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Improving Type-2 Diabetes Therapy Adherence and Persistence in Turkey

How to Address Avoidable Economic and
Societal Burden



Introduction

This Appendix document provides supporting material for the report entitled Improving Type-2 Diabetes Therapy Adherence and Persistence in Turkey, How to Address Avoidable Economic and Societal Burden.

This study is based on research and analysis undertaken by the IQVIA Consulting Services with support from Lilly.

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Appendix

Overview of methods

A number of key areas were addressed to understand how to improve type-2 diabetes (T2D) therapy adherence and persistence in Turkey. First, the current social, economic and political context surrounding T2D therapy adherence and persistence was assessed. The epidemiology of T2D, current strategies for treating and preventing T2D, as well as the different reasons and motivations for being adherent or non-adherent were explored before understanding the challenges faced by person(s) with T2D (PwD). After developing a full understanding of the state of care and of T2D therapy adherence and persistence, several key recommendations to improve the current situation were developed.

To build this holistic viewpoint and subsequent recommendations, a number of research methods, including literature research, stakeholder interviews, quantitative surveys and data requests from the Ministry of Health (MoH), were leveraged. In addition, the IQVIA CORE Diabetes Model (CDM) – an economic model validated in peer-reviewed journal articles – was used to forecast the cost of complications of T2D. Furthermore, the research findings, key economic model inputs and outputs, and proposed set of recommendations to address T2D therapy adherence and persistence were all validated in a Diabetes Stakeholder Meeting hosted by TEPAV on September 25, 2017.

Total and avoidable costs of T2D complications

Complication rates and costs linked to T2D and sub-optimal therapy adherence and persistence were quantified using the CDM, based on data inputs gathered from a variety of sources, including data shared by the Turkish MoH's General Directorate of Public Health for average HbA1c levels in the Turkish T2D population for 2016 and 2017.

The CDM was populated with a series of Turkey-specific inputs to build an average PwD risk profile for various diabetes-related complications, notably:

- The direct healthcare costs of various diabetes-related complications in Turkey (e.g., MI, stroke, amputation, blindness, renal disease, among others)
- The medical characteristics of the average PwD in Turkey (e.g., HbA1c levels, blood pressure, body mass index, age, duration of diabetes, co-morbidities, among others)

However, one input, HbA1c levels, was left as a variable in order to differentiate between adherent and non-adherent PwD in Turkey. The HbA1c levels of an adherent PwD and of a non-adherent PwD were calculated by collecting the following information:

- The proportion of PwD in Turkey who are adherent and non-adherent, respectively
- The average HbA1c levels of all PwD in Turkey
- The relationship between T2D therapy adherence and HbA1c levels among PwD in Turkey

With all of this information, the model was then run twice on a per-patient basis:

- Once in a scenario for adherent PwD, where HbA1c levels are lower and therefore the risk of complications is lower
- Once in a scenario for non-adherent PwD, where HbA1c levels are higher and therefore the risk of complications is higher

Each scenario resulted in a per-patient cost, which was multiplied by the number of PwD who are adherent or non-adherent in Turkey, respectively. The total of these two scaled-up scenarios represents the total cost burden of PwD in Turkey.

Finally, in order to determine the avoidable cost due to sub-optimal T2D therapy adherence and persistence, the adherent per-patient scenario was multiplied by the total number of PwD in Turkey (representing a hypothetical scenario where all PwD in Turkey have optimal therapy adherence and persistence levels and therefore lower rates of complications and costs) before subtracting it from the actual cost burden of PwD in Turkey. This difference captures the total avoidable cost due to T2D therapy non-adherence in Turkey and therefore the estimated cost saving if all PwD were to reach an optimal level of therapy adherence and persistence (generally defined as consuming over 80% T2D medication as prescribed by the physician or a score of 6 and above on a Morisky Medication Adherence scale [MMAS-8]).

CORE Diabetes Model Inputs

Various sources, including academic studies, an IQVIA physician survey, stakeholder interviews and data shared by the Turkish MoH's General Directorate of Public Health, were used to collect the inputs for the CDM. Academic studies that provide the most up-to-date information for a cohort representative of Turkey were prioritized as input data. A more detailed explanation of the approach taken for selection of key inputs is provided below.

Cost of complications

To finalize the cost inputs, a phased approach was followed. First, an extensive literature search was conducted, identifying 15 sources. Relevant sources were reviewed, prioritized based on their level of evidence and finally validated with experts. To ensure the costs of complications were up-to-date, the Health Application Communique Appendix 2/C (SUT Ek-2/C) was analyzed to calculate historic price changes in respective treatment items between 2016 and the year of the source study. However, there were few conclusive price changes identified based on the updated SUT Ek-2/C list. Consequently, each historic cost input was adjusted to reflect 2016 values using one of the below approaches:

1. Health inflation data from the Turkish Statistical Institute was used to project the costs and final numbers were pressure tested with experts. If experts suggested that for any cost item there could be a price decrease between the study year and 2016, original study figures were referenced, instead of projecting to 2016 with health inflation.
2. A limited number of model inputs such as renal transplant and cataract operation costs were projected using a combination of methodologies including SUT Ek-2/C price changes and health inflation update.

