

# Integrating Outpatient Care the Toyota Way: An Individualized Multidisciplinary Team-Care Model for Diabetes Care Delivery

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## Introduction

Diabetes mellitus poses unique challenges for both providers and patients – challenges that are arguably more problematic to overcome than those posed by other chronic diseases.

The unique challenge to providers is to satisfy two specific demands in diabetes care. The first is to *anticipate and recognize the onset of complications through comprehensive diabetes care*, which demands meticulous attention to a large number of process-of-care measures at each visit. The second, arguably greater challenge for providers is to *forestall the development of complications through effective diabetes care*, which demands mastery over many different skills in a variety of distinct fields in order to achieve performance goals covering multiple facets of management. Individually and collectively, these dual challenges constitute a virtually unsustainable burden for providers. That is because (a) com-

pleting all the mandated process measures for *comprehensive care* requires far more time than is traditionally available in a single patient visit; and (b) most providers do not themselves possess skills in all the ancillary disciplines essential for *effective care*, such as Diabetes Self-Management Education (DSME) or Medical Nutrition Therapy (MNT).

Diabetes presents patients with similarly unique dual challenges in mastering diabetes self-management with self-awareness, self-empowerment and self-confidence. *Comprehensive Diabetes Self-Management* demands the acquisition of a variety of skills in order to fulfil a multitude of tasks in many different areas of daily life. *Effective Diabetes Self-Management*, on the other hand, demands constant vigilance, consistent discipline and persistent attention over a lifetime, without respite, to nutritional self-discipline, monitoring blood glucose levels, and adherence to antidiabetic medication use. Together, they constitute a burden that most patients find difficult to sustain even with expert assistance, and all-but-impossible without it.

Not surprisingly, achieving successful and sustained self-management remains just as elusive for patients as delivering comprehensive and effective care is for many providers. National Health and Nutrition Examination Surveys (NHANES) show that approximately half of diabetic patients in the U.S. fail to reach goals in each of the three major performance (outcome)

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measures in diabetes care (A1c <7%, BP <130/80, and LDL <100 mg/dl) [1, 2]. Those statistics are disappointing in themselves, given that the development of diabetic complications is closely linked to a failure to attain and maintain each of those three goals. It is even more troubling that just ~19% of patients are successful in achieving all three goals, which is the hallmark of effective care (i.e., care that forestalls complications).

The inherent complexity of delivering comprehensive and effective diabetes care is not in doubt, but the fact that effective diabetes care remains an exercise in futility in ~80% of patients suggests that factors other than complexity may be at work. One major contributor, according to Phillips et al, is “Clinical Inertia,” which they define as “recognition of the problem, but a failure to act” [3]. Although the term might appear self-explanatory, the authors make it a point to restrict its application to conditions like diabetes, hypertension and hyperlipidemia, for which “goals for management are well defined, effective therapies are widely available, and practice guidelines for each of these diseases have been disseminated extensively.” These criteria explicitly exclude a failure to act because the cause or significance of an identified symptom or abnormality is unknown or unclear [3].

A failure to intensify therapy despite clear indication of benefit – the essence of “clinical inertia” – has been ascribed to a widespread tendency of providers to either justify inaction with “soft” reasons (essentially excuses) like “improving control” or “target almost reached” [3], or overestimate the care they provide [4]. According to Philips et al, the root cause is a failure of medical education and training programmes to emphasize the importance of focusing on the achievement of therapeutic goals, or teach practice organization to achieve therapeutic goals [3]. While there is no denying the critical importance of such “provider-driven” factors, attributing a failure to attain therapeutic goals in diabetes to clinical inertia alone runs the risk of oversimplifying a complex problem that may have more than just one layer. The current paradigm of reimbursement for chronic care in the U.S. may be

just as culpable as clinical inertia in the furtherance of therapeutic futility, specifically with regard to how that paradigm drives traditional clinical models for diabetes care delivery.

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## Traditional Clinical Models for Diabetes Care in the US

There are two models currently in use for diabetes care delivery in the US:

1. The “Single Provider-Patient dyad”: This model, which is the most widely used method for diabetes care delivery, is predicated on the principle that one provider can cover all aspects of diabetes care and management for a patient with diabetes. The undeniable advantage of this model lies in the intimacy that characterizes one-on-one interactions. Such intimacy becomes the foundation of personalized care that makes it possible to individualize goals selectively and calibrate intensity, depending on patient need. These advantages are offset, however, by the constraints of time-delimited patient visits, which are mandated to meet productivity targets or necessitated by the individual practitioner looking to the bottom line. Such time constraints make it impossible for one provider to cover multiple tasks in a comprehensive manner at any visit, forcing compromises in task selection at any visit. Inevitably patients and providers find themselves prioritizing tasks depending on perceived immediacy and need. These constraints prevent consistent fulfilment of all the process-of-care measures required to detect and prevent complications.

Another major drawback of the Single Provider-Patient dyad is that most clinical providers cannot fulfil patient needs for integrated care, simply because the skills required for DSME and MNT are outside the domain of most clinical care providers. Even when the importance of these interventions for effective diabetes care is recognized, they require ad hoc referrals to other providers who possess the requisite skill sets. The necessity for such

referrals burdens patients with multiple visits, so that their success is subject to the patient determining whether their perceived importance is worth the inconvenience of additional visits. With no assurance of follow-through, comprehensive management becomes hostage to patient discretion.

It is clear, therefore, that the economic costs of additional visits for the patient, provider time constraints and a lack of provider skills in MNT and DSME combine to contribute as much as clinical inertia to the failure of the Single Provider-Patient dyad to deliver comprehensive and effective diabetes care. Care fragmentation with this model is exacerbated further by arcane rules of fee-for-service reimbursement in the US, which disallow reimbursement for some services rendered by more than one provider for the same principal diagnosis (Diabetes, in this case) on the same day (e.g., for Clinical Care and DSME), with the exception of some types of MNT [5, 6]. Since integrated multidisciplinary care, by definition, calls for contemporaneous and synchronized care by more than one provider, each with a different skill set, such care becomes financially unsustainable if only one or two providers (out of three or four) are reimbursed. This is one reason fee-for-service reimbursement can be a prohibitive disincentive to the integration of multidisciplinary care in diabetes.

Another reason is that fee-for-service, the most widespread financial model in U.S. healthcare, adds a layer of particular complexity to chronic disease care. For the most part, fee-for-service reimbursement couples payment to the volume of services provided, not the overall cost or outcomes. Thus, providers are rewarded for increasing volume, which does not necessarily translate into greater value [7]. This model may work for acute care, where treatment is the goal, but not for chronic care, where prevention takes precedence over treatment. Even though reimbursement for chronic care is being increasingly linked to provider performance, diabetes-specific performance is usually measured by

global parameters, such as the percentage of all patients above or below some threshold A1c (e.g., <7% or >9), not from individual patient outcomes. Put another way, at the individual level, the system provides a greater financial reward for treating complications after they occur (downstream revenue generation), rather than preventing them (upstream cost reduction).

The barriers to integrated care delivery in the traditional single patient-provider dyad have led to the development of alternative models for chronic care (including for diabetes) based on the concept of a Patient-Centered Medical Home (PCMH) [8]. At its most fundamental level, the goal of PCMH is to maximize health outcomes by providing comprehensive and continuous medical care led by a healthcare provider through team-based healthcare delivery. The PCMH concept of integrated multidisciplinary care delivery is at the core of the Group Visit model for diabetes.

