

Impact case study (REF3)

Institution: University of Leicester		
Unit of Assessment: 2		
Title of case study: Identifying, Preventing and Treating Type-2 Diabetes		
Period when the underpinning research was undertaken: 2000–2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): 1) Prof Kamlesh Khunti 2) Prof Laura Gray 3) Prof Melanie Davies 4) Prof Thomas Yates	Role(s) (e.g. job title): 1) Professor of Primary Care Diabetes and Vascular Medicine 2) Professor of Medical Statistics 3) Professor of Diabetes Medicine 4) Professor of Physical Activity, Sedentary Behaviour and Health	Period(s) employed by submitting HEI: 1) 1993–Present 2) 2008–Present 3) 2006–Present 4) 2008–Present
Period when the claimed impact occurred: 2014–Present		
Is this case study continued from a case study submitted in 2014? N		
<p>1. Summary of the impact</p> <p>Type-2 Diabetes (T2DM) is one of the most prevalent long-term conditions globally; it is non-communicable, highly preventable and treatable. However, options for identifying, preventing and managing the condition are costly, have low uptake and underserve groups in greatest need. The Leicester Diabetes Research Centre (LDRC) runs the largest portfolio of translational research for the detection, prevention and management of T2DM nationally, redefining treatment paths and patient outcomes through the creation of the Leicester Diabetes Risk Score (LDRS) for early detection, the <i>Let's Prevent</i> programme for preventing progression from prediabetes, and the DESMOND (Diabetes Education and Self-Management for Ongoing and Newly Diagnosed) Structured Self-Management Programme for those with T2DM. These tools have transformed standard practice worldwide providing substantial health and economic benefits and enabling tailored, effective treatment.</p>		
<p>2. Underpinning research</p> <p>Population-based screening in Leicester and Leicestershire found that 20% of adults had either prediabetes or undiagnosed T2DM, which was significantly higher in ethnic minority groups [R1]. Prediabetes and early T2DM are asymptomatic and therefore difficult to detect; however, by identifying prediabetes, T2DM may be delayed or prevented through lifestyle changes. Structured Self-Management Education programmes (SSME) provide both prediabetes and T2DM patients with the knowledge and tools necessary to make effective, long-term changes to manage their condition.</p> <p>Identifying Prediabetes and T2DM</p> <p>The LDRC has developed a non-invasive screening tool, the LDRS, to reduce barriers to screening in comparison to existing NHS measures, where just 40% of patients attended screening appointments [G1]. Completers are scored on seven risk factors (age, sex, ethnicity, BMI, waist circumference, family diabetes history and blood pressure). The total score provides an accurate indication of prediabetes/T2DM risk, with high scorers advised to visit their GP for confirmatory tests. LDRS is the first and only tool developed and validated for use in a multi-ethnic UK population [R1].</p>		

When tested using national data, LDRS performed excellently; correctly identifying 82% of prediabetes/undiagnosed T2DM cases [R1]. As the presence of healthcare professionals is not required, LDRS provides ~GBP70 cost-per-case saving compared to existing screening methods [R2]. High-risk groups, such as people from South Asian ethnicities, have previously been difficult to reach. Not only was LDRS shown to reliably identify cases within such communities [R1], it has since been translated into five South Asian languages and rolled out in community venues nationwide to increase engagement and provide equitable healthcare access [R3].

Preventing Progression from Prediabetes to T2DM

In 2009, LDRC researchers began development of a lifestyle intervention aimed at preventing progression from prediabetes to T2DM by promoting increased physical activity, healthy diet and weight loss. The *Let's Prevent* [G2] intervention consisted of a core six-hour group-based behavioural educational intervention for individuals with prediabetes, led by trained educators, with follow-on maintenance support sessions offered annually. The programme followed a written, theory-driven curriculum, which, alongside improving diet, increasing physical activity, was a core aim, supported by the provision of pedometers and personalised step-per-day goals. 44 GP practices and 880 participants took part in the large cluster RCT to evaluate *Let's Prevent* [R5]. Results demonstrated that the programme effectively increased physical activity, improved glucose and cholesterol levels and psychosocial wellbeing after 3 years [R5]. Importantly, *Let's Prevent* proved to be both highly effective at reducing diabetes risk in session attendees (88% reduced risk in those attending all sessions) and was cost-effective: incremental cost-effectiveness ratio of GBP3643/QALY and 86% probability of being cost-effective at a willingness to pay threshold of GBP20,000/QALY [R6].

