



Diabetes expenditure, burden of disease and management in 5 EU countries

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Abstract

Background and Aims: Diabetes mellitus (DM) is associated with a high risk of developing complications and severe co-morbidities. Over the past few years, diabetes (Type 1 and 2) and its associated costs have risen, particularly those related to treatment of complications.

Our aims are to identify and compare the diabetes burden of disease, costs (direct and indirect) and diabetes outcomes, focusing on complications across France, Germany, Italy, Spain, and the UK (EU5). We will then have an understanding of the state of diabetes management in EU5 from which to make informed policy options.

Materials and methods: A survey was designed and sent to health economists in the EU5 countries. In turn, key diabetes clinicians, decision makers and health officials were interviewed in order to answer the survey. In addition, secondary data was collected from PubMed, diabetes association publications and health government publications and websites, including national statistics.

Results: Diabetes record keeping in all EU5 countries is poor for prevalence, direct diabetes costs, cost of complications, indirect costs and diabetes outcomes. No diabetes registers exist in any of the EU5 countries. Diabetes prevalence ranges between 4.8% (Italy) to 8.9% (Germany), and has increased over time. Although none of the EU5 countries record diabetes costs directly, including complications, estimates for 2010 suggest that the total direct annual cost ranges from €5.45bn (Spain) to €43.2bn (Germany); across EU5 the total direct cost burden of people with diabetes was €90 billion; this figure includes the cost of complications or medical conditions some of which may not necessarily be caused by diabetes, but can be exacerbated by it. Incremental costs are reported in Germany only and stand at €19.7 billion in 2010. Per patient direct medical costs are more comparable across countries, with some variation (€1,708 (Spain) to €5,899 (Germany) in 200), suggesting a key driver behind total diabetes costs is prevalence. Inpatient costs are consistently higher than outpatient costs in all countries, due to increased medical care required with diabetes-related complications. Outpatient costs on the other hand, as well as diabetes medications, can be less than half of inpatient costs due to the relatively low costs of maintaining good glycaemic control via medication and regular monitoring. Expenditure on insulin and oral anti-diabetic medicines ranges between 6.2% and 10.5% of total direct cost. A significant majority of inpatient direct costs account for treatment of diabetes related complications, affecting approximately 18.3 million diabetic patients each year across the five study countries. Indirect costs, relate to reduced productivity, absenteeism, early retirement, social benefits and carer costs; these costs are significant and, having quantified part of these costs for the first time in Europe (relating to absenteeism, early retirement and social benefits), it appears that they stand at €98.4 billion and can exceed direct costs by at least a factor of 2- or even 3- to-1 depending

on the country. Significant variations exist between countries in the availability of outcomes data and the quality of the relevant indicators. In some cases, improvements in quality of care for diabetic patients are shown over time (Italy, UK), whereas in others discrepancies exist between the quality of care in metropolitan versus rural areas (France, Spain).

Conclusions: Rising diabetes prevalence (both Type 1 & 2) and associated costs, including management of diabetes complications, are a growing concern. The absence of precise diabetes prevalence and cost data is challenging, given its prominent role in population health including its role in cardiovascular health. Furthermore, the relative lack of outcomes data (especially France, Germany, Spain) limits the ability to accurately gauge the health of the diabetes population or make any appropriate impacts on quality of care. As a result, the true impact of diabetes and its associated complications is likely to be underestimated or altogether unmeasured in all EU5 countries.

Executive summary

What this study does

This study aims to provide a comprehensive, up-to-date representation of Type 1 & 2 diabetes in 5 EU countries (Germany, UK, France, Italy, Spain) and address the associated costs, both direct and indirect, in as comprehensive a manner as possible. The study also quantifies prevalence data from the local perspective and uses a stratification of both qualitative and quantitative analysis to provide policy options – the first study of this kind since CODE2.

Background

There is increasing concern amongst government officials and public health agencies about diabetes care in Europe. Both diabetes prevalence and spending appear to be increasing. Comprehensive studies on diabetes costs are limited, particularly ones that include complications, diabetes Type 1 & 2, all ages as well as direct and indirect costs. This study attempts to rectify this by examining all aspects of diabetes management, from the macro government view to the micro patient view, and includes costs and outcomes whenever possible.