2. The *Group Visit model*: The inherent inability of the Single Provider-Patient dyad to deliver comprehensive disease management for patients with diabetes has led to the introduction of the Group Visit model to address and overcome the inefficiencies and inadequacies noted above [9]. The Group Visit model is founded on the premise that many facets of diabetes care are repetitive for individual patients and replicative – with relatively small variation – across patients. In this model a group of patients receives serial input from multiple providers covering different prespecified areas in one session. This assures comprehensive coverage of multiple facets of diabetes care (breadth of care) with the added advantage of achieving higher patient throughput (efficiency/volume). The Group model enables multiple providers with different specialized skills to deliver all aspects of diabetes care (MNT and DSME in particular) to a group of patients in a single session. Thus, Group Visits are designed to fulfil – at least in theory – the current definition of Chronic Disease Management (CDM)

as “a group of coherent interventions, designed to prevent or manage one or more chronic conditions using a....systematic and *structured* multidisciplinary approach potentially employing multiple treatment modalities. The goal of *chronic disease prevention and management* is to identify persons with one or more chronic conditions, to promote self-management by patients and to address the illness or conditions *according to disease severity and patient needs and based on the best available evidence*, maximizing clinical effectiveness and efficiency regardless of treatment setting(s) or typical reimbursement patterns. Routine process and outcome measurements should allow feedback to all those involved, as well as to adapt the programme” [10].

The increasing adoption of the Group Visit model in larger healthcare programmes has led to changes in reimbursement rules for Group visits and new billing codes for such visits [6]. This allows for economies of scale that can overcome the fact that per-patient reimbursements for group visits are individually too low to be profitable. Unfortunately, studies show that while the model reliably delivers comprehensive care reflected in *process-of-care* measures (i.e., documentation in identified diabetes care domains), it does not consistently deliver effective care (i.e., achieving BP, lipid or glycaemic goals) [9]. A recent meta-analysis of randomized control trials is more encouraging, with reductions in A1c ~0.5%, but not blood pressure or cholesterol [11].

The reason why Group Visits fail to consistently achieve performance targets is not clear, but one is left to wonder whether the absence of personalized care might play a role. A key component of CDM, as defined above, is calibration according to disease severity and risk stratification based on patient need. Group visits, by their very nature, are incapable of delivering individualized care calibrated to patient needs and risk stratification. Consequently, a face-to-face visit in a Single Provider-Patient dyad visit, either after the Group Visit, or in a separate visit on another

day is required for such calibration and risk stratification.

An additional criticism of the Group Visit model is that achieving the aforementioned economies of scale requires large patient numbers and a significant increase in resource allocation, including-infrastructure changes and manpower commitments. The need for such resources is a stumbling block to the widespread acceptance of this model outside of large organizations like Accountable Care Organizations (ACOs). Recent changes in coding and billing do incentivize ACOs to adopt Group visits for diabetes care. However, such factors provide little incentive for individual practitioners without access to the infrastructure and resources necessary for Group visits. For these reasons the adoption of the Group Visit model remains limited primarily to ACOs.

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## A Brief Overview of Healthcare Delivery in the VA System

The Veterans Health Administration is in many ways unique (for the U.S.). Run by the Veterans Affairs Department of the Federal Government, it is the largest integrated healthcare system in the U.S., serving 8.76 million Veterans each year through more than 1700 sites of care, including hospitals, community clinics and community living centres, domiciliary units, Vet Centres, and various other facilities [12].

A brief summary of VA healthcare benefits follows for the benefit of readers unfamiliar with the VA's mission and mandate. Even though this summary is excerpted (almost) verbatim from the source document, it must, of necessity, be incomplete, in the interests of brevity. The authors explicitly deny any claim that what follows is a comprehensive or accurate description of the full panoply of federal benefits available to qualifying Veterans. Readers are strongly advised to access the source document from which this summary is excerpted to verify/correct any details that may be vague, incorrect, missing or misleading [12]. The key summary features are:

- *Basic eligibility:* VA healthcare benefits are available to any person who served 24 continuous months or the full period for which he/she was called to active duty in the active military, naval, or air service and who was discharged or released under conditions other than dishonourable. Reservists and National Guard members may also qualify for VA healthcare benefits if they are called to active duty (other than for training only) and complete the full period for which they were called or ordered to active duty by Federal order. This minimum duty requirement may be waived for veterans discharged for hardship, early out or a disability incurred or aggravated in the line of duty.
- *Service connection:* The VA prioritizes healthcare enrolment based on degree of service connected disability, ranging from highest priority (>50% service connection, Priority Group 1) to lowest (no service connection), and applies geographic mean income threshold tests to further stratify priority in those without service connection (Groups 7–8).
- *Inpatient care:* Copayments for inpatient stays range from zero for the highest priority groups to a maximum of \$1216 for inpatient stays up to 90 days for those above the income threshold in the lowest priority group.
- *Copayments for Outpatient Care:* Many Veterans qualify for free healthcare services based on a VA compensable service-connected condition or other qualifying factor, but most are asked to provide a financial assessment to determine if they qualify for free services. Veterans whose income exceeds the established VA Income Thresholds as well as those who choose not to complete the financial assessment must agree to pay required copays to become eligible for VA healthcare services (Primary Care Services: \$15; Specialty Care Services: \$50). The copay amount is limited to a single charge per visit regardless of the number of healthcare providers seen in a single day, and is based on the highest level of clinical service received. Copays do not apply to outpatient visits solely for preventive screening and/or influenza and pneumococcal vaccinations, or screening for hypertension, hepatitis B, tobacco, alcohol, hyperlipidemia, breast cancer, cervical cancer, Human papillomavirus (HPV), colorectal cancer by faecal occult blood testing, education about the risks and benefits of prostate cancer screening, HIV testing and prevention counselling (including the distribution of condoms), and weight reduction or smoking cessation counselling (individual and group). Laboratory, flat plain film radiology, electrocardiograms, and hospice care and in-home video telehealth are also exempt from copays.
- *Medication Copayments:* While many Veterans are exempt for medication copays, nonservice-connected Veterans in Priority Groups 7 and 8 are charged \$9 for each 30-day supply of medication, provided on an outpatient basis for treatment of a nonservice-connected condition. Veterans enrolled in Priority Groups 2 through 6 are charged \$8 for each 30-day or less supply of medication; the maximum copay for medications that will be charged in calendar year 2013 is \$960 for nonservice-connected medications. Copays apply to prescription and over-the-counter medications, such as aspirin, cough syrup or vitamins, dispensed by a VA pharmacy. Copays are not charged for medical supplies such as syringes or alcohol wipes.
- The preceding paragraphs have been transcribed from the source document (with only minor edits). We add two items to the above that are essential to complete the picture of an integrated healthcare system that has more in common with government-run healthcare systems in other countries (akin to the U.K's NHS), than the indemnity insurance-based healthcare system that predominates in the U.S. The first is that VA employees, including physicians, are either salaried employees of the U.S. government (for the most part) or fee-based contractors compensated by time or patient volume (either way, care decisions are not linked to financial incentives or disincentives). The other is the way in which care is delivered and coordinated within the VA system, with specific relevance to diabetes care



delivery at VAPHS, which we describe briefly in our own words.