Let's Prevent was one of four original programmes approved and offered by the NHS Diabetes Prevention Programme (NHSDPP), branded *Healthier You* and, following LDRC cultural adaptation, can be delivered in South Asian languages.

Managing T2DM

Since 2005, LDRC has successfully developed, evaluated and implemented evidence based SSME programmes including the flagship group based SSME, DESMOND. DESMOND was tested in the largest ever trial of its kind evaluating the effectiveness of SSME for T2DM management. The cluster RCT recruited 207 GP practices and 824 participants. Over a 12-month period, DESMOND promoted health improvement behaviours, reducing depression and risk of cardiovascular disease. DESMOND was the first intervention to meet all NHS Quality Criteria that could be generalised and replicated nationwide, reliably and cost-effectively [R4].

LDRC SSME research has progressed rapidly, now extending programme availability to low-middle income countries as part of the MRC Global Health Challenge Directive. In collaboration with colleagues in Mozambique and Malawi, LDRC researchers have developed a full implementation pathway and toolkit to enable DESMOND to become embedded long-term [G3].

3. References to the research

R1. Barber SR, Dhalwani NN, **Davies MJ, Khunti K, Gray LJ** (2017) *External national validation of the Leicester Self-Assessment score for Type 2 diabetes using data from the English Longitudinal Study of Ageing*. Diabet Med. 2017. doi: 10.1111/dme.13433.

R2. **Khunti K, Gillies CL, Taub NA, Mostafa SA, Hiles SL, Abrams KR, Davies MJ** (2012) *A comparison of cost per case detected of screening strategies for Type 2 diabetes and impaired glucose regulation: modelling study*. Diabetes Res Clin Pract. 2012;97(3):505-13.

- R3.** Patel N, Willis A, Stone M, Barber S, **Gray L, Davies M, Khunti K** (2016) *Developing a Conceptually Equivalent Type 2 Diabetes Risk Score for Indian Gujaratis in the UK*, Diabetes Research, doi: 10.1155/2016/8107108.
- R4.** **Davies MJ, et al**, *Effectiveness of the diabetes education and self management for ongoing and newly diagnosed (DESMOND) programme for people with newly diagnosed type 2 diabetes: cluster randomised controlled trial* (2008), BMJ.
- R5.** **Davies MJ, Gray LJ**, Troughton J, Gray A, Tuomilehto J, Farooqi A, **Khunti K, Yates T**. (2016) *A community based primary prevention programme for type 2 diabetes integrating identification and lifestyle intervention for prevention: the Let's Prevent Diabetes cluster randomised controlled trial*. Preventive Medicine.
- R6.** Leal J, Ahrabian D, **Davies MJ, Gray LJ, Khunti K, Yates T**, Gray AM. *Cost-effectiveness of a pragmatic structured education intervention for the prevention of type 2 diabetes: economic evaluation of data from the Let's Prevent Diabetes cluster-randomised controlled trial*. BMJ Open. 2017 Jan 1;7(1):e013592.
- G1.** **Davies MJ, Khunti K** and **Gray LJ**. *A proposal to finalise and pilot a comprehensive self-assessment tool incorporating risk for diabetes and being at high risk of diabetes*. Diabetes UK (£30,000, 12/08-04/09).
- G2.** National Institute for Health Research (NIHR) Programme Grant for Applied Health Research. £2,081,960.00; 2007-2014 *A community based primary prevention programme for Type 2 Diabetes integrating identification, lifestyle intervention and community services for prevention*. **Prof Davies and Prof Khunti as co-PIs, Prof Yates as physical activity lead, Prof Gray Lead methodologist**.
- G3.** *Extending the availability of self-management structured education programmes for people with type 2 diabetes in low-to-middle income countries: the EXTEND Programme* GCRF/ Medical Research Council; £587,166; 2016-2019.

