specialist, and registered dietician/nutritionist (RDN). The Beyond Type 2 diabetes website provides a tool that can help people find the closest certified DCES [27]. Other team members may include family and friends, co-workers, support groups, religious leaders, and online coaches [17, 28]. Helping the patient find the best team for them is an important task that should not be overlooked.

A recent meta-analysis of 36 studies (n=22,243) reviewed the effect of nonphysician providers including nurses, pharmacists, and certified diabetes educators as agents to overcome TI. These interventions resulted in improvement in HbA_{1c}, and they often exceeded the benefit from physician interventions [29]. The authors concluded that levering these nonphysician providers to intensity treatment utilizing the appropriate guidelines can overcome TI. Integrating clinical pharmacists into your patient's care can provide critical information about diabetes medications and how to optimize the medication regimen in chronic conditions via medication therapeutic management (MTM) [30]. This is a covered benefit for many insurances and has been shown to reduce polypharmacy and improve patient safety. In addition, RDNs should also be included in the treatment team, because nutrition is the foundation of diabetes treatment. Because nutrition therapy is a covered benefit (as much as four or more times annually), RDNs should be engaged to help achieve glycemic targets.

Within your own office setting, a coordinated team approach is critical. Some ways to optimize your office include empowering medical assistants (MAs), nurses, and even students. MAs can be trained in motivational interviewing and the basics of diabetes care management to enable them to act as diabetes health coaches. Patients receiving care in primary care clinics utilizing MAs as health coaches showed significant improvement in A_{1c} and cholesterol levels when compared to usual care [31]. In this study, coached patients achieved the HbA_{1c} almost twice as often as noncoached patients (48.6 vs. 27.6%, p=0.01). Both quality of care and patient satisfaction were also increased when patients received health coaching [32]. This is especially true for patients who do not speak English [32]. MAs are often racially, ethnically, and linguistically concordant with the patient population compared to HCPs [33]. For example, Spanish-speaking MAs can overcome cultural and language barriers with Spanish-speaking patients through health coaching.

Another way to include your MA as part of the team is to have them reach out to patients 1 or 2 weeks after the appointment to ascertain questions or concerns. Engaging MAs in this fashion helps integrate them as members of the diabetes care team. The authors report that they receive anecdotal feedback from their staff that they believe that they are recognized as integral members of the team. They are also able to develop a trusting rapport with the patient that not only reduces delays in care but also improves patient satisfaction. When our patients are more engaged, they are provided an opportunity to self-advocate and report that they feel genuinely cared about by the entire office staff.

In addition, students can be especially valuable in creating and optimizing your team [34]. For example, you can train MA, nurse practitioner, or physician assistant students to assist in insulin titration and hypoglycemia management. This can be an affordable way for preceptors to implement a team-based approach for practices that would otherwise lack the personnel or resources to do so.

(1) *Utilize A_{1c} and glucose data to drive rapid-cycle treatment intensification*. The ADA Overcoming Therapeutic Inertia initiative recommends utilizing a combination of point-of-care A_{1c} testing, continuous glucose monitors, and/or self-monitoring of blood glucose data to intensify approaches [20].

(2) *Stratify follow-up based on A_{1c}/glucose and therapy change*. Before a patient even leaves the office, you should schedule their follow-up visit. How soon the follow-up visit should occur should be based upon the following: (1) treatment change and how soon the earliest maximal impact is expected; (2) the side-effect profile that may impact adherence; (3) the level of complexity (injectable, timing, etc.); (4) the stability levels of current glycemic patterns from self-monitoring or continuous glucose monitoring; and (5) the need to follow up on outcomes of referrals to specialty care or DSME. Table 1 demonstrates recommendations for follow-up based on A_{1c} parameters [20]. Prior to the leaving the office, the patient should be provided a printout that includes a summary of the visit and what needs to be done prior to the next appointment (lab orders, referrals, etc.) as well as what the patient should bring to the next appointment (blood glucose monitoring devices, nutritional/physical activity logs, etc.).