- *Primary, Secondary and Tertiary Care Delivery at VAPHS:* The VA system is organized into regional collaboratives called Veterans Integrated Service Networks (or VISNs), usually comprised of one or two tertiary care “Hub” hospitals (the Pittsburgh and Philadelphia VA hospitals are, respectively, the Western and Eastern hubs in VISN4), several feeder “Spoke” hospitals for each hub, which provide both secondary and primary care, and a number of Community Based Outpatient Clinics (CBOCs) devoted to primary care, clustered at varying distances around each spoke and hub hospital, based on geographic location. All patients must have a primary care provider (PCP) who directs and coordinates care, including referrals for specialty care, following the concept of a Patient-Centered Medical Home that emphasizes “care coordination and communication to transform primary care into what patients want it to be” [8]. All documentation is electronic (paperless), through the VA’s unique Computerized Patient Record System (CPRS), which allows nationwide access to patient records, regardless of location. Care coordination, with the PCP acting as the gatekeeper, is an integral component of care across the VA, but policies governing how that coordination is achieved are set at the local level, and thus vary by location. At the Pittsburgh VA (VAPHS), all specialty care providers are required to send “Inter-facility Communications” via CPRS to the PCP after any specialty consultation, documenting assessment and management plans (diagnostic and therapeutic).
- Care coordination achieves critical importance for diabetes, in particular, because of the need for management at many different levels and locations. At the most basic level, the symptomatic management of acute hypo- and hyperglycaemia often devolves to the PCP, even when a specialist oversees more advanced strategies for glycaemic management. At another level, the wide variety of chronic com-

plications requires input from many different specialists, whereas hospitalizations for acute emergencies often fall to hospitalists and critical care specialists. Thus, diabetes care is fraught with the potential for sometimes conflicting, even contradictory management strategies, making care coordination mandatory for success. This is an area in which the VA system excels, with its integrated network, common electronic record, and shared responsibility for care.

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### **The Need for a New Model to Deliver Outpatient Diabetes Care**

A realization that the traditional Single Provider-Patient dyad used at the Pittsburgh VA was incompatible with delivering both comprehensive and effective diabetes care encouraged us to explore other avenues for diabetes care delivery. We understood, furthermore, that the alternative of Group visits would require major changes to infrastructure that were not practical or financially feasible at our institution. Third, we were emboldened to develop a “third way” by the fact that there would be no financial disincentives to multi-provider visits in an integrated healthcare system like the VA, unlike a fee-for-service system. Lastly, the VA system has the unique ability to integrate and coordinate care across multiple disciplines.

These were the reasons why we explored the feasibility of constructing a chronic disease care model centred on an integrated multidisciplinary team that would deliver diabetes care that was both comprehensive and effective, yet retained the intimacy of the traditional Single Patient-Provider dyad. Critical to the success of that effort was funding through a Physician Champion Award from the Jewish Healthcare Foundation [13], as well as direct advisory guidance during development and implementation from the Pittsburgh Regional Health Initiative (PRHI), one of the nation’s first regional collaboratives of medical, business and civic leaders organized to address healthcare safety and quality improvements [14].

We started with the fundamental premise that the model had to satisfy the needs of both comprehensive and effective care without compromising either the personalized one-on-one care of the single patient-provider dyad or the coordinated care of the Group visit model. In other words, the goal was to preserve the advantages of both existing models while eliminating their disadvantages. In order to achieve such a seemingly impossible goal, we turned to industry, specifically the principles of the Toyota Production Systems [15], to develop a model of multidisciplinary outpatient diabetes care that is both comprehensive and effective. In order to understand how concepts developed for industrial manufacturing can be applied to bedside medicine, a brief introduction to the Toyota Way is warranted.

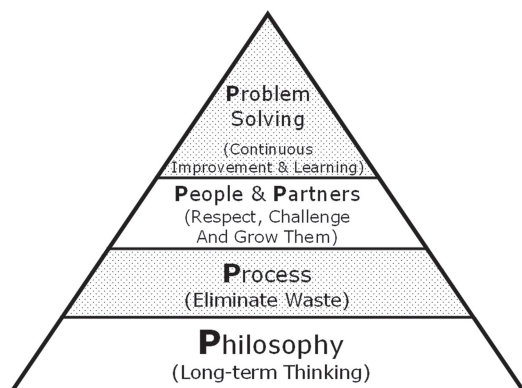
### An Introduction to Lean Systems Design

In his book *The Toyota Way*, Jeffery Liker lays out four Core Tenets for achieving efficiency and improving quality based on Toyota's unique management system [15]. These Core Tenets, shown in Fig. 2.1, are (i) a Long-term Philosophy, (ii) the Right Process, (iii) People as Partners, and (iv) Continuous Reflection to Solve Problems. Even though these tenets are principally associated with manufacturing processes, they have been shown by PRHI, a leader in the field of

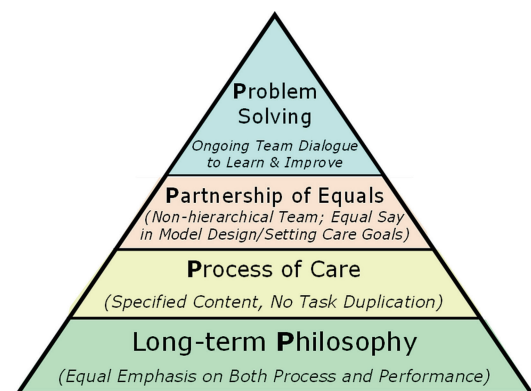
healthcare reform, to hold true for healthcare delivery [16]. Perfecting Patient Care<sup>SM</sup> (or PPC) is PRHI's flagship healthcare process improvement methodology based on the principles of the Toyota Production System. See Fig. 2.2.

### Redesigning the Diabetes Clinic at the VA Using Toyota Principles

Our initial purpose in redesigning diabetes management was to simply combine four distinct clinical disciplines in diabetes care (DSME, MNT, Blood Pressure/Lipid Management, and Glycaemic Management) into a single, clinic visit. From such crude and unpolished beginnings – off-handedly referred to in an initial team meeting as “one-stop shopping,” our purpose was transformed, thanks to direct engagement by PRHI and funding support from JHF, into a sophisticated application, which we call the “Individualized Multidisciplinary Team-Care Model.” The model, as implemented, has a far more ambitious purpose that goes beyond just patient convenience to the delivery of integrated, multidisciplinary care of high quality that not only meets patient needs but achieves better outcomes. (Parenthetically, it may be noted here that our model differs fundamentally from efforts to integrate diabetes care in Health Disparities Collaboratives (HDC) in the US or the Diabetes



**Fig. 2.1** Liker's 4P model (Adapted with permission from Liker [15])



**Fig. 2.2** Liker's 4P Tenets adapted to an Individualized Multidisciplinary Team-Care Model for integrated diabetes care delivery

Integrated Care Initiative (DICI) in the U.K) [17, 18]. The “Individualized Multidisciplinary Team-Care Model” integrates multidisciplinary *collaborative outpatient specialist care* (DSME, MNT and clinical) for diabetes in a *tertiary care setting*, whereas HDC and DICI focused on integrating patient education and lifestyle modifications (DSME and MNT) into *primary care* for diabetes in a *community setting* [17, 18].

