Utility of functioning in predicting costs of care for patients with mood and anxiety disorders: a prospective cohort study

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Development of payment systems for mental health services has been hindered by limited evidence for the utility of diagnosis or symptoms in predicting costs of care. We investigated the utility of functioning information in predicting costs for patients with mood and anxiety disorders. This was a prospective cohort study involving 102 adult patients attending a tertiary referral specialist clinic for mood and anxiety disorders. The main outcome was total costs, calculated by applying unit costs to healthcare use data. After adjusting for covariates, a significant total costs association was yielded for functioning ($\beta = 1.02$; 95% confidence interval: 1.01–1.03), but not depressive symptom severity or anxiety symptom severity. When we accounted for the correlations between the main independent variables by constructing an abridged functioning metric, a significant total costs association was again yielded for functioning ($\beta = 1.04$; 95% confidence interval: 1.01–1.09), but not symptom severity. The utility of functioning in predicting costs for patients with mood and anxiety disorders was supported. Functioning information could be useful within mental health payment systems. \textit{Int Clin Psychopharmacol} 32:205–212 (2017) Author(s). Published by Wolters Kluwer Health, Inc.

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Introduction

Mental disorders account for a sizeable share of the global burden of disease (~7%), but services for their treatment remain underfunded in most countries (Saxena \textit{et al.}, 2003; Murray \textit{et al.}, 2012). To meet the needs of patients, it is important that scarce mental health service resources are allocated systematically and efficiently (Essen, 2009). This could be achieved by healthcare payment systems that financially incentivize hospitals, clinics and other providers to treat as many patients as possible (Street and Maynard, 2007). Providers receive a fixed payment for every patient treated, adjusted for the ‘cluster’ that patients are assigned to on the basis of clinical characteristics and background. The primary purpose of patient clusters is to offer an accurate estimation of the costs of treating a given patient and thus the variables used in their definition must have good utility in predicting costs of care.

Diagnosis has been important in defining clusters because it facilitates their understanding as distinct clinical entities, and the utility of diagnostically defined clusters in predicting costs of care for the general population is well established (Busse \textit{et al.}, 2006; Mathauer and Wittenbecher, 2013). However, predicting costs of care in mental disorders is complex, largely because of instability in diagnosis and prognosis and wide variations in treatment and care models (Appleby \textit{et al.}, 2012). Moreover, the utility of diagnostically defined clusters in predicting costs of care in mental disorders has been refuted in various large-scale studies, and this has contributed towards a lack of progress in developing payment systems for mental health services around the world (English \textit{et al.}, 1986; Schumacher \textit{et al.}, 1986; Elphick and Antony, 1996; Cotterill and Thomas, 2004; Macdonald and Elphick, 2011; Mason \textit{et al.}, 2011). It seems necessary therefore to investigate alternatives to clustering psychiatric patients according to diagnosis. The governments of Australia, New Zealand and UK have pursued a ‘multidomain’ approach for defining patient clusters, principally using the Health of the Nations Outcome Scales (HoNOS). However, concerns over the validity and predictive ability of the HoNOS-based clusters have delayed the implementation of arising payment systems in these countries (Burgess \textit{et al.}, 1999; Eagar \textit{et al.}, 2004; Macdonald and Elphick, 2012; Wang \textit{et al.}, 2015). For example, pilot studies in the English National Health Service (NHS) have shown the low resource homogeneity of HoNOS-based clusters, and their inferiority to an alternative statistically derived model in reducing the variance in resource usage (Health...
In the framework of the International Classification of Functioning, Disability and Health (ICF), ‘functioning’ is an encompassing term relating to physiological and psychological health and the ability to undertake daily activities and participate in various life domains (Cieza et al., 2014). At some point in life, everybody will experience decrements in functioning, and common decrements occur across varying health conditions (Cieza et al., 2014; Cieza et al., 2015). The utility of functioning in predicting healthcare costs of mental disorders merits investigation for various reasons: individuals with mental disorders typically experience considerable decrements in functioning and describe functional recovery as essential for remission (Zimmerman et al., 2006; Lam et al., 2015); poorer functioning may predict recurrence of depressive and anxiety disorders (Rodriguez et al., 2005); and functioning is increasingly being recognized as a priority in the treatment and assessment of mental disorders, as reflected in the new dimensional approach of the Diagnostic and Statistical Manual of Mental Disorders, 5th ed. (DSM-V), whereby it is rated alongside diagnostic severity (Gold, 2014; Lam et al., 2015). The utility of functioning in predicting costs of care in the general population was supported in a recent review (Hopfe et al., 2016), but its utility in predicting costs in mental disorders is unclear – there is mixed evidence from investigations that deployed various domain-specific operationalizations of functioning and uncosted healthcare use outcomes (Patel et al., 2006; Cooper et al., 2010; Twomey et al., 2015a, 2015b).