Average of HbA1c levels of the T2D population in Turkey

Average HbA1c levels of PwD in Turkey was calculated to be 7.77%, which was determined by averaging figures from the following three sources: a retrospective study of PwD in a diabetes outpatient clinic in Turkey,¹ a phone survey of 30 endocrinologists and 80 internal medicine specialists in Turkey conducted by IQVIA,² and figures estimated by key stakeholders in diabetes.³ The final number was then cross-checked with an estimate of HbA1c levels provided by the MoH's General Directorate of Public Health and calculated from data of almost 500,000 PwD in Turkey; the two estimates were within 0.1 percentage points of each other.

Details of IQVIA physician survey

A phone survey of 30 endocrinologists and 80 internal medicine specialists was conducted in order to estimate the average HbA1c levels of PwD and the relationship between therapy adherence and HbA1c levels in Turkey. To ensure that the survey was representative, physicians were selected randomly from public, training and research, private and university hospitals in Turkey. The breakdown of the number of physicians interviewed by city and hospital type is provided in Exhibit A and Exhibit B.

Exhibit A: Breakdown of interviewed physicians by city

City	Number of physicians
Istanbul	41
Ankara	24
Izmir	13
Adana	5
Antalya	5
Samsun	4
Bursa	4
Gaziantep	4
Kayseri	3
Diyarbakır	3
Konya	3
Trabzon	1
Total	110

Exhibit B: Breakdown of interviewed physicians by hospital type

Hospital type	Number of physicians
Training and research	32
Private	28
Public	27
University	23
Total	110

Number of PwD in Turkey

For this study, the number of PwD in Turkey refers to the number of diagnosed PwD, not the prevalent T2D population – this is because the relationship of therapy adherence and persistence is only applicable to people who are being treated. MoH and Social Security Institution (SSI) databases provide the two main sources for the estimation of this number. SSI published a study in 2013 which puts the number of people with T1D and T2D at 5.2 million for 2012.⁴ Based on estimated T1D and T2D patient number distribution of 10% vs. 90% worldwide,⁵ respectively, the number of people with T2D in Turkey would be 4.7 million. A more recent SSI study estimated that there were 7.4 million PwD in Turkey in 2016;⁶ meanwhile, based on the MoH's saglik.net system (Turkey's National Health Information System), there were 5.4 million PwD in Turkey that same year. According to SSI figures,^{4,6} the average annual increase in prevalence of PwD was approximately 40% between 2008–2009, 9% between 2011–2012, and 12% between 2012–2016.

IQVIA Institute's estimate of 6.3 million PwD in 2016 is an extrapolation of the SSI's 2012 value of 4.7 million with a stabilized annual growth rate of 8%. This growth rate is more realistic than the annual growth rate calculated (12%) based on the 2012 and 2016 SSI studies, since one would expect the growth in diagnosed PwD to stabilize due to increased access to healthcare and a higher base in patient numbers. Finally, looking into the future and forecasting for the year 2025, IQVIA Institute applied a growth rate of approximately 6% per year. This number was derived from an expectation of a further decrease in annual growth and results in an estimate of 10.8 million PwD in 2025.

Creating the Recommendations

Following secondary research and an analysis of the current situation, PwD behaviors and challenges facing them, a number of recommendations to improve T2D therapy adherence and persistence were developed. These recommendations were then reviewed and optimized during qualitative one-on-one interviews and a Diabetes Stakeholder Meeting with healthcare professionals, payers, policy makers and patient association representatives thus ruling out all but the most important, effective and easily implementable solutions.

Recommendations

Exhibit C: Recommendations and Associated Interventions to Improve T2D Therapy Adherence and Persistence in Turkey

Recommendation	Intervention description	Possible intervention assessment metrics	Key partners	Outcomes
IDENTIFY AND PROFILE				
Identify PwD at risk of low adherence and persistence	<p>Propose two different approaches:</p> <p>Approach 1: Information already available in Electronic Medical Records (EMR) could be leveraged and supplemented by Healthcare Professional (HCP) expert judgement to identify potentially 'at risk' PwD</p> <p>Approach 2: An adherence and persistence module with collection and integration of health data could be used to progress to more advanced methods of identifying 'at risk' PwD through data mining and analysis</p>	Review quality of data by keeping a record of successful/ unsuccessful predictions	MoH, SSI and universities	<ul style="list-style-type: none"> Reliable, time- and cost-effective identification of individuals having or at risk of having sub-optimal therapy adherence and persistence Holistic and personalized care Better allocation of healthcare service use and resources