Our redesign of diabetes care delivery has a direct analogy in manufacturing, where a product manufactured in a traditional “job shop” moves from one functional grouping of machines to another (e.g., stamping, drilling, assembly, painting, etc). Process redesign in manufacturing is often done by regrouping machines around the needs of a product group into a “manufacturing cell.” Individual product components enter the cell in a specified order and are rapidly transformed at the cell’s stations into a finished product. In industry, transforming traditional production into cellular production often yields dramatic improvements in quality, inventory reduction and efficiency. Distilled to its essence, our redesign of diabetes care delivery is analogous to a cellular manufacturing process, in that it involves the regrouping of specified tasks into “stations” responsible for each care discipline, with the patient moving from one station to the next, accumulating care that is both comprehensive and integrated in the aggregate.

We were guided in our redesign by four principles derived from Spear and Bowen’s “Rules in Use” for business, which form the core of PPC<sup>SM</sup> [19]. Grunden terms these principles “Rules of Work Design that Guide Process Improvement” [16], and describes them as follows:

- *Rule 1:* Activities (work) must be highly specified as to content, sequence, timing, location and expected outcome.
  - *Rule 2:* Connections between customers and suppliers must be highly specified, direct, with a clear yes-or-no way to send requests and receive responses.
  - *Rule 3:* The pathway for every product and service must be predefined, highly specified, simple, and direct – no loops or forks.
  - *Rule 4:* Improvements are made using scientific method, with guidance from a teacher, as close as possible to the work, aiming towards the ideal.
- We operationalized these principles in the process of implementing our redesign by, first,
- (A) Outlining the actual work required of redesign (in six stages), then,
  - (B) Constructing and implementing the model and, finally,
  - (C) Re-evaluating constantly to improve model efficiency and performance (*kaizen*)
- (A) **Outline the Actual Work of Redesign for Integrated, Multidisciplinary Care**
- This was achieved in six stages, as follows:
1. *Define the Explicit Purpose of Redesign in Relation to Care Delivery:* After extensive discussions, team members reached consensus that any new model for integrating multidisciplinary care in diabetic patients must focus on delivering “*continuing care*,” rather than “*initial care*.” The reasons for that restriction will become readily apparent when we describe the elements of the model in greater detail, but they can be summarized briefly as follows:
    - (a) A focused, time-delimited and structured clinic visit is ideal for implementing and adjusting an established plan of *continuing care* but ill-suited to the elastic and sometimes drawn-out process of evaluating, discussing, and getting patient “buy-in” for an *initial* plan of care and therapeutic strategy, which can vary greatly in both length and complexity, depending on individual patient need.
    - (b) An essential precondition, therefore, is to establish an initial plan of care in a traditional Single Provider-Patient dyad visit prior to enrolment in the multidisciplinary clinic for continuing care,
    - (c) The only other precondition for enrolment is the patient must have the abil-



ity and motivation to engage in a comprehensive diabetes management strategy, and must possess a basic understanding of DSME and MNT.

2. *Define the Objectives of Care Delivery in Relation to Patient Needs:* The redesign was based on fulfilling specific patient needs, as follows:

- (a) Set individualized clinical goals based on patient need and risk stratification
- (b) Meeting 100 % of all process-of-care measures (HbA<sub>1c</sub>, LDL, blood pressure, creatinine and urinary microalbumin levels, annual foot and eye exams, and aspirin and statin use/contraindications/alternatives).
- (c) Ordering all necessary lab tests to fulfil process-of-care measures
- (d) Ensuring timely completion (annual at least) of periodic Foot and Eye Exams
- (e) Providing DSME and MNT contemporaneously with clinical care
- (f) Enabling process efficiency to utilize all resources available to care for the assigned patient population.

3. *Document the Current Process for Diabetes Care Delivery*, to identify areas of deficiency/improvement, including:

- (a) A complete description of tasks currently performed by each provider during various patient contacts (i.e., for clinical care, DSME, and MNT)
- (b) The timing and sequence of all provider tasks
- (c) The actual time for completing provider tasks (cycle times) and their variability
- (d) Any shared tasks requiring joint provider participation
- (e) Any potentially duplicative tasks by different providers (i.e., task sharing).
- (f) The current performance relative to patient need and efficiency.

4. *Sort the tasks* as follows:

- (a) Identify essential tasks that must be accomplished in each continuing care visit and which belong in other patient contacts.

- (b) Decide what, if any, remaining tasks can be eliminated or automated.

- (c) Allocate those tasks to team members exclusive to their particular skill set.

- (d) Arrange and assign each team member to “individual stations of care” working in sequence during each visit

- (e) Assess the cycle times for each member of the team to complete their current list of tasks at each station.

- (f) Allocate any tasks that overlap between two or more team members, depending on skill set, with the goal of balancing the work among all stations.

- (g) Continue rearranging station sequencing and/or task lists until all station task lists have about the same cycle time and cycle time variability.

- (h) Set up materials, equipment, information systems and back up assistance to allow providers to accomplish their work without interruption.

5. Run the redesigned process with actual patients:

- (a) Intensively observe whether tasks assigned to each station can be accomplished with high quality and within the targeted cycle times.

- (b) Note any instances where task completion or quality breaks down, and examine individual events for evidence of root causes.

- (c) Measure both quality and efficiency outcomes, based on delivering high quality care that is both comprehensive (i.e., achieves all process-of-care measures) and effective (i.e., meets performance goals for A1c, BP and Lipids) in reducing long term complications.

6. Continuously redesign the process to meet patient, provider and business needs:

- (a) Assess whether patient, provider, and business needs are all met.

- (b) Look to reduce the cycle times of individual tasks.

- (c) Rebalance work between stations.

- (d) As the process becomes more stable and efficient, decide by consensus how gains in improvement can be leveraged to enhance care, reduce provider workload, or service more patients.
- (e) Call for help outside the team, if additional resources or other enablers are needed to support the process in meeting objectives.

(B) **Construct and Implement a Model of Integrated, Multidisciplinary Care**

The practical aspects of implementing our model of integrated multidisciplinary care for diabetes can now be outlined, keeping in mind that the purpose of the redesign is explicitly restricted to continuing care. The model is organized into “stations of care,” each assigned to a single discipline and staffed by a provider with particular skills in that discipline. These stations are setup in a specified sequence, like a manufacturing cell, with individual patients moving through each station and service elements of diabetes care delivered serially to provide multidisciplinary care in the aggregate. Based on this, a model for diabetes care delivery was constructed as follows:

1. *Assemble the essential components of diabetes care into a comprehensive patient visit* involving a team of diabetes care providers assigned to specific “stations of care,” each responsible for *explicitly defined work content related to their expertise (PPC Rule #1)*, covering all aspects of multidisciplinary diabetes care, as follows:
  - (i) A Certified Diabetes Nurse Educator (CDE-RN)
  - (ii) A Diabetologist/Endocrinologist (Team leader, who oversees/problem solves at all stations)
  - (iii) A Nutritionist with CDE certification (CDE-RD)
  - (iv) A Clinical Pharmacist (Pharm D)
  - (v) A Nurse Practitioner with CDE certification and diabetes management experience (CDE-NP)

2. *Define Work Content across the 4 stations .*

The first step was to set Takt time<sup>1</sup> to accommodate a <15 min cycle time at each station (total visit length=60 min), and assure *unambiguous work flow (PPC Rule #2) along a highly specified path (PPC Rule #3)*, in the following sequence:

- (i) *Station 1 (“DSME” [Cycle Time = 13,-2,+4])*: The CDE-RN does the following tasks:

- (a) Collect the home blood glucose log or download from metre or insulin pump
- (b) Measure blood pressure;
- (c) Take a finger-stick blood sample to measure HbA<sub>1c</sub> and Lipid levels in the clinic (using point-of-care [POC] laboratory equipment);
- (d) Provide diabetes education in one of four predetermined “patient knowledge/skill areas,” in a repeating cycle over four visits. It is vital that the patient be familiar with the basics because the purpose is to review and reinforce familiar information, not introduce new information. Thus, the patient must participate in a preliminary DSME session prior to enrolment.