We carried out a cohort study set within an NHS tertiary referral specialist clinic to investigate the utility of functioning in predicting costs of care for patients with mood and anxiety disorders. Functioning is measured using a new ICF-based metric (the PARADISE 24) (Cieza et al., 2015) that captures its multidomain nature in an overall summary score. The PARADISE 24 differs from a previously developed ICF-based metric of multidomain functioning (i.e. the WHODAS-II) in that it includes items related to symptoms of psychological problems (e.g. anxiety and depression). We investigated the association of baseline functioning with total NHS costs at the 6-month follow-up and how functioning performed in comparison with depressive and anxiety symptom severity in cost prediction. We also investigated whether the potential predictive ability of functioning was driven by decrements related to the ICF domains of psychological health or ‘activities and participation’.

### Participants and methods

#### Participants

The study involved a convenience sample of adult patients attending an NHS tertiary referral specialist service for mood and anxiety disorders. Patients with cognitive, memory or literacy difficulties that prevented their provision of data were excluded. A size of 103 was required to detect a medium effect size (at 80% power) while entering seven predictive variables into general linear models (GLM) described below (Faul et al., 2007).

#### Procedure

The NHS London Queen Square Research Ethics Committee (reference: 14/LO/1900) and the University of Southampton (reference: 12086) provided ethics approval. Patients were invited to participate by means of a letter and an accompanying information sheet. Participation involved completing questionnaires in a baseline data collection meeting, providing information on recent healthcare use by telephone at follow-up, and agreeing that author C.T. could access electronic patient records held by the clinic. Baseline data collection meetings principally took place in the clinic after routine consultations, and, occasionally, at more convenient times in the clinic and by telephone. Participants were compensated for their time with a £10 shopping voucher.

#### Measures

**Sample characteristics**

Sample characteristics were assessed at baseline using age, sex, ethnicity, marital status, educational, employment status, Index of Multiple Deprivation score (Noble et al., 2006), general health comorbidity (Self-Administered Comorbidity Questionnaire) (Sangha et al., 2003), psychiatric comorbidity, ICD-10 diagnosis, depressive and anxiety symptom severity, functioning and clinician-rated severity of illness (Clinical Global Impression Scale) (Guy, 1976).

**Predictor variables: depressive and anxiety symptom severity, and functioning**

Depressive and anxiety symptom severity were measured using the two seven-item subscales from the Hospital Anxiety and Depression Scale (HADS), a psychometrically sound instrument that is used widely in clinical populations (Zigmond and Snaith, 1983; Bjelland et al., 2002). Functioning was measured using PARADISE 24, a metric developed using the probabilistic test theory and tested on over 700 participants with nine different neuropsychiatric disorders residing in four European countries (Italy, Poland, Spain and Finland) (Cieza et al., 2015). The reported psychometric properties of the metric are sound: as per infit mean square statistics, all items score in the (0.7–1.3) range for good item fit and the internal reliability of the instrument, indicated by the person–separation index (which has a maximum score of 1.0 and is analogous to Cronbach’s a) is 0.92 (Cieza et al., 2015). This 24-item self-report instrument covers functioning decrements in the following domains: psychological (12 items: ‘not feeling rested and refreshed’; ‘loss of interest’; ‘appetite’; ‘sleeping’; ‘irritability’; ‘slowed down’; ‘feeling sad, low or depressed’; ‘worry or anxiety’;
not being able to cope; ‘concentration’; ‘remembering to do important things’; ‘making decisions’; activities and participation (10 items: ‘starting and maintaining a conversation’; ‘walking a long distance’; ‘grooming or dressing, toiletting or eating’; ‘staying by yourself for a few days’; ‘looking after your health’; ‘initiating and maintaining a friendship’; ‘getting along with people who are close to you’; ‘day-to-day work or school’; ‘managing your money’; ‘joining in community activities’); pain (1 item); and sexual activities (1 item). Each item is scored on a three-point scale representing the level of decrements in functioning: 0 (None); 1 (Some); and 2 (A lot). The raw score ranges from 0 to 48 before transformation into a more intuitive scale ranging from 0 to 100 (Cicza et al., 2015).

