Depression and diabetes 3

Depression and diabetes: treatment and health-care delivery

Frank Pettrak, Harald Baumeister, Timothy C Skinner, Alex Brown, Richard I G Holt

Despite research efforts in the past 20 years, scientific evidence about screening and treatment for depression in diabetes remains incomplete and is mostly focused on North American and European health-care systems. Validated instruments to detect depression in diabetes, although widely available, only become effective and thus recommended if subsequent treatment pathways are accessible, which is often not the case. Because of the well known adverse effects of the interaction between depression and diabetes, treatment goals should focus on the remission or improvement of depression as well as improvement in glycaemic control as a marker for subsequent diabetes outcome. Scientific evidence evaluating treatment for depression in type 1 and type 2 diabetes shows that depression can be treated with moderate success by various psychological and pharmacological interventions, which are often implemented through collaborative care and stepped-care approaches. The evidence for improved glycaemic control in the treatment of depression by use of selective serotonin reuptake inhibitors or psychological approaches is conflicting; only some analyses show small to moderate improvements in glycaemic control. More research is needed to evaluate treatment of different depression subtypes in people with diabetes, the cost-effectiveness of treatments, the use of health-care resources, the need to account for cultural differences and different health-care systems, and new treatment and prevention approaches.

Introduction
Depression is frequently associated with diagnosed diabetes and has a profound effect on the well-being and medical outcomes of people affected by both disorders. Depression in people with diabetes adversely affects glycaemic control, heightens risk of microvascular and macrovascular complications, and increases the chances of admission to the intensive care unit and the use of health care in general. Depression in diabetes also increases mortality, especially after myocardial infarction, in elderly people and in women. Depression affects psychosocial outcomes in patients with diabetes. It is associated with increased diabetes-related distress (hereafter diabetes-distress), decreased quality of life, and decreased adherence to diabetes treatment. Recommendations for a healthy lifestyle (e.g., physical activity, eating habits) are often ignored in patients with both depression and diabetes. Despite the well-established adverse effects of the interaction between depression and diabetes, depression remains underdiagnosed and undertreated in people with diabetes. The best treatments to address medical and psychological outcomes simultaneously in patients with depression and diabetes are not known. Since most studies have been undertaken in high-income countries (mostly USA and Europe), whether these results can be extrapolated to other countries and cultures worldwide remains unclear.

This Series paper aims to summarise the evidence regarding screening and treatment for depression in adults with type 1 and type 2 diabetes. Most of the scientific literature does not differentiate between the two types of diabetes. Diabetes-distress, which is a concept related to depression but that should be considered separately from depression symptoms or depression as a mental disorder, is outside the scope of this article but is discussed in-depth in Paper 1 in this Series. We also focus on the prevention of depression in people with diabetes and address whether research in this area can be applied to different cultures and health-care systems, where such research has not yet been done. Finally, we provide recommendations to guide clinical practice.

Screening for depression in diabetes

Overview
Since depression often remains undetected in people with diabetes, various diabetes guidelines have recommended screening for depression. Screening for depression with questionnaires is not specific and results in a substantial overestimation of depression. Therefore, a positive screening questionnaire needs to be followed up by a formal clinical assessment to confirm the diagnosis and to consider differential diagnoses. Diagnostic interviews, such as the Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID-II) or the Schedule for Clinical Assessment in Neuropsychiatry 2-1, represent a benchmark for the diagnosis of mental disorders. Screening questionnaires should be validated against these accurate but time-consuming diagnostic interviews. A positive screening and confirmed diagnosis of depression then needs to be followed up with a clear treatment pathway and continuous monitoring of the results of treatment.

Evaluation of screening approaches
Many validated screening methods to detect depression have been used in the context of diabetes care. Roy and
colleagues summarised the use of different screening questionnaires in diabetes studies and identified the following questionnaires that are most often used: the Beck Depression Inventory (BDI; BDI-II), the Center for Epidemiologic Studies Depression Scale (CES-D), the Hospital Anxiety and Depression Scale (HADS), and different versions of the Patient Health Questionnaire (PHQ).

Attempts to identify the most effective screening questionnaires have yielded contradictory results, which might partly be attributable to different study populations and settings. In a 2012 review of the evidence for screening of depression in people with diabetes, the BDI, CES-D, and HADS showed adequate clinical specificity and sensitivity, whereas the PHQ-9 proved to be the best validated in people with diabetes. Without the use of any of these questionnaires, the potential overlap between diabetes-related symptoms and depression symptoms should be considered. Thus, different cutoff values for clinical depression have been proposed for use in people with diabetes. For example, in one study, the best cutoff score for the detection of depression with the PHQ-9 was not for epidemiological studies but 12 in the clinical setting for assessment of depression in people with diabetes.

**Scientific evidence for the benefits of screening**

A key issue under debate is whether screening for disorders is appropriate without specific data showing a clear benefit for a particular type of screening intervention. In the context of depression in diabetes, potential harms of screening include the stigma associated with depression, the risk that transient distress could be labelled as depression, and possible discrimination by insurance companies. In a Cochrane meta-analysis, Gilbody and colleagues showed that screening for depression in the general population, without a follow-up intervention, seems to have little or no effect on the detection and management of depression by clinicians. They concluded that any recommendations to adopt screening strategies with the use of only standardised questionnaires, without organisation of any subsequent treatment pathways, are not justified. Similar conclusions were drawn in systematic and narrative reviews regarding screening for depression in people with diabetes. The limited effectiveness of screening without integrated pathways to subsequent treatment has been verified by two randomised controlled trials done in the Netherlands and the USA. Both trials showed that screening did not significantly improve symptoms of depression compared with standard care, despite moderately increased use of mental health-care services.

Several reasons might explain the low effectiveness of screening for depression in people with diabetes. First, as shown repeatedly, few people with diabetes accept screening and subsequent referral to further care. Second, patients with low adherence to diabetes treatment and lifestyle recommendations and with poor health tend to be missed most often during screening procedures. Third, the use of standard screening questionnaires might be perceived by medical staff to be in conflict with a patient-centred approach (in which the patients would prefer to talk about problems not related to the screening questions). Fourth, the quality of care for depression is suboptimum in primary care systems, and the same probably holds true for depression care in patients with diabetes.