Leverage technology and tools

(1) *Adopt a diabetes algorithm*. The ADA "Standards of Medical Care in Diabetes" (Standards of Care) is a great place to start for creating diabetes algorithms for all physicians, nurse practitioners, and physician

Table 1: Recommended frequency of follow-up visits based on glycemic patterns.

HbA_{1c}	Frequency of follow-up visit[a]
<7%	Every 6 months
7–8%	Every 3 months
8–9%	Every 6 weeks
9–10%	Every 4 weeks
>10%	Every 2 weeks
Hypoglycemia	Within 2 weeks

[a]Visits can be conducted in-office, via telehealth, or by phone call. HbA_{1c}, Hemoglobin A_{1c}.

assistants in your practice [21]. In addition, you should create protocols for nursing and MA staff that can streamline care and ensure that all patients being seen for diabetes management receive the same level of care. An example could be that any patient found to have their most recent A_{1c} over 3 months ago would automatically receive a point-of-care test by the MA prior to being seen. Other protocols could include vaccinations (e.g., influenza, pneumococcal), yearly dilated eye exam referrals, DSME referrals, and identification of annual screening labs such as random urine albumin/creatine ratio.

(2) *Integrate decision support into the workflow*. Many EHRs can integrate decision support tools to help your practice meet process measures that have been shown to improve outcomes, such as ordering labs like A_{1c} and lipids, vaccinations, and referrals to specialists for eye screening examinations [35]. In addition, huddling with your medical support staff for 5–15 min prior to starting the day and again in the afternoon can help identify key items to be addressed in the patient's visit. Some items to address can include selecting and gathering patient education materials, reviewing/ordering labs, and identifying the need for and generating referrals for DSME, mental health specialists, optometry/ophthalmology, vaccinations, and so on. Huddles should involve identifying key items for virtual as well as in-person visits. Research on huddles demonstrates improved team communication, efficiency of patient care, and shared responsibility for team function [36].

(3) *Adopt technology to increase touchpoints*. The use of continuous glucose monitors to capture glucose data is a great way to comprehensively assess your patient's response to lifestyle and pharmacological interventions over time. Many patients may have personal devices with sharing capabilities that enable your practice to perform remote analysis and interpretation. This can enhance telehealth visits and facilitate more meaningful discussions about glucose management with your patients [37]. There are also novel online programs that provide daily text messages to help support patient self-care behaviors. These programs are not only patient-centered but also improve outcomes [38]. In addition, patient outreach programs improve the patient/provider relationship and metabolic control [39]. To find a diabetes education program in your area, access: https://www.diabetes.org/tools-support/diabetes-education-program. In addition to the recommendations by the ADA Overcoming Therapeutic Inertia initiative framework [20], any way to increase access to care will provide your patients with additional opportunities to overcome TI. Some suggestions include:

(1) *Offer alternative appointment times*. In the time of the COVID-19 pandemic, many practices have implemented alternatives to in-person visits such as telehealth visits. Individuals often cannot leave their workplaces for appointments due to a lack of vacation/sick time or secondary to workplace absenteeism [40]. Offering remote or in-person appointments at alternate times such as early in the morning before work or later in the afternoon, early evening, or even on weekends may help combat some of the issues that patients have with making and keeping appointments.

(2) *Allow self-scheduling*. Providing patients with the ability to schedule follow-up appointments on their own may reduce incoming call volume and free up front-office staff for other important office workflow tasks. There is also the likelihood that self-scheduling may reduce rates of patient no-shows or cancellations, so it is worth exploring whether this would work in your practice setting.

(3) *Consider shared medical appointments*. Shared medical appointments (SMAs) or "group visits'" can be a way to increase patients' access to DSME and visits with their HCPs. There are a variety of ways in which SMAs can be conducted (e.g., monthly in a preselected patient population vs. a drop-in visit), but these appointments should consistently include time for patient education, discussion, and support as well as individualized medical care [41]. The benefits of SMAs range from reduction in HbA_{1c}, blood pressure, and low-density lipoprotein cholesterol [42, 43] to psychosocial aspects such as self-efficacy and empowerment [41]. Individuals who participate in SMAs are more likely to meet ADA standards of care [42] including adopting recommendations for exercise and nutrition [41]. This may be a result of the accountability and support perceived from SMAs [41]. In addition, SMAs add variety to an HCP's schedule, improve workflow, and enhance relationships with patients [44].