Outcome: total NHS costs at the 6-month follow-up

The primary outcome was NHS total costs, with secondary analyses carried out on the subcategories of mental health service costs and general health service costs. Costs were calculated in two stages. First, we counted the number of contacts that patients had with different NHS providers using the combination of electronic patient records and an adapted version of the Client Service Receipt Inventory (CSRI) (Beecham and Knapp, 2001) administered by author C.T. at 3-month intervals. The electronic patient records provided data on mental health service contacts. The CSRI also covered mental health service contacts – including contacts not documented in electronic patient records – but it was mainly used for other types of service contacts (e.g. general practitioner). Second, we converted the counted NHS contacts into monetary values (Pounds Sterling; £) by applying unit costs, principally those from NHS reference costs for 2014–2015 (Department of Health, 2015). As all required unit costs were not available in this source, some were based on 2015 costs provided by the Personal Social Service Research Unit (Curtis and Burns, 2015) and internal financial records. Table 1 details the unit costs used in this study.

Statistical analysis

Main analyses

Analyses were carried out using STATA 13 (StatCorp LP, College Station, Texas, USA). Descriptive statistics were used for sample characteristics. The separate associations of baseline depressive symptom severity, anxiety symptom severity and functioning with costs at the 6-month follow-up were determined using unadjusted and adjusted exponentiated coefficients [with 95% confidence intervals (CIs)] modelled through ‘GLM-log-gamma’ analysis, which accounted for the skewness in the costs outcome. The skewness can be illustrated by the presence of markedly higher mean costs ($3899) than median costs ($1595); GLM-log-gamma is widely considered the analysis of choice for predicting skewed costs outcomes (with few zero values), largely because it shares

the benefits of log or Box–Cox transformation while facilitating ease of interpretation of coefficients and avoiding back-transformation issues (Gregori et al., 2011). The exponentiated coefficients indicated the percentage increase in the mean costs per unit increase in the specified covariate. For illustrative purposes, an exponentiated coefficient of 1.00 means a 0% increase in mean costs per unit increase in a specified covariate, whereas a coefficient of 1.10 indicates a 10% increase.

We sought to investigate how functioning performed in comparison with depressive and anxiety symptom severity in predicting costs. However, exploratory analysis showed that the validity of this comparison was limited by strong correlations between scores on the PARADISE 24 metric and the depression ($r = 0.73$) and anxiety ($r = 0.69$) subscales of the HADS. Thus, these variables were not entered together into statistical models. Their correlation was unsurprising because depressive and anxiety symptoms are part of functioning according to the ICF and are therefore included in the PARADISE 24 metric. To enable a more refined comparison of predictive ability, we removed items from the PARADISE 24 metric that were analogous to depressive and anxiety symptoms (i.e. items 1–9 and item 11) and analysed the association of this ‘PARADISE 14’ metric with costs. This procedure was not based on correlations between individual PARADISE 24 items with the HADS; rather, we focused on accounting for the overlap in the content of the measures (e.g. depressive symptoms). This procedure also allowed us to investigate the whether the potential predictive ability of functioning was driven by decrements related to the ICF domains of psychological health or ‘activities and participation’. Raw scores were used for analyses involving the truncated PARADISE 14 instrument because its scores could not be converted onto the same 100 point metric scale as the longer PARADISE 24.