No established scientific evidence exists that proves the cost-effectiveness of screening for depression in people with diabetes. Quality criteria for screening (eg, UK National Screening Committee criteria) are not met in many countries with different levels of care around the world. Differences in health economics for particular countries should be taken into consideration when deciding whether to incorporate screening for depression into diabetes care. By contrast, studies that assessed collaborative care interventions have provided clear evidence that screening followed by diagnosis and adequate treatment improves outcomes of depression.

**To screen or not to screen?**

Unless the screening is embedded in a comprehensive health-care system that ensures subsequent diagnosis and appropriate treatment options, it is neither effective nor ethical to screen for depression. However, where appropriate facilities exist, there is a strong rationale to offer screening to people with diabetes. Further trials are needed to support the clinical and cost-effectiveness of screening for depression outside the USA, and to develop the necessary quality standards for such screening procedures.

**Recommendations for screening**

A first step towards improved treatment of depression in people with diabetes would be to improve the low detection rates of depression consistently recorded in this patient group.

The health-care community is increasingly aware of the lack of precision in the terminology used to describe symptoms of depression, distress, and diabetes-distress in people with diabetes. As discussed in detail by Snoek and colleagues in the first paper in this Series, inconsistencies in definition and measurement of these constructs are partly responsible for the heterogeneous results in studies of epidemiology and treatment. Snoek and colleagues argue that the concepts of depression, depressive symptoms, and diabetes-distress need to be disentangled. Therefore, former recommendations to screen for depression and diabetes-distress with a distress measurement such as the Problem Areas in Diabetes (PAID) questionnaire or the WHO-5 Well-Being Index need to be reconsidered in clinical settings.
Series

Panel 1: How to rapidly screen, diagnose, and refer patients with depression in clinical settings

Administer the two questions from the PHQ-2 (sensitivity 95%, specificity 57%) to the patient in written form or within a consultation:

Over the past two weeks, have you been bothered by
(a) little interest or pleasure in doing things?
(b) feeling down, depressed, or hopeless?

If one of these questions is answered affirmatively, ask the remaining seven questions of the PHQ-9 (which represent the depression criteria). Refer the patient to a health-care professional if you are not qualified to diagnose depression. If you are a trained health-care professional, substantiate or reject the diagnosis on the basis of the answers of the patient. If the diagnosis is supported, discuss subsequent treatment options and inform the patient about specific ways for them to obtain treatment.

Although these questionnaires (not specific for depression) have quite good specificity and sensitivity, use of questionnaires such as the PHQ-9, with items that are nearly identical to the diagnostic depression criteria of the DSM-IV-TR, could be more practical and lead to a less time-consuming diagnostic procedure (panel 1).

Prevention of depression in people with diabetes

Despite the clear clinical need and the appreciation by health-care professionals of many of the general and diabetes-specific risk factors that predict depression in people with diabetes, few studies have assessed interventions to prevent depression in diabetes. A 2012 systematic review concluded that insufficient evidence exists to recommend low-intensity psychological interventions to prevent the relapse or recurrence of depression. Moreover, despite established evidence of the effectiveness of psychological interventions for the primary prevention of depression in general, experience from a systematic review in progress highlights that no studies have assessed the primary prevention of depression specifically in people with diabetes.

Given that depression occurs more frequently after a diagnosis of diabetes, the manner in which health-care professionals communicate the diagnosis of diabetes, and subsequently provide support for people with new-onset diabetes, might affect the subsequent mental health of these patients. Even when health-care professionals communicate in a patient-centred way, a diabetes diagnosis is nevertheless a starting point for lifelong treatment and recommended behavioural changes, which in themselves can be a burden and can thus promote depressive symptoms.

Diabetes and depression might share similar antecedents. Therefore, primary prevention of both disorders might be possible by the adoption of a population-based approach that focuses on shared lifestyle and environmental risk factors. Such an approach, however, has not been well studied.

Treatment of depression in diabetes

Prioritising treatment goals—glycaemic control or depression outcomes?

Since depression has an adverse effect on psychological wellbeing and on outcomes for diabetes, treatment of depression in people with diabetes should be directed towards the improvement of both psychological and medical outcomes. These goals are formulated specifically in the present evidence-based guidelines of the German Diabetes Association, which place equal emphasis on psychological and medical targets during the treatment of depression in diabetes. For the psychological targets, the priority is in the prevention of suicide related to depression and in a reduction of depressive symptoms until remission of depression. Subsequent goals focus on the improvement of health-related quality of life, on the restoration of psychosocial functioning and vocational productivity, on the improvement of coping with and acceptance of diabetes, and on changes to promote a healthy lifestyle. The most important medical target is to influence the course of diabetes by the reduction of physical comorbidity and diabetes-related complications that can lead to premature mortality. As an indicator of risk for poor diabetes outcomes, HbA1c is currently considered as the primary clinical outcome in most patients.

The best treatment for depression in diabetes would be an approach that simultaneously improved depressive symptoms and glycaemic control. We are not aware of any studies focusing on whether diabetes or depression should be treated first. We suggest, from a clinical perspective, that the rapid improvement or remission of depression should be the first priority. This is partly based on expected differences in the timecourse of treatment responses; in most patients, a clinical improvement of depression is seen within 2–4 weeks for antidepressants and within the first months for psychological interventions. This phase of treatment needs active management by health-care professionals. By contrast, changes in diabetes treatment leading to improved glycaemic control need several months for a meaningful assessment. Treatment of depression can be a prerequisite for good diabetes self-management, because people with diabetes might follow their treatment plan more easily if their mood is improved first.

Health-care delivery

Interventions that have been used to treat depression in diabetes include psychological interventions (most often problem-solving techniques, counselling, or cognitive behavioural therapy [CBT]), psychopharmacological treatments (including antidepressants, or selective
serotonin reuptake inhibitors [SSRIs]), dietary treatments (supplementation with magnesium and vitamin D), and physical activity. Details of studies that assessed these treatments are given in the following sections.

Models of care explored for treatment of depression in diabetes vary from conventional settings (eg, primary care) to telemental interventions. Complex interventions such as collaborative care or stepped-care approaches have been most popular in the USA. These models of care are generally algorithm-based and combine different psychological and psychopharmacological interventions according to the treatment response and patient preferences. Collaborative-care interventions are characterised by a heterogeneous set of methods including interdisciplinary cooperation between health-care providers, routine monitoring of outcomes, proactive follow-ups with patients, provision of evidence-based treatment options, self-management training and support for patients, supervision of care managers, and decision support for primary care physicians.10 In stepped-care approaches, interventions are provided in a sequential manner after an algorithm-based treatment plan with prespecified cutoffs for the transition to the next step.11

Evidence from clinical studies

The following overview of the evidence from randomised controlled trials for the treatment of depression in diabetes is based on systematic reviews on interventions for the treatment of depression in diabetes. We categorise the studies into psychological or pharmacological interventions,20,65–69 and into collaborative or stepped-care approaches.61,62–68 Depression was defined in a broad manner that includes clinical and subthreshold depression according to categorical classification systems (eg, DSM-IV, ICD-10), and symptoms of depression were assessed with dimensional assessment instruments with cut-off scores for symptomatic depression (eg, PHQ-9 ≥ 10).