Case studies

Case 1

A 48-year-old cisgender male with type 2 diabetes for less than 1 year presents for follow-up. When he was diagnosed last summer, he was able to make some changes to his diet, and he started walking regularly. This really seemed to work, and he was happy with his progress. He missed his winter appointment due to a work trip. He said this winter was tough, because he found it to be much harder to keep up with his walking and he was worried about the COVID-19 pandemic. This resulted in an increase in his comfort foods. He had lost weight last year, but he has gained the weight back. His A_{1c} was 8.6% at diagnosis, and he was able to get this to below 8% in the fall. He did not come to his November or February appointments but presents now in May with an HbA_{1c} of 9.0%. Metformin was recommended at diagnosis, but he wanted to be able to control his diabetes without medication. What are the TI issues in this scenario?

First, we want to congratulate the patient on taking those initial steps and success. The ADA guidelines recommend that metformin should be started in conjunction with therapeutic lifestyle changes because most people do not get enough response with the lifestyle modifications alone. A study by Brown and colleagues [45] found that delaying metformin even 6 months can reduce both the efficacy and the durability of metformin for people who are newly diagnosed. Another study found that when it came to initiating insulin, physicians underestimated what patients would be willing to do when trying to feel like they were in control [46].

Certainly, missed appointments are common and do not alone represent TI. Avoiding losing patients to follow-up is an excellent clinical best practice in treatment to adopt. This could include routinely scheduled labs, texting, and automated follow-up. In locations that have seasons, it is prudent to have a plan on how to keep patients working on diabetes self-care during periods of inclement weather. This could include developing strategies for physical activity, enrolling in food preparation and delivery, and maybe even joining group visits to provide additional support.

Case 2

A 48-year-old cisgender male presents with new-onset type 2 diabetes. He was diagnosed with type 2 diabetes mellitus when he went to the emergency department for an evaluation of chest pain. His pain was not found to be cardiac in origin, but he did get the surprise diagnosis of type 2 diabetes. He really wants to prevent the complications from diabetes that he has seen in his family and co-workers. He is recently divorced and sorting out how to manage daily routines on his own. He has a high-stress job working in a school cafeteria, but he loves seeing the kids. He wants to have a strong plan with details, and he is motivated to carry it out. What are TI issues with this patient?

This is a patient who is engaged and motivated to have control. He is asking for specifics, and this is a patient that wants a plan. Best practices would include a referral to a DCES to help him learn ways to navigate his daily schedule [27].

For this patient, we can highlight the benefit of early intensive therapy and its ability to provide a legacy effect. This would include therapeutic lifestyle change (150 min of physical activity weekly at a minimum) and the adoption of a nutrition plan that can help both diabetes and cardiovascular risk [17]. This patient would also benefit from knowing that interventions like the DIRECT study have put new-onset diabetes into remission [47]. This trial utilized a very low-calorie diet and showed that a substantial portion of participants were able to have an A_{1c} below 6.5% without the use of any medications for at least 3 months [48]. When patients have a clear endpoint and an opportunity to be "normal," the likelihood for success can increase if that endpoint is achieved. In addition to seeing the DCES, it may be worthwhile to help him with frequent touchpoints [49]. This will allow him to get feedback from what will work and not work in his life. The use of a continuous glucose monitor is also a great tool for this motivated patient to be able to "see" what his daily habits do to his glucose levels. This can provide both reinforcement for some habits and provide meaningful and timely feedback for those habits that contribute to dysglycemia.