Selection of covariates

On the basis of previous research showing their associations with mental health service costs (Durbin et al., 2015; Twomey et al., 2015a), initial adjustments were made for age, sex, marital status, ethnicity, employment status, area-level deprivation, general health comorbidity, psychiatric comorbidity, clinician-rated severity of illness, NHS costs incurred in the 3 months before baseline, functioning, depressive symptom severity and anxiety symptom severity. To safeguard statistical power, we subsequently removed several covariates that (a) were not associated with costs in exploratory analysis and (b) yielded $P$ values more than 0.20 in this association. These variables were sex, marital status, ethnicity, employment status, area-level deprivation and clinician-rated severity of illness.
Missing cost data (three participants, 2.9%) arose because of a participant death and two dropouts from follow-up. To preserve statistical power, we imputed these missing data using multiple imputation by chained equations with a predictive mean-matching model. Multiple imputation uses patterns in observed data to impute missing values, repeating this process multiple times to account for uncertainty in the imputed values (Lee and Simpson, 2011). Imputation models included all predictive variables entered into the GLM. A total of 100 imputed datasets were created, resulting in the introduction of minimal SE, as per guidelines (White et al., 2011). Internal consistency for the three main predictor variables was high: PARADISE 24 (α = 0.93); HADS-depression (α = 0.86); and HADS-anxiety (α = 0.84).

Associations of baseline predictor variable scores with costs at follow-up
Table 3 summarizes the unadjusted and adjusted associations. In unadjusted models, significant total costs associations were yielded for functioning (β = 1.05; 95% CI: 1.03–1.07) and depressive symptom severity (β = 1.10; 95% CI: 1.02–1.18), but not for anxiety symptom severity (β = 1.08; 95% CI: 0.98–1.18). After adjusting for age, baseline costs and comorbidity in separate models, a significant total costs association was yielded for functioning (β = 1.02; 95% CI: 1.01–1.03), but not per cent of the population were women and the vast majority were White. Marital and employment status varied. Most participants did not reside in relatively deprived geographical areas, but a sizeable minority did. Most had comorbidities and most were diagnosed with an ICD-10 depressive disorder. Scores on measures of functioning, depressive symptoms and anxiety symptoms were normally distributed. About half of the participants were deemed to be ‘moderately ill’ according to Clinical Global Impression Scale scores. The mean of the total costs accrued during follow-up was £3899 (SD = 7997), with a median of £1595.

**Table 1 Unit costs used in study**

| Contact                          | Source of unit cost          | Terminology used in source                      | Cost  |
|----------------------------------|------------------------------|-------------------------------------------------|-------|
| Mental health                    |                              |                                                 |       |
| Clinical psychologist            | NHS reference costs          | Clinical psychology                              | £210  |
| CMHT other                       | PSSRU                        | Community-based nurse (mental health)            | £87   |
| Crisis resolution team           | PSSRU                        | Crisis resolution team member (mental health)    | £189  |
| Day care attendances             | PSSRU                        | Local authority social services (mental health)  | £32   |
| Drug and alcohol misuse         | NHS reference costs          | Alcohol outpatient attendances                   | £81   |
| ECT                              | Southern Health NHS FT       | IAPT, adult and elderly                          | £94   |
| IAPT (primary care)              | NHS reference costs          | Care clusters unit cost per occupied bed day     | £493  |
| Psychiatric hospital days        | NHS reference costs          | Liaison psychiatry                               | £142  |
| Psychiatric liaison              | NHS reference costs          | Adult mental illness                             | £225  |
| Psychiatrist                     | NHS reference costs          | Social worker (adult services)                   | £355  |
| Social worker                    | PSSRU                        |                                                  |       |
| General health                   |                              |                                                 |       |
| A&E attendance                   | NHS reference costs          | A&E attendance                                  | £132  |
| Dentist                          | NHS reference costs          | General dental service                           | £77   |
| Dermatologist                    | NHS reference costs          | Dermatology                                      | £97   |
| District nurse                   | NHS reference costs          | District nurse                                   | £37   |
| Dietician/nutritionist           | NHS reference costs          | Dietician                                       | £88   |
| GP                               | PSSRU                        | GP patient contact (11.7 min)                    | £44   |
| Hospital bed days                | NHS reference costs          | Excess bed days                                  | £303  |
| Hospital doctor (general)        | NHS reference costs          | General medicine (hospital-based consultant)     | £149  |
| Hospital nurse                   | PSSRU                        | Hospital-based nurse: band 5                     | £38   |
| Nurse (GP practice)              | PSSRU                        | Nurse (GP practice)                              | £47   |
| Occupational therapist           | NHS reference costs          | Occupational therapist                           | £73   |
| Orthopaedic surgeon              | NHS reference costs          | Trauma & orthopaedics                            | £104  |
| Optometry                        | NHS reference costs          | Optometry                                       | £93   |
| Physiotherapist                  | NHS reference costs          | Physiotherapist                                  | £92   |
| Podiatrist                       | NHS reference costs          | Podiatrist, tier 1, general podiatry             | £40   |