Recommendation	Intervention description	Possible intervention assessment metrics	Key partners	Outcomes
ACTIVATE				
Increase tailored T2D management education for PwD, including information on therapy adherence and persistence	<ul style="list-style-type: none"> • Provide T2D education according to PwD level of health knowledge and ability to self-manage their condition • Provide a range of formats (e.g., human and technology interventions and mix thereof) based on PwD preferences and degree of activation • Improve T2D education programs' reach in terms of numbers and frequency 	<ul style="list-style-type: none"> • Measure number of PwD receiving T2D education, disease and medication knowledge (teach back method or questionnaire) • Follow improvements in PwD activation degrees and therapy adherence and persistence 	MoH, professional associations and patient associations	<ul style="list-style-type: none"> • Improved health literacy and health knowledge • Increased PwD engagement • Better T2D self-management (including therapy adherence and persistence) • Reduction in T2D-related complications • Optimized healthcare service use
Introduce trained & certified diabetes educators to support the facilitation of T2D education and activate PwD	Train and certify people as diabetes educator in health-related and even non-health-related professions, such as social service specialists, to facilitate T2D education courses for a wider PwD population	<ul style="list-style-type: none"> • Measure number of trained and certified diabetes educators and PwD receiving T2D education 	MoH, Key Opinion Leaders (KOLs), Turkish Nursing Association and other professional organizations	<ul style="list-style-type: none"> • Improved health literacy and health knowledge • Increased PwD engagement • Better T2D self-management (including therapy adherence and persistence) • Reduction in T2D-related complications • Optimized healthcare service use

Recommendation	Intervention description	Possible intervention assessment metrics	Key partners	Outcomes
Empower family practitioners (FPs) with more capabilities to manage PwD and increase activation	Empower FPs to provide monitoring, engagement and patient education function for PwD without serious complications (e.g., Provide annual T2D refresher courses to build on and maintain their knowledge)	<ul style="list-style-type: none"> • Measure number of PwD monitored and managed in family health centers • Follow improvements in PwD activation degrees • Measure number of FPs receiving refresher courses and module on therapy adherence and persistence 	MoH, KOLs and FPs	<ul style="list-style-type: none"> • Reduction in secondary and tertiary care patient load • Improved health literacy and health knowledge • Increased PwD engagement • Better T2D self-management (including therapy adherence and persistence) • Reduction in T2D-related complications • Optimized healthcare service use
SUSTAIN				
Monitor PwD activation and repeat or adapt activation tactics for PwD with decreasing activation or diabetes control	Once a PwD is optimally activated, a set of clinical and non-clinical outcomes could be used to cost-effectively identify PwD experiencing a temporary setback in activation; thus allowing HCPs to understand when further or different strategies are needed to increase activation or improve control	<ul style="list-style-type: none"> • Follow improvements or setbacks in PwD clinical and non-clinical outcomes, therapy adherence and persistence and activation levels 	MoH, SSI, universities/ research institutions	<ul style="list-style-type: none"> • Holistic and personalized care • Improved PwD engagement and health status • Optimized healthcare service use
Leverage technology and digital offerings tailored to PwD activation	Leverage technology for T2D therapy tracking, T2D management support, refresher education and reminders to reduce need for human intervention	<ul style="list-style-type: none"> • Follow improvements or setbacks in PwD clinical and non-clinical outcomes, therapy adherence and persistence and activation levels 	MoH, SSI, universities/ research institutions, mobile service providers, application developers	<ul style="list-style-type: none"> • Better T2D self-management (including therapy adherence and persistence) • Reduced costs to healthcare system • Optimized healthcare service use

References

- ^{1.} Ucak S, Şatır E, Basat O, Altuntas Y. Compliance to treatment and reaching of metabolic goals are better in OAD-treated diabetics than insulin-treated diabetics in the Turkish population. Turkish Journal of Medical Sciences. 2014;43(2):203–207
- ^{2.} IQVIA survey with 110 physicians, September 2017
- ^{3.} Diabetes Stakeholder Meeting hosted by TEPAV on 25th September 2017
- ^{4.} Social Security Institution. Diabetes from the perspective of Social Security Institution. 2013
- ^{5.} International Diabetes Federation. IDF Diabetes Atlas, 7th edn. Brussels, Belgium: International Diabetes Federation, 2015.
- ^{6.} Publicly presented values by Social Security Institution during Diabetes Management Symposium, February 2017, Ankara. Available at <https://www.sadefe.org.tr/diyabet-yonetimi-sempozyumu>. Last Accessed on 6 November 2017



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