We identified 29 eligible randomised controlled trials51,70–97 of which 12 trials70–82 compared psychological interventions versus usual care, waiting list, or a pharmacological intervention. 12 trials83–91 investigated pharmacological interventions versus placebo or other pharmacological and psychological interventions, and five trials92–97 investigated collaborative and stepped-care approaches versus usual care (table 1). We use a meta-review approach to describe the evidence as reported in systematic reviews20,65–69 and additionally complement this evidence by reviewing five newly identified trials.70,72,78,82 We focus on the effect of interventions on depression severity, glycaemic control, and health economic evaluations. Because of different assessment approaches used for the estimation of depression severity and glycaemic control, we report standardised mean differences (SMDs based on Hedges’ g).20 Further details of the effect of interventions on other outcomes such as quality of life, drug adherence, and mortality have been published previously.20,65–69

Nine of the 13 trials that investigated the effects of psychological interventions used usual care as a comparison group, two trials used a waiting list control group, one trial83 used an active placebo group (psychoeducation as a non-specific intervention), and one trial used an active pharmacological comparison group (table 1). Interventions varied widely in terms of doses, communication methods (face-to-face, telephone, or internet-based), theory base (eg, CBT or psychoeducation) and type of health-care provider (eg, nurses or psychotherapists). Not surprisingly, in view of this heterogeneity, the results varied substantially: SMDs for depression severity at the end of treatment in favour of the psychological intervention compared with usual care and waiting list ranged from –0.14 to –1.47, most of which were statistically significant. Three trials reported significant medium-term (1 to 6 months after the end of treatment) and long-term (more than 6 months after the end of treatment) sustainability effects of treatment on depressive symptoms.20 Results for glycaemic control were less conclusive; SMDs ranged from 0.40 to –1.40 in one review,20 whereas in a similar review,92 which analysed most of the same primary trials, a significant moderate effect for the use of psychological interventions on glycaemic control was reported. The difference between reviews can be attributed to different data aggregation and analysis strategies. Different methods used to pool effect sizes can lead to different results, which makes interpretation of results across systematic reviews challenging. Nevertheless, such a difference can be seen as an indicator for the lack of robustness in the findings for glycaemic control. The four trials72,75,78,81 that compared psychological interventions versus usual care, waiting list, or active placebo, but that were not included in the systematic reviews,20,65 likewise show substantial improvements in the severity of depression, with SMDs ranging from –0.64 to –0.89, but a less pronounced and overall non-significant improvement in glycaemic control (SMDs from –0.25 to –0.68). Heterogeneity between studies did not allow us to provide pooled estimates across trials.20

Eight of the 12 trials that studied the effect of pharmacological interventions were placebo-controlled (table 1). Seven of these trials tested SSRIs (four with paroxetine [alone or in combination with alprazolam], two with sertraline, and one with fluoxetine), and one trial tested the tricyclic antidepressant nortriptyline. Antidepressants effectively reduced depression severity compared with placebo (overall SMD of –0.61 and SMD of –0.39 for trials that assessed SSRIs).20 Likewise, the meta-analysis on glycaemic control indicated a beneficial effect of SSRIs compared with placebo (SMD of –0.38).20 Similar results were obtained in another review,78 supporting the robustness of these findings. However, concerns exist that at least some antidepressants increase the risk of type 2 diabetes, either directly or indirectly through weight gain. Therefore, results that show improved glycaemic control
with individual antidepressants should not be extrapolated to all antidepressants. None of the trials reported medium-term or long-term follow-up data for the pharmacological interventions after the end of treatment.

Three of 12 trials that studied the effect of pharmacological interventions used an active control group (table 1). The results indicated no significant differences in depression severity between the interventions examined (imipramine vs magnesium, fluoxetine vs paroxetine, fluoxetine vs citalopram).

Another trial, which tested a pharmacological intervention in a secondary care setting, compared the