Conclusions

An interpersonal and collaborative process—such as is the one outlined above—can increase the efficiency and productivity of the healthcare team. We have presented pragmatic approaches that do not require significant changes to your current practice setting's infrastructure, nor do they cause you to incur additional costs to integrate. To be successful, busy physicians must rely on and incorporate the resources that they currently have available. Although not all the suggestions may be applicable to your practice setting, implementing just one can lead to improving diabetes care and enable you to become the

force required to overcome TI. For more information, professional development on Overcoming Therapeutic Inertia, and practice-related resources, please visit https://www.therapeuticinertia.diabetes.org/ [20].

Research funding: None reported.

Author contributions: All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content; all authors gave final approval of the version of the article to be published; and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Competing interests: None reported.

References

1. Phillips LS, Branch WT, Cook CB, Doyle JP, El-Kebbi IM, Gallina DL, et al. Clinical inertia. Ann Intern Med 2001;135:825–34.
2. Fu AZ, Qiu Y, Davies MJ, Radican L, Engel SS. Treatment intensification in patients with type 2 diabetes who failed metformin monotherapy. Diabetes Obes Metabol 2011;13: 765–9.
3. Nichols GA, Koo YH, Shah SH. Delay of insulin addition to oral combination therapy despite inadequate glycemic control: delay of insulin therapy. J Gen Intern Med 2007;22:453–8.
4. Khunti K, Wolden ML, Thorsted BL, Andersen M, Davies MJ. Clinical inertia in people with type 2 diabetes: a retrospective cohort study of more than 80,000 people. Diabetes Care 2013;36: 3411–7.
5. Pantalone KM, Wells BJ, Chagin KM, Ejzykowicz F, Yu C, Milinovich A, et al. Intensification of diabetes therapy and time until A_{1c} goal attainment among patients with newly diagnosed type 2 diabetes who fail metformin monotherapy within a large integrated health system. Diabetes Care 2016;39:1527–34.
6. Pantalone KM, Misra-Hebert AD, Hobbs TM, Ji X, Kong SX, Milinovich A, et al. Clinical inertia in type 2 diabetes management: evidence from a large, real-world data set. Diabetes Care 2018;41:e113–4.
7. Carls G, Huynh J, Tuttle E, Yee J, Edelman SV. Achievement of glycated hemoglobin goals in the US remains unchanged through 2014. Diabetes Ther 2017;8:863–73.
8. Fang M, Wang D, Coresh J, Selvin E. Trends in diabetes treatment and control in U.S. adults, 1999–2018. N Engl J Med 2021;384: 2219–28.
9. Murray P, Chune GW, Raghavan VA. Legacy effects from DCCT and UKPDS: what they mean and implications for future diabetes trials. Curr Atherosclerosis Rep 2010;12:432–9.
10. Lovshin JA, Zinman B. Diabetes: clinical inertia–a barrier to effective management of T_2DM. Nat Rev Endocrinol 2013;9:635–6.
11. Diabetes Control and Complications Trial (DCCT)/Epidemiology of Diabetes Interventions and Complications (EDIC) study research group. Intensive diabetes treatment and cardiovascular outcomes in type 1 diabetes: the DCCT/EDIC study 30-year follow-up. Diabetes Care 2016;39:686–93.