4. Details of the impact

LDRC run the largest portfolio of translational research for T2DM identification, prevention and management nationally, ensuring that prediabetes and T2DM can be identified early, progression halted and patients (including hard-to-reach, high-risk communities) have the tools to effectively manage their condition.

Changing Clinical Practice

Independent evaluation of LDRS demonstrated its superiority, cost-effectiveness and savings in difficult to reach communities. Further independent modelling showed that its increased use could result in an additional ~17,500 prediabetes and 4,500 T2DM diagnoses annually, providing NHS savings of >GBP850,000,000 over a 20-year period **[E5]**. LDRS is now recommended for prediabetes and T2DM detection by NICE and NHSDPP **[E2, E3]**.

Since 2015, LDRS has been incorporated into VISION GP electronic record systems covering 636 practices and >4,300,000 patients **[E4]** and the PRIMIS GRASP-DM quality improvement tool which enables GP identification and monitoring of high-risk patients.

Internationally, LDRS is recommended for T2DM detection by the Norwegian Diabetes Association and has been both directly adapted and used as a basis for population specific risk scores worldwide including in Bangladesh, China, Pakistan, Peru and Portugal **[E6]**.

In 2003, UK T2DM patients had no SSME access due to the lack of a NICE recommendation. LDRC research ensured that by 2016 >77% could access programmes at a real-world cost of just GBP89p/p, leading to updated NICE guidelines to include SSME in 2017 **[E2]**. The 2016 Berlin Declaration (global call for T2DM prevention and management) highlighted the importance of SSME, citing DESMOND as a best-practice example **[E7]** and was endorsed by Primary Care Diabetes Europe, International Diabetes Federation and World Heart Foundation **[E7]**. The 2018 International Consensus Recommendations by the American Diabetes Association/European

Association for the Study of Diabetes recommended SSME, citing demonstrable 26% all-cause mortality reduction, HbA1c reduction and additional biomedical/psychosocial benefits [E8].

DESMOND is now embedded as routine clinical practice in >66% of UK CCGs, providing substantial treatment quality and health outcome improvements to >300,000 patients. The programme is delivered by >1,185 UK and 293 international LDRC trained Health Care Professionals/lay educators enabling access nationwide and to ~4,250 patient beneficiaries in New Zealand, Gibraltar and Australia. DESMOND has been adopted as the national programme under the Australian National Diabetes Service Scheme [E9].

Improving Patient Health Outcomes

Since 2011, >2,800,000 people completed LDRS via Diabetes UK channels (online, 'Know Your Risk' roadshows and through industrial partnerships) [E10]. Of the ~1.4million completions since September 2014, ~25% would have received a high score and visited their GP resulting in ~77,194 T2DM and 192,299 prediabetes diagnoses. In addition to local LDRC deployment, Diabetes UK used LDRS in national pharmacy collaborations with Tesco, Boots, Lloyds, Northern Ireland Health Alliance and the Network of Welsh Pharmacies [E11].

In July 2020, the UK Government unveiled the Tackling Obesity national strategy which greatly expanded LDRS utility by enabling completers receiving moderate or high LDRS risk scores to self-refer to *NHS Healthier You* and, by extension, *Let's Prevent* for the first time [E16].