<table>
<thead>
<tr>
<th>Study location</th>
<th>Type of intervention and control group</th>
<th>Sample</th>
<th>Mean age in years (SD) and percentage of women in intervention and control groups</th>
<th>Assessment of depressive disorder</th>
<th>Number of patients</th>
<th>Glycaemic control (SMD/OR [95% CI])</th>
<th>Depression severity (SMD [95% CI])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lustman et al (1998)</td>
<td>USA CBT versus usual care</td>
<td>Primary care outpatients with type 2 diabetes and major depression</td>
<td>53 (10·5)/56 (9·7) 60%/59·1%</td>
<td>Major depression diagnosis assessed by DIS and a BDI score ≥14</td>
<td>51</td>
<td>0·43 (–0·18, 1·04)</td>
<td>–1·10 (–1·75, –0·45)</td>
</tr>
<tr>
<td>Huang et al (2002)</td>
<td>China Health education and psychosocial intervention versus usual care</td>
<td>Inpatients and outpatients with type 2 diabetes and depression</td>
<td>Not reported Not reported</td>
<td>SDS score &gt;0·50</td>
<td>59</td>
<td>–0·97 (–1·52, –0·42)</td>
<td>–0·61 (–1·14, –0·08)</td>
</tr>
<tr>
<td>Li et al (2003)</td>
<td>China Psychological therapy versus usual care</td>
<td>Patients with diabetes and depression, anxiety, or both</td>
<td>51 (10·4)/52 (11·2) 60%/55%</td>
<td>SDS score &gt; 50 or SAS score &gt;50</td>
<td>120</td>
<td>Not reported or not calculable</td>
<td>–1·35 (–1·74, –0·96)</td>
</tr>
<tr>
<td>Lu et al (2005)</td>
<td>China Cognitive therapy and electroencephalographic feedback versus usual care</td>
<td>Patients with diabetes and depression after cerebral infarction</td>
<td>66 (8·8)/65 (9·5) 37%/40%</td>
<td>HAMD score ≥8</td>
<td>60</td>
<td>Not reported or not calculable</td>
<td>–1·47 (–2·04, –0·90)</td>
</tr>
<tr>
<td>Simson et al (2008)</td>
<td>Germany Psychodynamic supportive psychotherapy versus usual care</td>
<td>Patients with diabetes from inpatient care with diabetic syndrome and depression</td>
<td>58 (13·9)/63 (10·8) 53%/53·3%</td>
<td>HADS depression score ≥8</td>
<td>30</td>
<td>Not reported or not calculable</td>
<td>–0·23 (–0·96, 0·50)</td>
</tr>
<tr>
<td>Lammers et al (2010)</td>
<td>Netherlands Minimal psychological intervention versus usual care</td>
<td>Primary care patients with depression and type 2 diabetes aged 60 years or older</td>
<td>71 (6·6)/71 (6·6) 51%/50·5%</td>
<td>Minor, mild-to-moderate depression, and dysthymia according to screening with PHQ and structured diagnostic interview with MINI</td>
<td>208</td>
<td>0·47 (–0·10, 1·04)</td>
<td>–0·14 (–0·41, 0·13)</td>
</tr>
<tr>
<td>Piette et al (2011)</td>
<td>USA Telephone-delivered CBT versus usual care</td>
<td>Outpatients with type 2 diabetes and substantial depressive symptoms</td>
<td>55 (9·4)/56 (10·9) 51%/50%</td>
<td>PHQ-9 score ≥11, BDI score ≥21 in in-person screening</td>
<td>339</td>
<td>0·00 (–0·24, 0·24)</td>
<td>–0·42 (–0·66, –0·18)</td>
</tr>
<tr>
<td>van Bastelaar et al (2011)</td>
<td>Netherlands Web-based CBT versus waiting list</td>
<td>Patients with type 1 and type 2 diabetes and substantial depressive symptoms</td>
<td>48 (12)/51 (12) 66%/56%</td>
<td>CES-D score ≥16 and CIDI</td>
<td>255</td>
<td>0·31 (0·06, 0·56)</td>
<td>–0·28 (0·40, –0·16)</td>
</tr>
<tr>
<td>Penckofe et al (2012)</td>
<td>USA Psychoeducational intervention (SWEEP) versus usual care</td>
<td>Patients with type 2 diabetes and depression</td>
<td>54 (8·8)/54 (8·4) 100%/100%</td>
<td>CES-D ≥16</td>
<td>84</td>
<td>–0·25 (–0·74, 0·24)</td>
<td>–0·78 (–1·29, –0·27)</td>
</tr>
<tr>
<td>Safren et al (2014)</td>
<td>USA CBT for adherence and depression versus enhanced treatment as usual</td>
<td>Patients with type 2 diabetes and depression</td>
<td>55 (8·7)/55 (7·4) 51%/47·6%</td>
<td>MINI, CGI, MADRS</td>
<td>87</td>
<td>–0·68 (–1·11, –0·24)</td>
<td>–0·65 (–1·08, –0·22)</td>
</tr>
<tr>
<td>Tovote et al (2014)</td>
<td>Netherlands Mindfulness-based cognitive therapy versus CBT versus waiting list</td>
<td>Patients with type 1 or type 2 diabetes and depressive symptoms</td>
<td>49 (13·3)/54 (8·4) 45%/29%</td>
<td>BDI-II ≥14</td>
<td>94</td>
<td>Not reported or not calculable</td>
<td>–0·64 (–1·08, –0·20)</td>
</tr>
<tr>
<td>Nobs et al (2015)</td>
<td>Germany Internet intervention (GET.ON mood enhancer) versus online psychoeducation</td>
<td>Patients with type 1 or type 2 diabetes and depression</td>
<td>50 (12)/51 (12) 64%/63%</td>
<td>SCID interview and CES-D ≥23</td>
<td>260</td>
<td>Not reported or not calculable</td>
<td>–0·89 (–1·14, –0·65)</td>
</tr>
</tbody>
</table>

(Table 1 continues on next page)
(Continued from previous page)

<table>
<thead>
<tr>
<th>Study location</th>
<th>Type of intervention and control group</th>
<th>Sample</th>
<th>Mean age in years (SD) and percentage of women in intervention and control groups</th>
<th>Assessment of depressive disorder</th>
<th>Number of patients*</th>
<th>Glycaemic control (SMD/OR [95% CI])</th>
<th>Depression severity (SMD [95% CI])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacological...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lustman et al**        (1997)</td>
<td>Nortriptyline (25 mg increased to 50 mg in second week) versus placebo</td>
<td>Patients aged 21–65 years with poorly controlled diabetes type 1 or type 2 diabetes</td>
<td>45 (12·2)/45 (12·5) 71·4%/50%</td>
<td>Major depression according to DIS and DSM-III-R criteria</td>
<td>35</td>
<td>-0·23 (-0·97, 0·51) -0·83 (-1·59, -0·07)</td>
<td></td>
</tr>
<tr>
<td>Lustman et al**        (2000)</td>
<td>Fluoxetine (20 mg/day, up to 40 mg/day) versus placebo</td>
<td>Patients with type 1 and type 2 diabetes and major depression</td>
<td>45 (13·0)/48 (11·5) 81·5%/59·3%</td>
<td>Major depression according to DSM-III-R assessed by the DIS and a BDI or HAMD score ≥14</td>
<td>60</td>
<td>-0·43 (-0·98, 0·12) -0·49 (-1·04, 0·06)</td>
<td></td>
</tr>
<tr>
<td>Paile-Hyvärinen et al** (2003)</td>
<td>Paroxetine (20 mg/day) versus placebo</td>
<td>Mildly depressed, postmenopausal women aged 50 or older with type 2 diabetes</td>
<td>61 (8·6)/62 (11·5) 100%/100%</td>
<td>Major depression with score between 2·5 and 12 on MADRS</td>
<td>15</td>
<td>-0·98 (-2·14, 0·18) -0·63 (-1·75, 0·49)</td>
<td></td>
</tr>
<tr>
<td>Xue**                  (2004)</td>
<td>Paroxetine (3 × 0·4 mg/day) versus placebo</td>
<td>Patients with type 1 and type 2 diabetes and depression, anxiety, or both</td>
<td>46 (8·0)/49 (11·5) 62·5%/54·1%</td>
<td>Not reported</td>
<td>60</td>
<td>-0·43 (-0·98, 0·12) -0·49 (-1·04, 0·06)</td>
<td></td>
</tr>
<tr>
<td>Qu and Meng**          (2005)</td>
<td>Paroxetine (20 mg/day) and alprazolam versus placebo</td>
<td>Inpatients with type 2 diabetes and depression, anxiety, or both</td>
<td>Not reported</td>
<td>Not reported</td>
<td>Not reported or not calculable</td>
<td>Not reported or not calculable</td>
<td></td>
</tr>
<tr>
<td>Paile-Hyvärinen et al** (2007)</td>
<td>Paroxetine (20 mg/day) versus placebo</td>
<td>Mildly depressed patients with non-optimally controlled diabetes</td>
<td>59 (5·4)/60 (6·0) 26%/20%</td>
<td>Mild depression (not more than six depressive symptoms according to DSM-IV)</td>
<td>49</td>
<td>-0·10 (-0·77, 0·57) -0·25 (-0·92, 0·42)</td>
<td></td>
</tr>
<tr>
<td>Echeverry et al**      (2009)</td>
<td>Sertraline (50 mg daily, up to 100 mg) versus placebo</td>
<td>Low-income Hispanic and African American patients with type 1 or type 2 diabetes and depression from a diabetes clinic</td>
<td>52 (8)/53 (10) 73·3%/92·7%</td>
<td>Screening with Whooley’s two-question tool, confirmation of depression with CDIS software</td>
<td>89</td>
<td>-0·48 (-0·91, -0·05) -0·28 (-0·69, 0·13)</td>
<td></td>
</tr>
<tr>
<td>Komorousova et al**    (2010)</td>
<td>Sertraline (100 mg/day) versus placebo</td>
<td>Patients with type 1 diabetes and depression, anxiety, or both</td>
<td>25/25 71% (whole sample)</td>
<td>Not reported or not calculable</td>
<td>Not reported or not calculable</td>
<td>Not reported or not calculable</td>
<td></td>
</tr>
</tbody>
</table>