12. Holman RR, Paul SK, Bethel MA, Neil HAW, Matthews DR. Long-term follow-up after tight control of blood pressure in type 2 diabetes. N Engl J Med 2008;359:1565–76.
13. Gabbay RA, Kendall D, Beebe C, Cuddeback J, Hobb T, Khan ND, et al. Addressing therapeutic inertia in 2020 and beyond: a 3-year initiative of the American Diabetes Association. Clin Diabetes 2020;38:371–81.
14. Nuti L, Turkcan A, Lawley MA, Zhang L, Sands L, McComb S. The impact of interventions on appointment and clinical outcomes for individuals with diabetes: a systematic review. BMC Health Serv Res 2015;15:355.
15. Levengood TW, Peng Y, Xiong KZ, Song Z, Elder R, Ali MK, et al. Team-based care to improve diabetes management: a community guide meta-analysis. Am J Prev Med 2019;57: e17–26.
16. Ullah S, Rajan S, Liu T, Demagistris E, Jahrstorfer R, Anandan S, et al. Why do patients miss their appointments at primary care clinics? J Fam Med Dis Prev 2018;4. https://doi.org/10.23937/2469-5793/1510090.
17. American Diabetes Association Professional Practice Committee. Facilitating behavior change and well-being to improve health outcomes: standards of medical care in diabetes – 2022. Diabetes Care 2022;45(1 Suppl):S60–82.
18. Marciano L, Camerini AL, Schulz PJ. The role of health literacy in diabetes knowledge, self-care, and glycemic control: a meta-analysis. J Gen Intern Med 2019;34:1007–17.
19. Young CF, Yun K, Kang E, Shubrook JH, Dugan JA. Correlations between A_{1c} and diabetes knowledge, diabetes numeracy, and food security in a vulnerable type 2 diabetes population. Diabetes Spectr 2018;31:177–83.
20. American Diabetes Association. Therapeutic inertia: practice improvement resources; 2022. Available from: https://www.therapeuticinertia.diabetes.org/practice-improvement-resources [Accessed 28 June 2022].
21. American Diabetes Association Professional Practice Committee. Pharmacologic approaches to glycemic treatment: Standards of medical Care in diabetes – 2022. Diabetes Care 2022;459(10 Suppl):S125–43.
22. Powers MA, Bardsley JK, Cypress M, Funnell MM, Harms D, Hess-Fischl A, et al. Diabetes self-management education and support in adults with type 2 diabetes: a consensus report of the American diabetes association, the association of diabetes care & education specialists, the academy of nutrition and dietetics, the American academy of family physicians, the American academy of physician assistants, the American association of nurse practitioners and the American pharmacists association. Diabetes Care 2020;43:1636–49.
23. DeChant PF, Acs A, Rhee KB, Boulanger TS, Snowdon JL, Tutty MA, et al. Effect of organization-directed workplace interventions on physician burnout: a systematic review. Mayo Clin Proc Innov Qual Outcomes 2019;3:384–408.
24. Nagelkerk J, Thompson ME, Bouthillier M, Tompkins A, Baer LJ, Trytko J, et al. Improving outcomes in adults with diabetes through an interprofessional collaborative practice program. J Interprof Care 2018;32:4–13.
25. Pichardo-Lowden AR, Haidet PM. Closing the loop: optimizing diabetes care in the hospital by addressing dispersed