A&E, Accident & Emergency; CMHT other, community mental health team; nurse/support worker/assistant psychologist/care co-ordinator/occupational therapist; ECT, electroconvulsive therapy; FT, Foundation Trust; GP, general practitioner; IAPT, improving access to psychological therapies initiative; NHS, National Health Service; PSSRU, Personal Social Service Research Unit.

aThe mean of the care clusters unit cost per occupied bed day was calculated and used.
bThe mean cost of different types of A&E attendances was calculated and used.
depressive symptom severity ($\beta = 1.03$; 95% CI: 0.98–1.07) or anxiety symptom severity ($\beta = 1.03$; 95% CI: 0.98–1.07). In the final model that accounted for the strong correlations between functioning and HADS scores by removing items from the PARADISE 24 metric that were analogous to depressive and anxiety symptoms, a similar pattern emerged: a significant total costs association was yielded for functioning, but not symptom severity. The latter finding also supported the predictive ability of functioning decrements related to ‘activities and participation’ over and above decrements in psychological health. All predictor variables had greater utility in predicting mental health service costs than general health service costs.

### Discussion

#### Summary of main findings

After adjusting for covariates in separate models, a significant total costs association was yielded for functioning, but not depressive symptom severity or anxiety symptom severity. Interpreting the magnitude of the significant association, for every one point increase in the mean PARADISE 24 score, there was a 2% increase in costs. As the PARADISE 24 has 100 points, this can be considered as a relatively strong association. In the final model that accounted for the strong correlations between functioning and HADS scores by removing items from the PARADISE 24 metric that were analogous to depressive and anxiety symptoms, a similar pattern emerged: a significant total costs association was yielded for functioning, but not symptom severity. The latter finding also supported the predictive ability of functioning decrements related to ‘activities and participation’ over and above decrements in psychological health. All predictor variables had greater utility in predicting mental health service costs than general health service costs.

#### Limitations and strengths

Our study is the first to predict healthcare costs for individuals with mental disorders using an ICF-based measure of functioning. Sample representativeness was strengthened by a high participation rate (90%), a low dropout rate (3%) and use of multiple imputation. The normal distribution of scores on measures of functioning, depressive symptoms and anxiety symptoms safeguarded the validity of statistical analyses in terms of the prediction of costs. However, statistical power was limited by the sample size of 102, which reduced the number of covariates that could be included in statistical models. The study was set within a tertiary referral specialist clinic; thus, the sample is not typical of all patients with mood or anxiety disorders: compared with the characteristics of patients attending secondary care mental health services in the Lambeth region of London ($n = 266$ 169) (Stewart et al., 2009), the sample had a higher mean age and more participants of female sex and White ethnicity. Furthermore, the service is led by author D.S.B., who administers treatment on the basis of clinical judgement: different treatment decisions may be made in other services, which could limit the generalizability of our findings. Unavoidable practical issues meant that electronic patient records only covered mental health service use data were collected using the CSRI, which may have been subject to recall errors. The precision and applicability of unit costs data are limited because of various data access issues: unit costs data were not available for all types of NHS contacts and thus it was necessary to approximate the costs of some contacts using available unit costs from similar services (Table 1); the data were based on national averages and may not be