Comparison between different active interventions

<table>
<thead>
<tr>
<th>Study location</th>
<th>Type of intervention and control group</th>
<th>Sample</th>
<th>Mean age in years (SD) and percentage of women in intervention and control groups</th>
<th>Assessment of depressive disorder</th>
<th>Number of patients*</th>
<th>Glycaemic control (SMD/OR [95% CI])</th>
<th>Depression severity (SMD [95% CI])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gülseren et al**       (2005)</td>
<td>Fluoxetine (20 mg/day) versus paroxetine (20 mg/day)</td>
<td>Patients with type 2 diabetes and major depression</td>
<td>58 (12·3)/57 (10·4) 81·8%/88·9%</td>
<td>HADS score ≥10, major depressive disorder according to SCID and score of ≥16 on HDRS</td>
<td>23</td>
<td>Not reported or not calculable</td>
<td>OR= 1·40 (0·23, 8·46) (remission)</td>
</tr>
<tr>
<td>Barragán-Rodríguez et al** (2008)</td>
<td>Magnesium supplementation (2·5 g/day) versus imipramine (25 mg/ day, up to 150 mg/day)</td>
<td>Elderly (≥60 years) patients in primary care with type 2 diabetes, hypomagnesaemia, and depression</td>
<td>69 (5·9)/66 (6·1) 52·2% (whole sample)</td>
<td>Depression severity ≥11 on Yasavage and Brink scale</td>
<td>23</td>
<td>-0·10 (-1·24, 1·04) 0·50 (-3·04, 4·04)</td>
<td></td>
</tr>
<tr>
<td>Khazaie et al**       (2011)</td>
<td>Fluoxetine (20–40 mg/day) versus citalopram (20–40 mg/day)</td>
<td>Patients with diabetes and major depression</td>
<td>52 (8·4)/48 (8·6) 35%/45%</td>
<td>Major depression diagnosis based on BDI score of ≥14 and SCID</td>
<td>47</td>
<td>-1·00 (-1·85, -0·15) 0·40 (-1·34, 2·23)</td>
<td></td>
</tr>
</tbody>
</table>

(Table 1 continues on next page)
effects of sertraline treatment with effects of diabetes-specific CBT for 12 weeks in patients with poorly controlled diabetes and major depression. Continuous treatment to prevent relapse of depression was provided for an additional 12 months in the sertraline group. In the CBT group, investigators assumed that carry-over effects would stabilise the results without further treatment. Both sertraline and CBT improved depression severity at the end of treatment, but sertraline was more effective than CBT in prevention of relapse at 1-year follow-up for patients who remitted with treatment. Poor glycaemic control remained nearly unchanged during the entire trial in both intervention groups.82

A 2014 systematic review by Atlantis and colleagues88 on collaborative care for diabetes and depression included seven trials, two of which examined mixed groups of people with diabetes, coronary artery disease, or both. Interventions were heterogeneous and consisted of a case manager and a structured treatment plan. The interventions were delivered partly within a stepped-care framework and partly as an integrated diabetes-care programme, and some trials explicitly targeted lifestyle risk factors. The meta-analyses of outcomes for depression severity and glycaemic control indicated substantial heterogeneity between studies; therefore, we provide single-trial effects from the five trials that showed in table 1 follow previously published methods.20