A primary search for relevant diabetes information was performed via a survey sent to a representative in each EU5 country (France, Germany, Italy, Spain, the UKⁱ) encompassing national and regional programmes, patient and professional groups, incidence and prevalence, diabetes guidelines and practice, monitoring for complications, diabetes spending and costs, diabetes outcomes and complications. This was substantiated and supplemented by a secondary search for all reports coming from academic, government and other interested parties (patient groups).

Diabetes Burden and National Strategies

Diabetes prevalence has been increasing steadily over the past two decades, along with an aging European population, increasing, high obesity prevalence and changing ethnic make-up. This study estimates that Germany has the highest diabetes prevalence at 8.9%, followed by Spain (8.1%), France (6.4%), the UK (6.1%) and Italy (4.8%); based on medium-size studies and extrapolated to the national level, due to the absence of national or regional diabetes registries in the study countries, and poor prevalence data collection in all EU5 countries.

Only three countries have national diabetes programmes (NDPs) (Italy, Spain, UK), while France's has not been operational since 2005. Germany has Diabetes Disease Management Programmes (D-DMP), however, not all patients with diabetes are registered. None of these

ⁱ This study includes England, Wales and Scotland, but excludes Northern Ireland due to data insufficiencies on prevalence, outcomes and costs.

strategies have hard targets to achieve ideal diabetes management, instead they discuss multi-disciplinary care, patient-centred care, patient education and paediatric management among others. Only France and Germany have diabetes screening programmes for high-risk patients, although participation is variable. The UK began screening high-risk patients for vascular diseases, including diabetes, in 2009, but implementation is slow. Most patients with Type 2 are seen by their GP, while insulin-dependent Type 2 patients and Type 1 patients are seen by a diabetologist or a paediatrician respectively. Access to other services, such as chiropody, diabetes nurse specialists and dieticians, is limited or not covered (France) and partially dependent on the primary point of diabetes care (outpatient clinic versus community GP care). All countries have care guidelines, the UK's being the most prolific, but none have guidelines written for patients. Patient education appears to be highly regionalised within countries with differing content and focus; only the UK has national diabetes education training protocols (DAFNE and DESMOND) but these are not universally used. Thus, despite having national plans in place, policy and monitoring to ensure their success is either limited or applies only to some patients.

Economic Burden of Diabetes

Diabetes spending in all EU5 countries is difficult to determine precisely, as with prevalence data collection, diabetes cost collection is neglected. None of the governments collect diabetes spending accurately. In part this is due to the complexity of diabetes in conjunction with its complications, which makes cost coding more difficult and inaccurate.

The study takes into consideration the direct medical cost for treating diabetes as well as other medical cost, for instance, in terms of treating complications related to diabetes and other medical conditions, which may not be associated with or caused by diabetes, but their extent can be exacerbated by it. All five study countries include these medical cost components.

Based on the above, and being mindful of the close association between diabetes and other – often related- co-morbidities, the study estimates that in 2010, the direct cost burden of people with diabetes was highest in Germany, in part due to the greater diabetes population, at €43.2 billion, followed by the UK (€20.2 [£13.8] billion) France (€12.9 billion), Italy (€7.9 billion) and Spain (€5.4 billion). Inpatient costs are consistently higher than outpatient costs in all countries, due to increased medical care required with diabetes-related complications. Outpatient costs on the other hand, as well as diabetes medications, can be less than half of inpatient costs due to the relatively low costs of maintaining good glycaemic control via medication and regular monitoring. The presence of complications, particularly multiple complications, can multiply diabetes costs several times. Diabetes drug costs are the smallest component of drug, in- and out-patient costs combined, ranging from 6.2% (France, Italy) to 10.5% (Spain). Conversely, non-diabetes medications are 3 to 4 times the diabetes

medications in terms of total costs, with cardiovascular medicines consuming the largest portion in cost and prescribing.