The four assigned tasks differ, depending on whether the patient needs reinforcement of basic skills or more advanced skills, and are calibrated to patient needs. The four basic skills reviewed are:

- Metre technique
- Injection technique
- Sick-day and hypoglycaemia management, including instruction on glucagon administration by spouse/home caregiver
- Foot care

<sup>1</sup>Takt time is the maximum amount of time in which a product needs to be produced. Adjustable time unit used in lean production to synchronize the rate of production with the rate of demand.

More advanced skills for patients on an insulin pump include

- priming and refilling the insulin pump
- infusion set insertion technique
- ability to change pump basal rates, and
- familiarity with the pump's bolus administration tool (e.g., Carb Smart or Bolus Wizard)

(e) Work content is designed specifically to assure that the nurse completes tasks a to c (above) plus one of the DSME skill areas in d. within a cycle time of 13 min on average, although that can be as short as 11 min, or as long as 17 min when unexpected delays occur in accessing pump and metre software.

(ii) *Station 2 ("MNT" [Cycle Time = 11 min, -1, +3]):* The CDE Nutritionist's tasks include the following:

- (a) Weigh the patient, discuss implications of weight gain, or need for weight loss
- (b) Review dietary principles in one of four predetermined "patient knowledge areas" over four visits in turn in a repeating cycle. Just as for DSME, the intent is to review and reinforce familiar information, not introduce new information, which is why it is essential for the patient to participate in a preliminary nutrition education session prior to enrolment.

The four assigned tasks differ, depending on whether the patient needs reinforcement of basic skills or advanced skills.

The four basic nutritional skills reviewed

- food groups
- food choice
- hypoglycemia, and
- portion control.

In patients on a Multiple Daily Insulin (MDI) regimen or using an Insulin Pump, the focus of MNT is on more advanced skills, including:

- Carbohydrate counting, including verification by food logs, if necessary
- Effect of dietary fat and protein on carbohydrate absorption
- Dual, extended and square-wave bolus strategies, and
- Hypoglycaemia prevention strategies, e.g., the proactive use of carbohydrate intake before exercise

(c) Work content at this station is designed specifically to assure that the nutritionist weighs the patient and provides one of the MNT skill areas in (b) within a cycle time of 11 min on average, although that can be as short as 10 min, or as long as 14 min

(iii) *Station 3 ("BP-Lipids" [Cycle Time 10 min, -4, +1]):* The initial configuration of the model had this station manned by a clinical pharmacist who performs the following tasks (this configuration changed subsequently, for reasons we will outline later):

- (a) Rechecks BP in those not at goal at initial measurement (Station 1)
- (b) Orders labs as needed for annual surveillance
- (c) Performs medication reconciliation
- (d) Interprets POC Lipid results and reconciles with previous lab results
- (e) Adjusts/intensifies/refills BP, lipid, and aspirin therapy, according to patient need, to achieve patient-specific targets (BP <140/90 in all patients, and <130/80; LDL <100 mg/dl or <70 mg/dl, depending on risk stratification).

- (f) Work content at the BP/Lipid station varies more than at any other Station, depending on whether or not the patient is at goals for BP and Lipid therapy. Thus, cycle time can be as short as 7 min in patients at goal for both BP and Lipids (which applies to the great majority of patients currently seen in the clinic) up to a maximum of 12 min in the rare patient needing intensification of both BP and Lipid therapy. This assures task completion with a cycle time well within the 15 min Takt time, so that the model is able to accommodate delays (i.e., “make-up” for lost time) at one of the earlier stations.
  - (iv) *Station 4 (“Glycaemia”)*: A CDE-Nurse Practitioner performs the following tasks:
    - (a) A diabetes-focused exam (e.g., injection sites, feet)
    - (b) Reviews and records results from Diabetes Retinopathy Surveillance Reports
    - (c) Reviews the home blood glucose (or insulin pump) printout
    - (d) Adjusts therapy as needed to meet patient-specific glycaemic targets (A1c), calibrated to patient need, based on individual risk stratification.
    - (e) Ensures compliance with annual retinopathy surveillance (referral to ophthalmology)
    - (f) Work content at this station is predictable for the most part (~14 min) and, while stable, is variable enough that cycle time can extend to as much as 25 min when unanticipated problems or complications are recognized, such as an infected abrasion or ulcer on the foot. In such patients, the Supervising MD enters Station 4 as soon as the problem is recognized, in order to provide input for managing both glycaemia and the unanticipated problem within the allotted Takt of 15 min. The MD then exits allowing the NP to concentrate on providing extended task completion for such patients, while the MD takes the next patient in line for Glycaemic Management, so that there are no hold-ups in patient throughput.
  - (v) *“Floating Station” (Supervising Diabetologist)*: Work content at this station consists of the following tasks:
    - (a) See all patients at Station 4 to discuss/endorse decisions on glycaemic management
    - (b) Sign off on all changes in therapy at Stations 3 and 4
    - (c) Provide continuous oversight of work flow across the four stations
    - (d) Act as an on-site problem solver for interruptions in work flow
    - (e) Function as an extra outlet to maintain work flow when hold-ups occur at any station because of unanticipated complexity (as discussed above).
    - (f) Perform medication reconciliation
    - (g) Document and send Inter-facility Communication to PCP
    - (h) Seek specialist consultation for newly recognized or existing problems (e.g., Cardiology, Nephrology, Podiatry, Vascular Surgery, and Psychiatry etc.)
3. *Ensure Task Completion through Documentation*: Template-based electronic documentation in modular form for each station assures completion of all assigned tasks. Documentation modules for each station were developed by individual team members and only finalized after extensive dialogue among team members to ensure appropriateness and brevity, and to eliminate duplication. Previously documented information in CPRS is imported into a

templated note that mandates completion of all identified tasks in specific fields at each Station, while also allowing for inclusion of free text. Thus, *work content and documentation requirement for each visit and station is explicitly defined (PPC Rule #1)*. At the end of the visit, the unique capability of CPRS allows the four modules, each individually signed by the assigned provider at each Station, to be combined to appear as a single cohesive and comprehensive note in the electronic record, rather than as four separate notes.

(C) **Re-evaluate constantly to Improve Model Efficiency and Performance (Kaizen)**

Team meetings are held regularly to *constantly evaluate performance through problem-solving (PPC Rule #4)*. The purpose is to engage in team dialogue focused on making sure the model is working for each team member, without finger-pointing or blame (the essence of *kaizen*). We cite three specific examples of how *kaizen* was utilized to make changes in work content, work flow, and model design.