Following the establishment of *Healthier You*, LDRC collaborated with leading service design and delivery company Ingeus UK to tailor *Let's Prevent* to meet the programme's service specification. The application was successful and *Let's Prevent* became the only joint NHS-Industry provider among the original four approved suppliers. Initially offered in 27 areas (~26,000,000 people), *Let's Prevent* is now one of the most widely delivered programmes nationally, at its height holding >42% market share. Since 2016, 140,000 patients have been referred to *Let's Prevent* achieving substantial health benefits including clinically meaningful weight loss (averaging 4kgs each), significant diabetes risk reduction and improved glycaemic control [E14]. Published case studies showcase the positive impact on individuals, with attendees successfully implementing fundamental lifestyle changes as a result of the programme [E4]. NHS England predict 390,000 *Healthier You* attendees by 2021, thereby delaying or preventing 4,500 T2DM cases. Long term, *Healthier You* will provide the NHS net economic benefits of GBP1,200,000,000 through diabetes prevention and reduced healthcare resource demand with *Let's Prevent* integral in achieving these successes [E15].

In 2016, LDRC developed MyDESMOND; a unique digital SSME created through collaboration with patients, medical professionals and web designers to address changing expectations from commissioners and patients concerning choice and access. MyDESMOND is now approved by the NHS app store and incorporated in all UK sites to support long-term maintenance of self-care behaviour as an alternative to group-based delivery. Over 12,500 patients have utilised MyDESMOND, engaging for an average of 55 days. 80% of users continue use after completion, in many cases for over two years [E12]. During the COVID-19 pandemic, LDRC took the unprecedented decision to make MyDESMOND free to all [E17] resulting in over 10,000 new users since March 2020 [E12].

Engaging Hard to Reach Communities

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Though ethnic minority groups have higher T2DM risk, their screening uptake is significantly lower. LDRC translation of LDRS into 5 South Asian languages has broadened access and resultant health benefits to >700,000 people nationwide. These translated versions have been used >1,200 times in local schools, faith/community centres and workplaces with >40% completers referred to their GP. The translations also form the basis for Diabetes UK's training of local 'Community Champions' to perform LDRS in previously hard to reach communities [E13].

Since 2015, LDRC have released tailored versions of DESMOND to meet the specific needs of fasting Muslim patients. By 2019, they had trained 50 Health Care Professionals, 20 community leaders and 6 lay educators to promote and deliver this 'Safer Ramadan' intervention, thereby enabling T2DM to observe the holy month safely [E12].

5. Sources to corroborate the impact

- E1. National Diabetes Audit Report 1: [Care Processes and Treatment Targets 2016-17](#)
- E2. NICE Guideline '[Type-2 Diabetes: Prevention in People at High Risk](#)', 2017.
- E3. NHS National Diabetes Prevention Programme [Service Specification and Patient Case Studies](#)
- E4. Kontopantelis E et al. '[Spatial distribution of clinical computer systems in primary care in England in 2016 and implications for primary care electronic medical record databases: a cross-sectional population study](#)', 2018.
- E5. Output from UoS modelling.
- E6. Collated International Uptake Examples.
- E7. The Berlin Declaration: [A collective ambition for policy change to drive early action in type 2 diabetes](#), 2016, [media coverage](#) and [endorsement from IDF](#)
- E8. ADA/EASD International Consensus Statement '[Management of Hyperglycaemia in Type 2 Diabetes](#)', 2018.
- E9. [Diabetes Western Australia Implementation](#)
- E10. [Diabetes UK](#) website, NIHR '[Growth Through Health Research](#)' 2016.
- E11. Diabetes UK Testimony (26/10/2017).
- E12. Statement from DESMOND National Office.
- E13. De Montfort University '[Square Mile Project](#)'
- E14. Uptake, attendance and outcome of referrals to the NHS Diabetes Prevention Programme provided by Ingeus UK Ltd: [an interim evaluation](#)
- E15. [NHS England Impact Analysis of implementing NHS Diabetes Prevention Programme, 2016 to 2021](#)
- E16. [NHS England News 'Surge in people checking their risk of type 2 diabetes', September 2020](#)
- E17. [Diabetes Times; MyDesmond made free to aid people with type 2 diabetes', April 2020](#)