Annual per patient direct costs are primarily derived from small regional studies, and in some countries the data is differentiated between diabetes types. The total per patient costs are highest in Germany (€5,899) (€2,684 if only incremental costs are taken into account), followed by France (€5,432), the UK (€4,744-€5,470 [£3,233-£3,717]), Italy (€2,756) and Spain (€1,708-€3,015 depending on the study and approach). Type 1 patients can be more expensive to treat than Type 2 annually however, they represent a minority of all diabetes patients. The inpatient costs are in some instances more than double the outpatient costs, particularly when patients experience complications involving renal failure or diabetic foot (the former requiring dialysis and transplant, and the latter amputation at last stages) (France inpatient €2,022 and outpatient €1,950, the latter including injection devices, self-blood glucose monitoring equipment, insulin pumps and other medical devices, Germany in- €1,985 out-patient €1,672; Italy in- €1,569 out-patient €83; Spain in- €829 out-patient €247; UK in- €2,681 [£1,807]-€3,786 [£2,552] out-patient €439 [£304] - €530 [£367]). Many diabetic patients experience multiple complications, compounding the complexity of treatment and thus costs.

Cardiovascular disease, including angina (16% of diabetic patients), myocardial infarctions (1-8%), stroke (1.7-7%), ischemic heart disease and heart failure (6.3-11%) are the major complications resulting from diabetes. Treatment costs range from €2,100 (fatal MI, UK) - €9,767 (MI, Germany) for myocardial infarctions and €4,314 (UK) - €11,786 (Germany) for stroke. Renal damage is another costly complication, with up to 3% of patients annually experiencing end stage renal disease costing €41,052 (Spain) - €81,449 (France) annually for haemodialysis and €33,437 (UK) - €76,852 (Germany) for renal transplants. Diabetic foot is relatively easy and inexpensive to prevent with frequent checks and foot care. Peripheral arterial occlusive disease is the initial stage of foot disease, affecting up to 10% of diabetic patients resulting in ulcers and wounds. If blood glucose control remains poor and foot checks are not performed daily this may result in gangrene, amputation of toes or all or part of a foot (0.2-0.3% of all cases). Depending on the severity of the amputation, this can cost up to 32,000 (France) per patient, not including any mobility rehabilitation or prostheses.

Very little information on the indirect costs of diabetes is available. However, the potential impact of diabetes is manifold and entails significant indirect costs, chiefly relating to the economy (i.e. external to the health care services), such as reduced productivity and sickness absence, the wider social sector, such as early retirement, drawing social benefits – particularly due to job-loss as a result of insulin use in some professions (e.g. professional driving). In addition, there is an impact on the family, through informal caring and carer costs

as well as dealing with the effects of premature mortality. This study identified costs due to absenteeism, early retirement and expenditure on social benefits, amounting to a total of €98.4 billion across the study countries in 2010 (€7.9 billion in Germany, €17.6 billion in Spain, €17.3 billion in the UK, €12.9 billion in France and €12.6 billion in Italy). In the cases of Germany, the UK and France, these indirect costs are on a par with direct costs, whereas in the cases of Italy and Spain, they are shown to exceed direct costs by a factor of 2-to-1 and 3-to-1 respectively. This is an under-estimate since the costs of reduced productivity, premature mortality or informal carer costs could not be accounted for.

Overall, the direct and indirect cost burden of people with diabetes across the 5 study countries amounts to €188 billion in 2010. The direct costs include medical costs of treating complications and other conditions not necessarily related to diabetes. The indirect costs are likely to be under-estimates, since it was only possible to account for a part of the economic impact indirectly caused by diabetes.

Current Diabetes Outcomes and Related Complications

Only France, Italy and the UK regularly collect and publish monitoring data. France do so intermittently (2001, 2007) and Italy and the UK annually. In Germany these are internal to the sickfunds.

Such data measures how many patients have one or more of the following evaluated: glycosylated haemoglobin (HbA_{1c}), blood pressure, BMI, cholesterol (total or LDL), urinary albumin, serum creatinine, retinal screening, foot checks and smoking status.