- (i) *The reassignment of the task of BP measurement from the “BP/Lipids” Station to its current placement in Station 1, “DSME”*: This represents an early example of how constructive dialogue based on evidence was used to reassign work content in order to improve workflow. Initially, the team assumed that the natural placement of the task of BP measurement would be in the “BP/Lipids” Station. However, it became clear early in implementation that hold-ups at that station were an intermittent but recurring problem. Evidence from time measurements revealed a periodic imbalance in workload because the pharmacist was sometimes compelled to wait as much as 10 min for the patient to reach a resting state for accurate BP measurements, particularly when repeat measurements were called for in patients not at goal on the first measurement. A realization

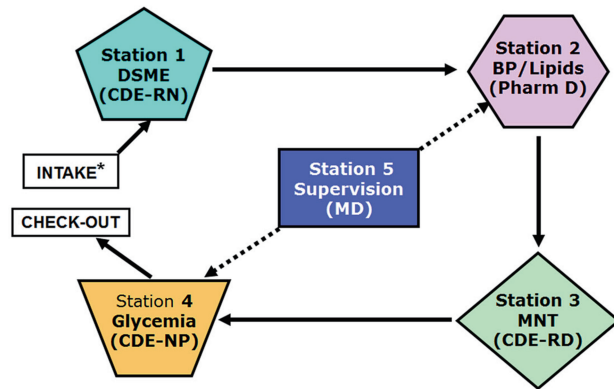
that such hold-ups were of little consequence at the start of the visit prompted a redistribution of the task of initial BP measurement to the “DSME” Station, achieving better work balance and evening out cycle times across stations (*heijunka*).

- (ii) *The reordering of station sequence over time*: This constitutes a second example of how evidence from ongoing monitoring was used to make adjustments in work flow (Fig. 2.3a–c). “BP-Lipids” was initially thought to be ideally positioned as Station 2 (Fig. 2.3a. First Iteration), but monitoring showed significant hold-ups in workflow occurring even after it was divested of the task of initial BP measurement. Continued monitoring revealed that the hold-ups occurred because it often took >15 min for the POC-lipids test to result, which meant the pharmacist did not receive those within the 15 min takt, with further delays added on whenever treatment changes were called for. The BP/Lipids Station was therefore moved to what was then thought to be its “ideal” position at Station #3 in the visit sequence, exchanging places with “MNT” (Fig. 2.3b Second Iteration). This allowed for an additional 15 min to elapse while the patient received MNT at the newly configured Station #2, before the patient was seen for BP/Lipid management at Station #3, by which time the POC Lipid result was available for any adjustments in therapy.
- (iii) *Changing the configuration of the model from its original conception based on changing circumstances*. We have been forced into yet another reconfiguration of the model, which further demonstrates the flexibility of the model. This was prompted by administrative reallocation of manpower resources, which terminated the Clinical Pharmacist’s participation in the clinic. Consequently, the

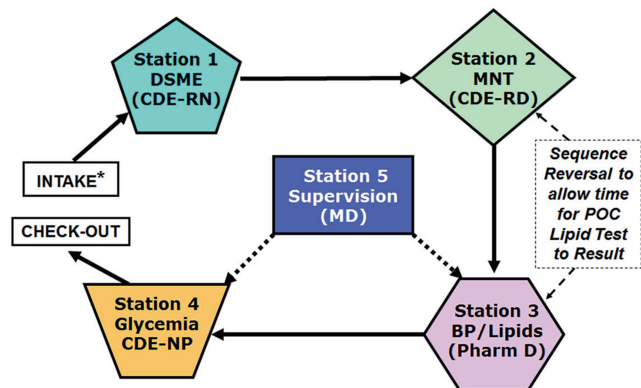


**Fig. 2.3** Changes made to Station sequence over time (*kaizen* in practice). (a) First iteration: five stations in their original sequence. (b) Second iteration: sequence reversal of “BP/Lipids” and “MNT” stations, prompted by hold-ups traced to POC Lipid results taking >15 min to become available. (c) Third iteration (current), showing BP/Lipids last in sequence as an “Optional Station.”

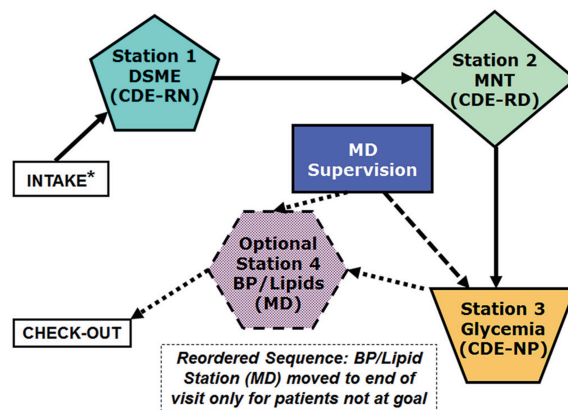
Supervising MD provides one-on-one BP/Lipid management at the end of the visit in patients not meeting goals, and oversees glycaemic management (See text for details). \*Intake restricted to Continuing/Established Care, not Initial Care. Key: *CDE* Certified Diabetes Educator, *NP* Nurse Practitioner, *Pharm D* Doctor of Pharmacy, *POC* Point-of-care, *RD* Registered Dietitian, *RN* Registered Nurse



**A. First Iteration**



**B. Second Iteration**



**C. Third Iteration (Current)**

tasks assigned to this station were reassigned, of necessity, to the Supervising Diabetologist, the only team member “free” to engage in completing those tasks. As part of the reconfiguration of task assignment, it was necessary to move “BP-Lipids” to the last Station in line (Station #4), exchanging places with “Glycaemia,” which became Station #3. The reconfiguration required the team to accept that the Supervising MD would be, of necessity, unavailable to engage in glycaemic management on the spot. In anticipation of this, it was decided to reserve a 30 min time slot at the end of clinic for specific interactions between the NP and MD regarding glycaemic management. In the event that changes in recommendations became necessary, these would be subsequently communicated to the patient by the NP, and documented by the MD in the “Supervising Diabetologist” component of the composite visit note.

Our expectation of insoluble problems resulting from the potentially crippling loss of what was originally considered a critical component of the model has turned out to be completely unfounded! The keys to such a stress-free turnaround were vigorous team dialogue and evidence-based task monitoring, as soon as it became clear that the loss of the Pharm D’s participation was irrevocable. The critical importance of *kaizen* – a combination of dialogue and evidence – is shown in our discovery that cycle time at the BP/Lipids Station could be as low as 4 min in patients at goal for both parameters. (Parenthetically, we must note here – to be revisited later – that the model has been successful in achieving BP/Lipid goals in ~90 % of patients after the second visit, so that visit complexity is drastically curtailed in 90 % of patients receiving ongoing care for BP/Lipid management.) As a result, most patients need only one session – at most, two – of

one-on-one intervention for BP/Lipids management to achieve and maintain goal for both measures.

The current configuration (Fig. 2.3c, Third Iteration) makes use of this fact by effectively combining the last two stations in 90 % of patients meeting BP and Lipid goals, so that the patient visit ends after three Stations. The “downtime” afforded by this combination of stations allows the supervising MD to complete documentation tasks for the BP/Lipids Station, including medication reconciliation, and ordering labs in anticipation of the next patient’s needs, during the first 5 min of the cycle time at Station 3, while the NP completes a preparatory glycaemic evaluation. The supervising MD then enters Station #3 during the latter half of cycle time, combining endorsement of success in reaching BP/Lipid goals with supervisory functions at the “Glycaemia” station (now Station #3). In the minority of patients who need specific interventions because BP-Lipid goals are not met, the Supervising MD can render those at an “Optional” Station #4 during a truncated visit (~7–8 min) after the completion of the “Glycaemia” visit, which still leaves enough time for the MD to fulfil a glycaemic supervisory role for the next patient at Station 3.