<table>
<thead>
<tr>
<th>Study location</th>
<th>Type of intervention and control group</th>
<th>Sample</th>
<th>Mean age in years (SD) and percentage of women in intervention and control groups</th>
<th>Assessment of depressive disorder</th>
<th>Number of patients*</th>
<th>Glycaemic control (SMD/OR [95% CI])</th>
<th>Depression severity (SMD [95% CI])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petak et al82 (2015)</td>
<td>Diabetes-specific behavioural group therapy (CBT) versus SSRI treatment (sertraline); relapse prevention; CBT carry-over effects versus continuous SSRI maintenance therapy</td>
<td>Secondary care outpatients with type 1 or type 2 diabetes and depression, or improved or remitted depression</td>
<td>49.0 (10.6)/47.9 (12.8) 62.7%/61.6%</td>
<td>CES-D and SCID and HAMD (treatment); 115 (relapse prevention)</td>
<td>251</td>
<td>-0.12 (-0.49, 0.24)†</td>
<td>-0.39 (-0.02, 0.76)‡</td>
</tr>
<tr>
<td>Katon et al84 (2004)</td>
<td>USA Stepped-care intervention (Pathways) versus usual care</td>
<td>Primary care patients with diabetes and major depression or dysthymia</td>
<td>58.6 (11.8)/58.1 (12.0) 66.2%/64.8%</td>
<td>PHQ-9 ≥10 with ≥5 symptoms and SCL-90 mean score ≥1</td>
<td>329</td>
<td>Non-significant</td>
<td>-0.29 (-0.50, -0.07)</td>
</tr>
<tr>
<td>Williams et al85 (2004)</td>
<td>USA Stepped-care intervention (IMPACT) versus usual care</td>
<td>Patients with major depression or dysthymia</td>
<td>70.1 (6.9)/70.3 (7.1) 54%/53%</td>
<td>SCID interview</td>
<td>417</td>
<td>HbA1c levels:</td>
<td>0.00 (-0.26, 0.26)</td>
</tr>
<tr>
<td>Ell et al86 (2010)</td>
<td>USA Stepped-care (problem-solving therapy and/or antidepressants) versus enhanced usual care</td>
<td>Patients with diabetes and depression or dysthymia</td>
<td>69.1%/75.1% (≥50 years of age) 79.8%/84.5%</td>
<td>SCL-20 score ≥15 (depression) 2 questions of SCID (dysthymia)</td>
<td>387</td>
<td>-0.03 (-0.27, 0.20)</td>
<td>0.82 (0.74, 1.94)</td>
</tr>
<tr>
<td>Bogner and de Vries87 (2010)</td>
<td>USA Integrated-care intervention versus usual care</td>
<td>Patients with type 2 diabetes and depression</td>
<td>61.6 (8.3)/58.3 (6.3) 82.8%/86.2%</td>
<td>Diagnosis of depression or prescription of antidepressants (past year)</td>
<td>58</td>
<td>-0.48 (-1.00, 0.04)</td>
<td>-0.57 (-1.09, -0.04)</td>
</tr>
<tr>
<td>Bogner et al88 (2012)</td>
<td>USA Integrated-care intervention versus usual care</td>
<td>Patients with type 2 diabetes and depressive symptoms</td>
<td>57.8 (9.4)/57.1 (9.6) 64%/58%</td>
<td>Range of depressive symptoms (prescription of antidepressants, PHQ-9)</td>
<td>180</td>
<td>-0.54 (-0.84, -0.24)</td>
<td>-0.13 (-0.42, 0.16)</td>
</tr>
</tbody>
</table>

Table 1: Characteristics of reviewed clinical trials (adapted with permission from Baumeister and colleagues89)

BDI=Beck Depression Inventory. CBT=cognitive behavioural therapy. CDIS=Computerised Diagnostic Interview Survey. CES-D=Center for Epidemiologic Studies Depression Scale. CGI=Clinical Global Impression. CIDI=Composite International Diagnostic Interview. DIS=Diagnostic Interview Schedule. HADS=Hospital Anxiety-Depression scale. HAMA=Hamilton Anxiety Rating Scale. HAMD=Hamilton Rating Scale for Depression. HDRS=Hamilton Depression Rating Scale. MADRS=Montgomery Asberg’s Depression Rating Scale. MINI=Mini International Neuropsychiatric Interview. PHQ=Patient Health Questionnaire. SAS=Zung Self-Rating Anxiety Scale. SCID=Structural Clinical Interview for DSM-IV. SCL=90=Symptom-Checklist-90. SDS=Zung Self-Rating Depression Scale. SMD=standardised mean difference. SWEEP=Study of Women’s Health and Depression.
reach statistical significance. From the available evidence, which key characteristics of the heterogeneous treatment interventions explored thus far are most effective, and how these interventions might work, remains unclear.

Health-care costs were not investigated in the aforementioned psychological and pharmacological intervention trials, except in one trial that compared the comparative health-care costs of a minimal (basic) psychological intervention versus usual care. The results showed no significant differences between the two treatment groups. By contrast, all three collaborative stepped-care intervention trials done in the USA provided cost effectiveness data, highlighting that collaborative care can be cost-effective, with incremental costs for collaborative care interventions per quality-adjusted life year in one study setting of $US198–397 and $US4053 in another study setting. The Pathways study even showed that, in a 24-month period, collaborative care was more effective but also more economical compared with usual care. Thus, although the evidence thus far shows collaborative and stepped-care approaches to be both effective and cost effective, health economic analyses should become a priority for future trials that assess psychological and pharmacological interventions in depression and diabetes. Expansion of cost-effectiveness analyses for psychological and pharmacological interventions is also mandatory to appropriately guide health-care expenditures.

Outlook on upcoming trials

The scientific and public awareness of depression in people with diabetes is illustrated by the large number of clinical trials in progress on this topic (14 at the time of writing; table 2). The trials focus almost exclusively on psychological (ten trials) and collaborative or stepped-care approaches (three trials), and one trial is investigating the effect of vitamin D versus placebo. No standard pharmacological trial was identified. As for published trials, ongoing trials are testing heterogeneous