Examination of outcomes data finds that tight glycaemic control can be variable (HbA_{1c} ≤6.5%: France 24-32%; Italy 24-44%; England 25%) and slightly more with good glycaemic control (HbA_{1c} ≤7.5%: France 24-52%; England 28-66.5%; Scotland 22-64%). Results for blood pressure are similarly variable, in both excellent levels (≤130 mmHg: France 15-22%; Italy 15-36%; England 50-63%) and good levels (≤140 mmHg: France 46%, England 61-69%; Scotland 75-79%).

Although the measurement of these process and outcome indicators is encouraging, there are some missing or misleading elements. It is commonly recommended that many of these indicators (HbA_{1c}, blood pressure, urinary albumin, serum albumin, foot checks) are tested more than once annually, thus the annual period does not correspond with the monitoring guidelines. Publications focus on how many patients achieve good control, but neglect how many are in serious danger of complications. A combination of indicators, again important in identifying higher risk sub-groups, is also ignored. It appears that both process and outcome indicators are worse in Type 1 patients, suggesting these patients might be receiving poorer care than Type 2 patients, or that clinicians caring for Type 1 patients place less importance

on reporting indicator data. All but the UK appear to ignore data collection and reporting in children, a serious omission, particularly considering only 4% of all children in the UK had all monitoring variables measured (or reported) in 2008/09. Finally, the choice of outcome indicators neglects renal function, and frequently fails to differentiate between Type 1 & 2 diabetes.

Implications for National Diabetes Planning

Overall, this study suggests diabetes management in the EU5 countries is not ideal. There appears to be significant room for improvement starting with improved data collection of prevalence (and incidence, mortality), the cost burden to the health system and society (including diabetes-related complications and how diabetes exacerbates complications and other potentially unrelated co-morbidities), monitoring adherence and outcomes. Creating national diabetes registries would be an ideal platform to help steer diabetes care from patient and economic perspectives, particularly if national diabetes strategies emerged from these organisations independent from the national health services. Additionally, it would provide a better understanding of complications associated with diabetes and their impact on variables such as resource use, length of stay and, ultimately, total cost reimbursed from health insurance to providers. In many settings hospitalisations for certain conditions are not considered to be diabetes-related, even if they are caused by diabetes. It is also known that diabetes has a significant impact on hospitalisation cost because it increases the length of stay.

A greater understanding of indirect costs is also needed, not least because this is a cost borne by all segments of society, including patients, carers where applicable, employers, and the broader social protection network (pensions, social security & benefits payments), funded largely by the taxpayer.

Further, it appears that greater effort must be placed on obesity prevention to help halt diabetes incidence, in addition to targeted screening of high-risk individuals, the majority of whom are diagnosed with diabetes-related complications already in place. As with other chronic disease care, creation of hard targets to encourage monitoring in line with guideline recommendations might be needed if softer planning does not create an ideal platform for complication prevention.

Greater differentiation of care and data collection between Type 1 and 2 patients should be supported, as the life pathway is not the same, particularly with childhood diagnosis. Education programmes should be targeted to specific groups, such as time since diagnosis, age ranges, diabetes type and complications present, in order for diabetes education to be effective.

Greater effort should be placed on ideal care pathways, with guaranteed access to endocrinologists for insulin users, as well as access to other diabetes professionals (diabetes nurse specialists, dieticians, chiropodists, ophthalmologists) to prevent or halt diabetes related-complications. On the same note as multi-disciplinary care, is patient-centred care. Diabetes is a chronic illness demanding high levels of self care by patients – patients must be involved in their care plans from the beginning (including childhood if possible) to create a communicated vested interest in their diagnosis.

On the whole, greater emphasis must be placed on diabetes in the health and social care system and in the broader national context. The fact that none of these countries collects accurate prevalence data or has precise accounting for diabetes (or related complications) suggests potential neglect of a significant and populous disease, which, for the most part, is preventable. Not only must more effort be made from the bottom up in terms of patient level care, but significantly greater effort must be made from the top down to create an atmosphere and environment of prevention of diabetes and diabetes complications, in addition to ideal management.