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**Table 2 Sample characteristics (N = 102)**

| Variables | n (% | Mean (SD) | Median (25th–75th centile) |
|-----------|------|-----------|----------------------------|
| Age*      | 102  | 50.6 (13.5) | 52.0 (42.8–60.3) |
| Sex       |      |            |                            |
| Male      | 40 (39.2) | –       | –                           |
| Female    | 62 (60.8) | –       | –                           |
| Ethnicity |      |            |                            |
| White     | 96 (94.1) | –       | –                           |
| Non-White | 6 (5.9)   | –       | –                           |
| Marital status | | | |
| Single    | 28 (27.5)  | –       | –                           |
| Married or in civil union | 54 (52.9)  | –       | –                           |
| Divorced, separated or widowed | 20 (19.6)  | –       | –                           |
| Employment status | | | |
| In paid employment | 35 (34.3)  | –       | –                           |
| Unemployed or unable to work | 41 (40.2)  | –       | –                           |
| Retired   | 23 (22.6)  | –       | –                           |
| Student   | 3 (2.9)    | –       | –                           |
| Index of Multiple | | | |
| Deprivation decile b | – | 6.3 (2.6) | 6.0 (4.0–8.0) |
| General health comorbidity (SCQ) | | | |
| (range: 0–21) | 55 (53.9)  | –       | –                           |
| ICD-10 diagnosis | | | |
| Depressive disorder | 55 (53.9)  | –       | –                           |
| (F31–F34; F38.10) | – | 5.3 (4.6) | 5.0 (2.0–8.0) |
| Anxiety disorder | 16 (15.7)  | –       | –                           |
| (F40–F42) | – | – | – |
| Bipolar disorder (F31) | 28 (27.5)  | –       | –                           |
| Other     | 3 (2.9)    | –       | –                           |
| HADS-depression score (range: 0–21) | – | 10.0 (4.9) | 10.0 (7.0–13.0) |
| HADS-anxiety score (range: 0–21) | – | 11.6 (4.7) | 12.0 (8.0–15.0) |
| PARADISE 24 functioning score (range: 0–100) | – | 63.1 (15.9) | 65.0 (52.0–73.5) |
| Psychiatric comorbidity | | | |
| Yes | 50 (49.0) | – | – |
| No | 52 (51.0) | – | – |
| Clinical Global Impression score | – | 3.7 (0.8) | 4.0 (3.0–4.0) |

**Legend:**

*HADS, Hospital Anxiety and Depression Scales; NHS, National Health Service; SCQ, Self-Administered Comorbidity Questionnaire.

*aAge range is 18–79 years.

*bThe lower the decile score, the higher the relative deprivation in the area.
Table 3  Associations of baseline HADS-depression, HADS-anxiety, HADS-total and functioning (PARADISE 24 and PARADISE 14) with ‘6-month’ costs (n = 102)

| Predictor variable and covariates | MH service costs | GH service costs | Total costs |
|-----------------------------------|------------------|------------------|------------|
| HADS-depression                    |                  |                  |            |
| Unadjusted                        | 1.11 (1.02–1.21) | 1.02 (0.95–1.09) | 1.10 (1.02–1.18) |
| Age, baseline total costs, comorbidity* | 1.05 (0.99–1.11) | 0.98 (0.94–1.03) | 1.03 (0.98–1.07) |
| Further adjustment for anxiety, ‘PARADISE 14’ scores | 1.02 (0.95–1.08) | 0.99 (0.93–1.06) | 0.99 (0.94–1.05) |
| HADS-anxiety                      |                  |                  |            |
| Unadjusted                        | 1.09 (0.97–1.23) | 0.99 (0.92–1.07) | 1.08 (0.98–1.18) |
| Age, baseline total costs, comorbidity* | 1.04 (0.99–1.10) | 0.96 (0.92–1.01) | 1.03 (0.98–1.07) |
| Further adjustment for depression, ‘PARADISE 14’ scores | 0.99 (0.93–1.06) | 0.95 (0.89–1.01) | 0.98 (0.93–1.04) |
| Functioning                       |                  |                  |            |
| Unadjusted                        | 1.05 (1.03–1.08) | 1.06 (0.99–1.03) | 1.05 (1.03–1.07) |
| Age, baseline total costs, comorbidity* | 1.03 (1.01–1.05) | 1.00 (0.98–1.01) | 1.02 (1.01–1.03) |
| Further adjustment for depression, anxiety | 1.14 (1.07–1.20) | 1.03 (0.98–1.08) | 1.11 (1.06–1.18) |
| Functioning (PARADISE 14)bc      |                  |                  |            |
| Unadjusted                        | 1.06 (1.02–1.11) | 0.99 (0.96–1.02) | 1.04 (1.01–1.07) |
| Age, baseline total costs, comorbidity* | 1.06 (1.00–1.11) | 1.02 (0.97–1.06) | 1.04 (1.01–1.09) |

$c^e$ = Exponentiated coefficients – modelled using ‘general linear model-log-gammas’. 
CI, confidence interval; CGI, Clinical Global Impressions scale; GH, general health; HADS, Hospital Anxiety and Depression Scale; MH, Mental Health.