<table>
<thead>
<tr>
<th>Location</th>
<th>Intervention and control groups</th>
<th>Sample</th>
<th>Results of assessment of depressive disorder</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Croatia</td>
<td>Psychoeducation versus usual care</td>
<td>Patients with diabetes and depression symptoms</td>
<td>PHQ-9 score between 10 and 14 (mild-to-moderate depression) CES-D ≥16</td>
<td>50</td>
</tr>
<tr>
<td>Croatia</td>
<td>Psychoeducation or physical activity versus usual care</td>
<td>Patients with type 2 diabetes and depression symptoms</td>
<td>PHQ-2 and SCID-I</td>
<td>Not reported</td>
</tr>
<tr>
<td>USA</td>
<td>Physician interview skills training versus knowledge enhancement</td>
<td>Patients with diagnoses of depression and diabetes (medical record) and screened for depression</td>
<td>PHQ-9 ≥10</td>
<td>248</td>
</tr>
<tr>
<td>USA</td>
<td>Lifestyle modification programme (CALM-D) versus usual care</td>
<td>Patients with type 2 diabetes and major depression (primarily black and Hispanic patients)</td>
<td>Not reported</td>
<td>200</td>
</tr>
<tr>
<td>Germany</td>
<td>CBT-based stepped-care approach versus usual care</td>
<td>Patients with diabetes and subthreshold or clinical depression</td>
<td>CES-D ≥16 or PAID ≥40</td>
<td>256</td>
</tr>
<tr>
<td>USA</td>
<td>Behavioural activation versus usual care</td>
<td>Patients with type 2 diabetes and depression</td>
<td>Clinical diagnosis of depression and PHQ-9 ≥10</td>
<td>Not reported</td>
</tr>
<tr>
<td>China</td>
<td>Web-based collaborative care versus waiting list</td>
<td>Outpatients with type 2 diabetes and depression</td>
<td>PHQ-9 ≥10</td>
<td>Not reported</td>
</tr>
<tr>
<td>USA</td>
<td>Patient education and behavioural activation versus usual care</td>
<td>Patients with diabetes with cardiovascular risk factor and depression</td>
<td>PHQ-9 ≥10</td>
<td>360</td>
</tr>
<tr>
<td>USA</td>
<td>Empowerment and CBT classes (MADE-IT) versus waiting list</td>
<td>Low-income Latino patients with diabetes and depression</td>
<td>GDS ≥5</td>
<td>121</td>
</tr>
<tr>
<td>Germany</td>
<td>Diabetes-specific CBT adapted for the elderly versus intensified treatment as usual versus a guided self-help intervention</td>
<td>Elderly type 2 diabetes patients with minor, mild, or major depression</td>
<td>Screening with PHQ-9 and SCID interview for diagnosis</td>
<td>166</td>
</tr>
<tr>
<td>USA</td>
<td>Vitamin D supplementation versus placebo</td>
<td>Women with type 2 diabetes and depression</td>
<td>Not reported</td>
<td>180</td>
</tr>
<tr>
<td>India</td>
<td>Physician-led counselling versus usual care</td>
<td>Patients with diabetes and depression</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>USA</td>
<td>Psychological intervention (HDPPE) versus usual care</td>
<td>Rural veterans with poorly controlled diabetes and depression symptoms</td>
<td>PHQ-9 ≥10</td>
<td>242</td>
</tr>
<tr>
<td>China</td>
<td>Peer support and yoga music therapy versus group education course and medical therapy</td>
<td>Patients with type 2 diabetes, depression and sleep disorder</td>
<td>PHQ-9 between 5 and 14</td>
<td>40</td>
</tr>
</tbody>
</table>

CBT=cognitive behavioural therapy. CES-D=Center of Epidemiologic Studies Depression Scale. GDS=Geriatric Depression Scale. PAID=Problem Areas in Diabetes Questionnaire. PHQ=Patient Health Questionnaire. SCID=Structured Clinical Interview for DSM-IV. *Target patient number for recruitment in ongoing trial. Date indicates year of study registration.

Table 2: Characteristics of clinical trials in progress (as of Dec 2014)
psychological interventions: low intensity psycho-education, peer support and counselling, CBT, and an intervention aimed at the training of physician interview skills. Interventions are provided face-to-face, via telephone, or via internet-based platforms. Future analyses of these trials might help to disentangle the specific aspects of psychological interventions that are most effective in terms of the type of intervention and health-care provider, dose, communication method, and patient characteristics.

Critical appraisal and recommendations for future studies
Psychological and pharmacological interventions, and more complex collaborative-care and stepped-care approaches, show moderate effects in the reduction of depression severity in people with diabetes and depression.8–11,44 A small to moderate positive effect on glycaemic control is likewise shown for SSRIs.20,21 Some psychological approaches, particularly when combined with diabetes education, also lead to improved glycaemic control, but results are inconclusive.66,67,105,106 Most trials were done in primary care settings in patients with moderate to poor glycaemic control. For patients in secondary care settings with very poor glycaemic control, neither CBT nor sertraline improved glycaemic control.82

The prescription of antidepressant drugs, possible side-effects, and drug-drug interactions need to be carefully balanced against their possible benefits for depression and glycaemic control.20,21 Beyond this general conclusion, we are unable to give more specific recommendations because of the heterogeneity of psychological and collaborative care approaches, the lack of sustainability data (longevity of effects once treatment is stopped) for pharmacological interventions, and the generally moderate quality of the evidence.20,25,45

Future research needs to confront and dismantle the general conclusions of studies that suggest that particular interventions are effective for all people with diabetes and depression. The specific characteristics of the participants have to be taken into account (eg, whether they are in a setting of primary vs secondary care, have satisfactory vs poor glycaemic control, and others). No evidence exists to help to elucidate which components of complex interventions are effective. Only limited evidence exists about appropriate doses and treatment durations. More active comparison trials are needed to identify the most effective interventions and communication pathways to reach different patient groups. Finally, treatments tailored according to the needs of the specific clinical setting, culture, and country are of major importance.

Promising experimental interventions from other disciplines, such as individualised treatments for depression subtypes,205 and novel treatment approaches, such as anti-inflammatory therapy, could be integrated in future investigations.207,208 Lifestyle interventions focusing on improving physical activity, diet, and social interaction, or reducing nicotine and alcohol consumption might be other approaches to improve both depression and diabetes.209 Moreover, to establish the public health effect of interventions, future research should assess the reach of the interventions by examining the dissemination and implementation strategies that help exploit the full potential of each intervention.210

Applicability of interventions to different cultural and societal groups
According to the International Diabetes Federation, 77% of people with diabetes live in low-income and middle-income countries.110 However, most studies of depression in diabetes originate from high-income countries. For example, a 2013 meta-analysis on depression as a risk factor for the development of diabetes included only one study from outside Europe or North America.111 Two core dimensions—economic development and cultural differences—need to be considered whenever conclusions from the scientific literature are applied to non-European or non-North American contexts. Economic development affects depression in diabetes in multiple ways, most obviously through the effect of poverty and relative poverty on mental health, and through the restricted availability of health care in some settings. However, reviews of the literature on mental health disorders in low-income and middle-income countries note that poverty and socioeconomic difficulties are the most important factors causing emotional distress.112 Thus, interventions that cannot address these issues will probably show weak or nonexistent effects on outcomes of interest. Cultures around the world differ in various dimensions, such as universalism (whether universal principles are seen to apply across all contexts rather than a particular context being more important), individualism (the extent to which individuals function independently of a social group or affiliation), and emotionality (the extent to which the expression of emotions is normative). To illustrate the effect of cultural differences, we provide an example (panel 2) of the experience of depression in Indigenous Australians with potential implications for diabetes and depression; in depth exploration of this topic is beyond the scope of this article.