The above examples demonstrate the inherent plasticity of the model, to the extent that we were able to accommodate a loss of manpower with little or no disruption in work flow. That experience further validates the adaptability of the Toyota Way to care delivery in a multitude of chronic disease states. It must be reiterated, however, that the ability to make the BP/Lipid Station optional in the current configuration is critically dependent on the fact that BP/Lipid goals are met in 90 % of patients. This would not be possible in a population in whom these

goals are not met in a significant number of patients; in that case, the configuration shown in Fig. 2.3b, Second Iteration, would be mandatory.

## Performance and Results

### Process-of-Care Measures (Table 2.1)

As part of annual performance reviews at VAPHS over the past 8 years, we are required to show compliance with standards of care in a random sample of ~20 patients each year. These reviews show 100 % documentation in *all* ADA specified domains of diabetes care (HbA<sub>1c</sub>, LDL, blood pressure, creatinine and urinary microalbumin levels, annual foot and eye exams, and aspirin and statin use/contraindications/alternatives). No published diabetic care model approaches, let alone equals, this level of performance.

### Performance Measures (Figs. 2.4, 2.5, and 2.6)

To evaluate performance, we secured IRB permission to track surrogate measures associated with better long-term outcomes (A1c, LDL and

SBP) in 57 patients who were seen at least three times in the traditional single provider clinic prior to redesign and followed for at least three visits after redesign. Significant improvements were achieved in all three measures compared to prior performance in the same patients who had been attending the traditional single provider-patient clinic prior to redesign.

Figure 2.4 shows that mean HbA<sub>1c</sub> declined by 0.6 % after redesign (7.4 % compared to 8 % for the same patients before redesign) and that a greater proportion of patients achieved an HbA<sub>1c</sub> of <8.0 % (a modified care goal driven by the fact that most of our patients are of advanced age and have multiple co-morbidities). Similarly, Fig. 2.5 shows that mean LDL fell by 20 mg/dl (0.5 mmol/l), with a goal LDL of <100 mg/dl (<2.6 mmol/l) being achieved in 90 % of patients, compared to 75 % in the prior clinic, with no patient having an LDL >130 mg/dl (3.4 mmol/l). Finally, as shown in Fig. 2.6, SBP levels fell by 11 mmHg, and SBP <130 mmHg was achieved in almost twice as many patients as before (63 % vs 35 %), with 100 % of patients maintaining goal SBP <140 mmHg. Most importantly, in every instance in which SBP was >130 mmHg, or LDL >100, there was documentation of action taken to intensify therapy, or the reason for a decision not to intervene.

**Table 2.1** Fulfilment of 12 process-of-care measures in the Individualized Multidisciplinary Team-Care Model for Integrated Diabetes Care

Process measure	Documentation <sup>b</sup>	Assessment <sup>c</sup>	Intervention <sup>d</sup>
Blood pressure	100 %	100 %	–
A1c (POC testing)	100 %	100 %	–
LDL (POC testing)	100 %	100 %	–
Annual foot exam	100 %	100 %	–
Annual dilated eye exam <sup>a</sup>	100 %	100 %	–
Annual urinary ACR	100 %	100 %	–
Annual creatinine	100 %	100 %	–
Medication reconciliation	100 %	–	–
ASA/contraindications	100 %	–	100 %
Lipid Rx/contraindications	100 %	100 %	100 %
HTN Rx/contraindications	100 %	100 %	100 %
Glycaemia Rx/contraindications	100 %	100 %	100 %

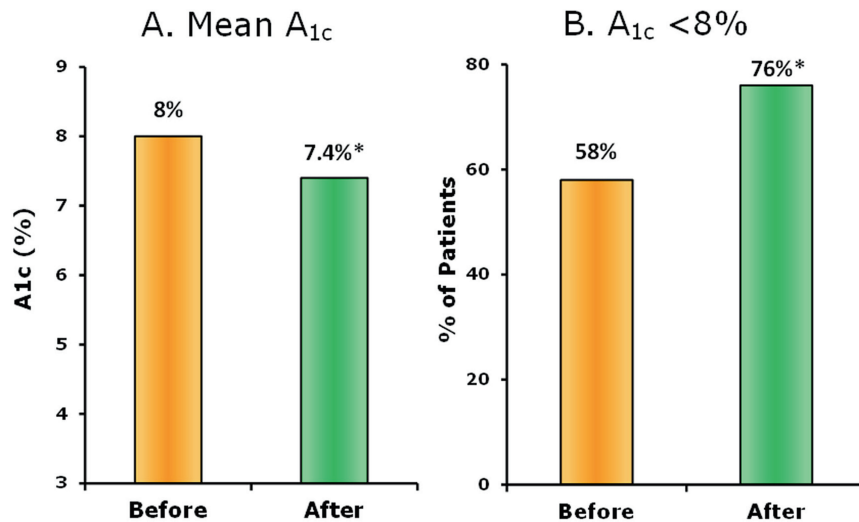
ACR Albumin Creatinine Ratio, ASA aspirin, HTN hypertension, POC Point of Care, Rx Treatment

<sup>a</sup>Retinopathy (absent/present and type/severity) documented from Annual Surveillance exams

<sup>b</sup>Documentation that each measure was either performed/resulted or due/ordered

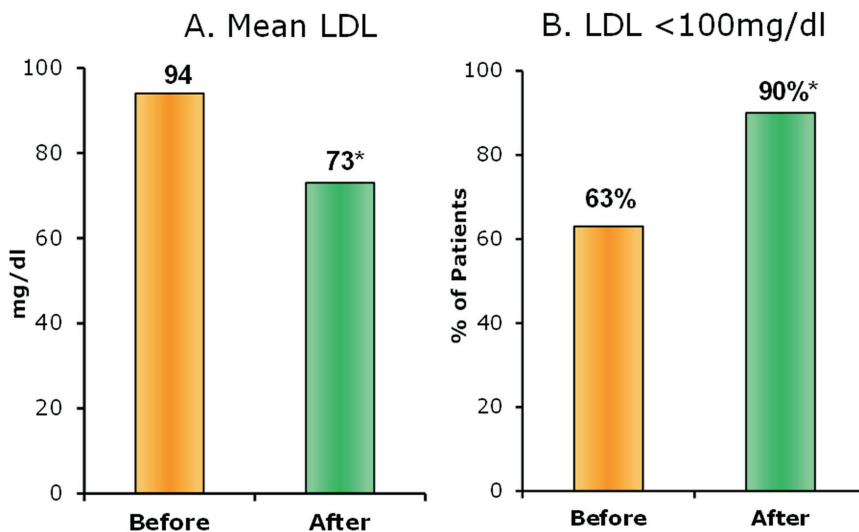
<sup>c</sup>Assessment of each Measure documented as “normal”/“at goal” or “abnormal”/“not at goal”

<sup>d</sup>Intervention (therapy intensification/contraindication) documented in all patients not at goal



**Fig. 2.4** (a, b) Change in A<sub>1c</sub> in 57 patients seen for  $\geq 3$  visits before and after changing from a traditional Single Patient-Provider Model to an Individualized

Multidisciplinary Team-Care Model for Delivering Integrated Diabetes Care (\*  $p < 0.05$ )