*Adjustments were made for both general health and psychiatric comorbidity.

The PARADISE 14 was created after removing items from the PARADISE 24 considered to be symptoms of mood disorders (i.e. items 1–9 and item 11).

Raw scores were used for analysis involving this truncated instrument.

applicable to certain NHS services; and the data had to be extracted from two different sources. The 6-month time frame for the analysis of costs does not take into account possible seasonal effects on resource use to the same degree as studies lasting over 1 year. The duration of our time frame was constrained by the amount of costs data that needed to be collected using the CSRI (at 3-month intervals) and other practical considerations.

Comparison with other studies

Comparisons of our findings with those from relevant previous studies are tentative because these studies had differing clinical populations and deployed various domain-specific operationalizations of functioning and uncosted healthcare use outcomes (Patel et al., 2006; Cooper et al., 2010; Twomey et al., 2015a, 2015b). Domain-specific operationalizations of functioning may be less representative of care needs than the multi-domain PARADISE 24, whereas uncosted healthcare use outcomes do not provide a weighted summary of resource consumption and are therefore less precise than costed outcomes. Nevertheless, our findings that support the predictive utility of functioning correspond with those of a cross-sectional study (n = 7461), whereby ‘activities of daily living’ was associated with the number of psychotherapy and general practitioner attendances by individuals with ‘common mental disorders’(Cooper et al., 2010), but not with those of a cohort study (n = 85), whereby social functioning impairment was not associated with healthcare costs for patients with schizophrenia (Patel et al., 2006). The utility of functioning in predicting costs of care in the general population has also been supported in a recent review (Hopfe et al., 2016). The lack of strong support for the utility of depressive and anxiety symptom severity in predicting costs is in agreement with evidence from numerous studies involving large-scale and national datasets (English et al., 1986; Schumacher et al., 1986; Elphick and Antony, 1996; Cotterill and Thomas, 2004; Macdonald and Elphick, 2011; Prina et al., 2015; Twomey et al., 2015a).

Potential implications

Our findings support the utility of functioning in predicting costs of care for patients with mood and anxiety disorders, and this may have implications for health policy-makers. The PARADISE 24 metric benefits from its theoretical underpinnings in the ICF and is short, easy to use and applicable across mental disorders. It should be noted, however, that the overlap of items from the PARADISE 24 with measures of diagnostic and symptom severity and quality of life needs to be taken into account to prevent the confounding of estimates in analysis. Our findings supporting the utility of functioning decrements related to ‘activities and participation’ in costs prediction show that adding functioning information to existing diagnostically defined clusters may improve their predictive ability as has been shown in the general population (Hopfe et al., 2016).

Future research

A more diverse clinical sample would enable a more complete assessment of the predictive utility of functioning. The use of a more comprehensive case-register could increase the validity of the costs outcome – although the widespread absence of data linkage between primary care, secondary care and hospital case-registers represents a drawback (Garcia Alvarez et al., 2011). The HoNOS instrument has been proposed for use in the mental health PbR system of the English NHS (Self et al., 2008; Lovaglio and Monzani, 2011, 2012; Speak and Muncer, 2015; Wang et al., 2015) and a future study directly comparing its utility with that of the PARADISE
24 metric in costs prediction might inform policy debates in UK and other countries. The PARADISE 24 was developed as a self-report measure that can be used across all mental disorders, but for more complex and severe disorders, ‘self-report’ is often not possible: future investigations of the psychometric properties and practicality of a clinician-rated version of the PARADISE 24 metric would be welcome. Future research could explore alternative approaches to developing payment systems for mental health services: for example, Monitor – the NHS regulator – has suggested that payments should be closely linked to agreed patient outcome standards rather than costs, to incentivize quality of care (Monitor and NHS England, 2015).

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Conflicts of interest
There are no conflicts of interest.

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