Recommendations for clinical practice
Recommendations for treatment
As acknowledged in the Global Guidelines for Type 2 Diabetes of the International Diabetes Federation, “in many parts of the developing world the implementation of particular standards of care is limited by lack of resources”.21

This situation results in different levels of care ranging from limited care (lack of standard medical resources and fully trained health professionals) to recommended care (evidence-based cost-effective care), to comprehensive care...
Although many classic features of depression are reported by Indigenous Australians, feelings of hopelessness, guilt, or self-reproach typical of patients with depression are not reported. These differences might reflect a different perspective on life, as one elder explained, "we walk into the future backwards". This retrospective lens suggests that the effect of colonisation and past attempts at genocide might still be carried nowadays. Therefore, vulnerability to depression might be heightened.

Additionally, Indigenous Australians place their notion of spirit central to the experience and explanation of depression. The continual effect of chronic stress due to socio-economic disadvantage, racism, and high levels of bereavement can all weaken, misplace, or injure an individual’s spirit. Furthermore, the maintenance of positive connections between people and their environment is central to the well-being of Indigenous Australians. Thus, when Indigenous Australians leave their home communities to access modern health care, they might be even more susceptible to mental health disorders.

**Panel 3: What is the best model of health-care delivery for people with diabetes and depression?**

Few guidelines exist to organise services and deliver appropriate treatment for people with diabetes and depression. Although new approaches to health-care delivery, such as collaborative care, follow the intuitively appealing ideas of interdisciplinary, integrated care and optimised case management, the evidence to support these approaches is limited to studies in the USA. Whether results that support these approaches can be extrapolated to different health-care systems in other parts of the world remains unknown and needs further evaluation. Investigations are needed to develop novel technologies, such as telemedicine and electronic and mobile health applications, which could be extended to the existing models of care for patients and providers.

From a clinical perspective, the lack of communication between health-care professionals working across different disciplines and the lack of knowledge about particular treatments used in patients are frequently major obstacles to patient-centred care. These obstacles particularly affect patients with comorbid physical and mental illnesses such as diabetes with depression, which require complex treatment regimens. Health-care providers need to recognise that multimorbidity is the norm for many people. Collaborative-care approaches that only focus on two or perhaps three disorders might fail to meet the complex and multiple health complications of many patients. Thus, the collaborative-care approach of the future needs to expand its focus to become truly holistic by addressing both the biomedical outcomes and the psychosocial needs of patients.

**Panel 2: Experience of depression in Indigenous Australians**

The cultural difference in the way that Indigenous Australians deal with depression should be taken into consideration in the management of patients with concurrent diabetes and depression. Type 2 diabetes has prevalence rates of up to 33% in Indigenous Australians and is three times more common in this population as compared with the general population of Australia. As a result of the historical and socio-cultural environment that Indigenous Australians experience, psychological distress and depression are up to three times higher in this population than in the general Australian population. Only one study has reported how depression affects diabetes in Indigenous Australians. In this small study, diabetes increased the prevalence of depression in Indigenous Australians to the same extent that diabetes increases the prevalence of depression in the general population, in line with prevalence data from Indigenous communities in the USA. Although many classic features of depression are reported by Indigenous Australians, feelings of hopelessness, guilt, or self-reproach typical of patients with depression are not reported. These differences might reflect a different perspective on life, as one elder explained, "we walk into the future backwards". This retrospective lens suggests that the effect of colonisation and past attempts at genocide might still be carried nowadays. Therefore, vulnerability to depression might be heightened.

Additionally, Indigenous Australians place their notion of spirit central to the experience and explanation of depression. The continual effect of chronic stress due to socio-economic disadvantage, racism, and high levels of bereavement can all weaken, misplace, or injure an individual’s spirit. Furthermore, the maintenance of positive connections between people and their environment is central to the well-being of Indigenous Australians. Thus, when Indigenous Australians leave their home communities to access modern health care, they might be even more susceptible to mental health disorders.
Step 2: moderate depression (or persistent mild depression that does not respond to step 1)

For moderate depression, a specific treatment for depression is needed. Patients should be offered information about different treatment options to facilitate shared decision making. These options include CBT as the first choice for psychological treatments and SSRIs as the first choice for pharmacological treatment. In patients with recurrent depression, the combination of pharmacotherapy and psychotherapy is especially recommended. Continuous monitoring of patients is essential. If no response is observed after 2–4 weeks of drug treatment, the dose or the type of drug can be changed. Response to psychological treatment should monitored with the length of time to be decided on an individual basis.

Step 3: severe depression (or moderate depression not responding to step 2)

For severe depression, treatment options include antidepressants as a first choice treatment (with SSRIs as a first choice drug), generally in combination with psychotherapy. These patients can be treated on either an inpatient or outpatient basis, dependent on the individual patient.

Step 4: very severe depression (or severe depression not responding to step 3)

Psychotherapy is usually not sufficient for very severe depression and sometimes not possible in these patients. Treatment should be offered on an inpatient basis. A complex drug regimen is often needed. Dependent on the individual patient, psychotherapy can be offered concomitantly with treatment or after initial response to treatment.

Conclusion

The comorbidity of diabetes and depression remains a clinical challenge for patients and health-care professionals alike. Changes in the undergraduate and postgraduate education and training of health-care professionals who deliver clinical care for patients with diabetes and depression are urgently needed (panel 3). Training must account for the complex aspects of these comorbidities. Training materials created by specialists often neglect the importance of concurrent treatment and management of mental and physical disorders. Training should promote the development of cross-disciplinary collaboration leading to effective prevention and treatment of diabetes and depression. Non-clinical health-care providers, such as community health workers and peer supporters, should also be included in training schemes. These individuals might be particularly adept in managing comorbid depression and diabetes and can provide much needed support for patients and health-care professionals. Although the evidence base is still incomplete, health-care delivery can be much improved to help to alleviate the suffering of patients affected by concurrent diabetes and depression.

Contributors

FP, HB, TCS, AB, and RIGH contributed equally to this Series paper.

Declaration of interests

RIGH has received fees for lectures, consultancy work, and attendance at conferences from the following companies: Novo Nordisk, Eli Lilly & Co, Boehringer Ingelheim, Otsuka, Lundbeck, Sanofi-Aventis, Janssen, and Merck Sharp & Dohme. He also received research funding from Novo Nordisk to develop an online CBT-based intervention for people with diabetes and depression. FP, HB, TCS, and AB declare no competing interests.

References


Wing JK, Babor T, Brugha T, et al. SCAN. Schedules for Clinical Assessment in Neuropsychiatry. Arch Gen Psychiatry 1990; 47: 589–93.


Whooler MA, Avis AL, Miranda J, Browner WS. Case-finding instruments for depression. Two questions are as good as many. J Gen Intern Med 1997; 12: 439–45.