information in electronic health records and using clinical decision support. J Diabetes Sci Technol 2019;13:783–9.
26. Ekong G, Chou C, Lakin J, Hardin A, Fox B, Hunt C, et al. Pharmacist-led motivational interviewing for diabetes medication adherence in a worksite wellness program. J Am Pharmaceut Assoc 2020;60:e224–9.
27. Beyond type 2. Finding a diabetes care and education specialist. Available from: https://beyondtype2.org/finding-a-dces/ [Accessed 28 June 2022].
28. Rosland AM, Kieffer E, Israel B, Cofield M, Palmisano G, Sinco B, et al. When is social support important? The association of family support and professional support with specific diabetes self-management behaviors. J Gen Intern Med 2008;23:1992–9.
29. Powell RE, Zaccardi F, Beebe C, Chen XM, Crawford A, Cuddeback J, et al. Strategies for overcoming therapeutic inertia in type 2 diabetes: a systematic review and meta-analysis. Diabetes Obes Metabol 2021;23:2137–54.
30. Ndefo UA, Moultry AM, Davis PN, Askew R. Provision of medication therapy management by pharmacists to patients with type-2 diabetes mellitus in a federally qualified health center. PT 2017;42:632–7.
31. Willard-Grace R, Chen EH, Hessler D, DeVore D, Prado C, Bodenheimer T, et al. Health coaching by medical assistants to improve control of diabetes, hypertension, and hyperlipidemia in low-income patients: a randomized controlled trial. Ann Fam Med 2015;13:130–8.
32. Thom DH, Hessler D, Willard-Grace R, DeVore D, Prado C, Bodenheimer T, et al. Health coaching by medical assistants improves patients' chronic care experience. Am J Manag Care 2015;21:685–91.
33. Fraher EP, Cummings A, Neutze D. The evolving role of medical assistants in primary care practice: divergent and concordant perspectives from MAs and family physicians. Med Care Res Rev 2021;78(1 Suppl):7S–17.
34. Engelhard C, Lonneman W, Warner D, Brown B. The implementation and evaluation of health professions students as health coaches within a diabetes self-management education program. Curr Pharm Teach Learn 2018;10:1600–8.
35. Lessing SE, Hayman LL. Diabetes care and management using electronic medical records: a systematic review. J Diabetes Sci Technol 2019;13:774–82.
36. Walsh A, Moore A, Everson J, DeCaire K. Gathering, strategizing, motivating and celebrating: the team huddle in a teaching general practice. Educ Prim Care 2018;29:94–9.
37. Greenwood DA, Gee PM, Fatkin KJ, Peeples MA. Systematic review of reviews evaluating technology-enabled diabetes self-management education and support. J Diabetes Sci Technol 2017;11:1015–27.
38. Watterson JL, Rodriguez HP, Shortell SM, Aguilera A. Improved diabetes care management through a text-message intervention for low-income patients: mixed-methods pilot study. JMIR Diabetes 2018;3:e15.
39. Denberg TD, Myers BA, Eckel RH, McDermott MT, Perry Dickinson W, Lin C-T. A patient outreach program between visits improves diabetes care: a pilot study. Int J Qual Health Care 2009;21:130–6.
40. Mehrotra A, Chernew ME, Linetsky D, Hatch H, Cutler DA. The impact of the COVID-19 pandemic on outpatient visits: a rebound emerges, *To the Point* (blog). New York: Commonwealth Fund; 2021. https://doi.org/10.26099/ds9e-jm36.
41. Hernandez MS, Nutting R, Vasey AJ, Burbach SK, Shiffermiller JF. Shared medical appointments for patients with type 2 diabetes. Evidence-Based Diabetes Manage 2016;22.
42. Edelman D, Gierisch JM, McDuffie JR, Oddone E, Williams JW. Shared medical appointments for patients with diabetes mellitus: a systematic review. J Gen Intern Med 2014;30: 99–106.
43. Trento M, Gamba S, Gentile L, Grassi G, Miselli V, Morone G, et al. Rethink Organization to Improve Education and Outcomes (ROMEO): a multicenter randomized trial of lifestyle intervention by group care to manage type 2 diabetes. Diabetes Care 2010;33: 745–7.
44. Noordman J, Mejino A, van Dulmen S. Shared medical appointments for children and adolescents with type 1 diabetes: perspectives and experiences of patients, parents, and health care providers. Adolesc Health Med Therapeut 2012; 3:75–83.
45. Brown JB, Conner C, Nichols GA. Secondary failure of metformin monotherapy in clinical practice. Diabetes Care 2010;33:501–6.
46. Edelman SV, Wood R, Roberts M, Shubrook JH. Patients with type 2 diabetes are willing to do more to overcome therapeutic inertia: results from a double-blind survey. Clin Diabetes 2020;38: 222–9.
47. Riddle MC, Cefalu WT, Evans PH, Gerstein HC, Nauck MA, Oh WK, et al. Consensus report: definition and interpretation of remission in type 2 diabetes. Diabetes Care 2021;44:2438–44.
48. Lean MEJ, Leslie WS, Barnes AC, Brosnahan N, Thom G, McCombie L, et al. Durability of a primary care-led weight-management intervention for remission of type 2 diabetes: 2-year results of the DiRECT open-label, cluster-randomised trial. Lancet Diabetes Endocrinol 2019;7:344–55.
49. Prahalad P, Zaharieva DP, Addala A, New C, Scheinker D, Desai M, et al. Improving clinical outcomes in newly diagnosed pediatric type 1 diabetes: teamwork, targets, technology, and tight control-the 4T Study. Front Endocrinol 2020;11:360.