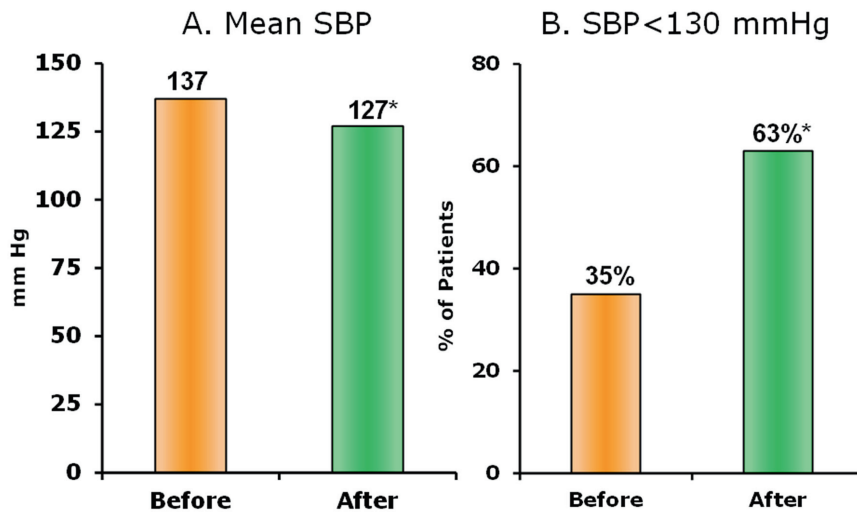
**Fig. 2.5** (a, b) Change in LDL Cholesterol in 57 patients seen for  $\geq 3$  visits before and after changing from a traditional Single Patient-Provider Model to an Individualized

Multidisciplinary Team-Care Model for Delivering Integrated Diabetes Care (\*  $p < 0.01$ )

### Provider Patient Interactions in the Individualized Multidisciplinary Team Care Model (Table 2.2)

In the traditional “single provider” clinic that existed prior to redesign, there were ten scheduled appointments, including two overbooks, for

a net of eight patient appointments of 30 min each with a Nurse Practitioner in a 4 h clinic session (which included direct supervisory input from a Diabetologist), for a total of 240 min of face-to-face patient contact. In the redesigned clinic, 14 visits are scheduled, with three overbooks, for a net of 11 patient visits, on average, totaling 60 min each (15 min with four provid-



**Fig. 2.6** (a, b) Change in Systolic Blood Pressure in 57 patients seen for  $\geq 3$  visits before and after changing from a traditional single patient: provider model to an Individualized Multidisciplinary Team-Care Model for Delivering Integrated Diabetes Care (\*  $p < 0.01$ )

**Table 2.2** Patient-provider interactions before and after implementation of the Individualized Multidisciplinary Team-Care Model

Parameter	Before redesign	After redesign	% Change
Number of providers	2	4	100 % ↑
Daily appointment slots	10	14	40 % ↑
Average # of patients seen/day	8	11	38 % ↑
Scheduled clinic duration (min)	240	240	↔
Scheduled visit duration (min)	30	60	100 % ↑
Mean time Check-in to Depart (min)	56	63	12 % ↑
Mean (max) wait time (min)	23 (58)	8 (19)	65 % ↓
Average face-to-face time (min)	33	55	68 % ↑
Integrated delivery of DSME calibrated to need	No	Yes	–
Integrated delivery of MNT calibrated to need	No	Yes	–
Fragmented/uncoordinated ancillary care	Yes	No	–

ers). This translates to 660 min of face-to-face patient contact, which represents a 175 % increase in available time for care delivery in the 4 h session.

The inclusion of MNT and DSME in an integrated visit, in particular, represents a major improvement in care that cannot be quantified. In addition, one-on-one interactions at every station ensure patient-centred (individualized) care delivery calibrated to each patient's needs,

abilities and goals. Finally, an unexpected benefit from time-constrained visits in the redesigned clinic is a dramatic improvement in punctuality. Average patient-wait time is now 8 min, with a maximum of 19 min, so that 90 % of patients are seen within 5 min of their scheduled appointment time, compared to an average wait time of 23 min previously, when only 30 % were seen within 15 min of their scheduled appointment time.



## Conclusions

Krumholz et al. identify eight domains of care that must be covered in any CDM programme [20, 21]. The component interventions encompassing those domains comprise a precise yardstick for measuring the effectiveness of a CDM programme, as follows:

- (i) an identified population with specific health and disease conditions;
- (ii) the application of evidence-based practice guidelines to treat those patients;
- (iii) collaborative practice models that include physician and support-service providers;
- (iv) patient self-management education (may include primary prevention, behaviour modification programmes, and compliance/surveillance);
- (v) risk stratification to match interventions with need;
- (vi) process and outcomes measurement, evaluation, and management (including primary prevention, behavior modification programs, and compliance/surveillance);
- (vii) routine reporting and feedback loops that include communication with the patient, physician, health plan, and ancillary providers; and
- (viii) appropriate use of information technology (including use of specialized software, data registries, automated decision support tools, and callback systems).

The “Individualized Multidisciplinary Team-care Model” of Diabetes Care at VA Pittsburgh, which was designed according to PPC<sup>SM</sup> Principles, derived from the Toyota Production System, has achieved an exceptional level of success in fulfilling all of the above criteria, as follows:

- (i) The model is designed for a specific, at-risk population (veterans with diabetes);
- (ii) Goals of care are set according to evidence-based practice guidelines;
- (iii) It delivers collaborative care through ongoing dialogue between physician and ancil-

lary care providers to set and attain care goals, based on individual patient needs;

- (iv) It places equal emphasis on patient self-management (DSME and MNT) and therapeutic management (BP/Lipids, and Glycaemia) for attaining care goals;
- (v) Care at each station is calibrated to match interventions to individual patient need, based on proactive risk stratification;
- (vi) It meets all process and performance measures;
- (vii) It incorporates feedback loops through open communication between all care providers to not only set, achieve and maintain individualized care goals but also to improve care delivery through alterations in the practice model;
- (viii) It uses information technology to create a templated note that mandates documentation of all process measures at each station, and to compile notes at each station into a single cohesive visit note.

In addition, the model has proven to be remarkably successful in fulfilling all process-of-care and performance measures. By providing comprehensive and effective diabetes care without compromising individualized attention – the hallmark of patient-centred care – our Individualized Multidisciplinary Team-care Model has achieved a level of success exceeding that in published studies of other models, where documentation in each of the nine ADA-identified domains ranges from 12 % to 70 % individually (and only 10 % for all nine domains collectively), and goal for any one outcome measure ( $A_{1c}$ , LDL or SBP) is reached in just 35–60 % of patients and all three in just 19 %.

One source of ongoing disappointment must, however, be mentioned before closing. It is our failure to imbue others with our enthusiasm for changing diabetes care delivery, which means that our success has not been replicated elsewhere in the VA system. That, however, may reflect the inertia that resists any change to a deep rooted tradition. That is what we encountered when we first set out to redesign diabetes care delivery, and our experience shows that the iner-

tia becomes particularly obdurate when faced with a paradigm-shifting change that seeks to replace long-held practices with those based on concepts borrowed from industry! Our experience shows that overcoming the resistance requires unshakeable belief, sustained commitment, and enthusiastic buy-in from all presumptive stakeholders, including (most importantly) decision-makers responsible for allocating resources. If all those prerequisites are marshalled, then it is possible to (a) improve surrogate measures associated with improved outcomes; (b) achieve 100 % performance on all ADA-identified process-of-care measures; and (c) improve punctuality and timeliness in providing patient-centred care for diabetes.

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