Master Thesis

Measuring functional outcomes in a Medical Psychiatric Unit: a validation study

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Abstract

Objective

At least 25% of patients admitted in a general hospital because of a somatic problem, have psychiatric comorbidity. Psychiatric comorbidity is associated with a longer hospital stay, more severe somatic and social problems and a higher number of discharges to inpatient care settings. A Medical Psychiatric Unit (MPU) provides specialized care for these patients. Little is known about the effect of MPU-care on functional outcomes. A valid instrument to measure this is missing. The aim of the study was to examine if changes in functional outcomes can be measured in patients admitted to a MPU using the Care Dependency Scale (CDS) and Health of the Nation Outcome Scales (HoNOS).

Method

In a single centre observational prospective design, construct validity of the CDS and HoNOS was investigated in a medical psychiatric unit population. Measurements were conducted at admission and discharge. The Spearman's correlation with the Clinical Global Impression (CGI) and the widely used Camberwell Assessment of Needs Short Appraisal Schedule (CANSAS) was determined on difference scores.

Results

50 patients were included, whereby an admission and discharge measurement was carried out. The CDS and HoNOS showed moderate to good correlations with the CGI and CANSAS. The correlations did not have a significant difference, with one exception: the CDS correlates significantly stronger with the residents' CGI than the HoNOS.

Conclusion

The CDS and HoNOS are both consistent with clinical observations and show construct validity. This study shows that the instruments are complementary and partly measuring different domains. For a complete outcome measurement of functional status both the CDS and HoNOS are needed.

Key words

Medical psychiatric unit; functional status; routine outcome measurement.

Introduction and rationale

Many patients suffer from both somatic and psychiatric problems. At least 25% of patients admitted to a general hospital, have psychiatric comorbidity (1,2). Psychiatric comorbidity is associated with a longer hospital stay, more severe somatic and social problems and a higher number of discharges to inpatient care settings (3–5). A Medical Psychiatric Unit (MPU) particularly provides more specialized nursing care in a safe setting for these patients in comparison to regular units (5). However, specialized facilities for patients with significant somatic and psychiatric problems are rare in both general and university hospitals, because these units are relatively expensive (5,6). It is known that patients admitted to a MPU experienced less stigmatization and more appropriate treatment (7). The other benefits although in theory and clinical practice clear have been poorly studied.

Routine Outcome Measurement (ROM) plays an important role in quality of care and treatment (8–10). An important outcome measure of the effect of admission in a MPU is functional status (11). This predicts care dependency, increased health care costs, unplanned readmissions and mortality (12–15). Functional status includes Activities of Daily Living (ADL), mobility, social participation and living conditions (12). Little is known about the effect of MPU-care on functional outcomes (6). This is possible related to the fact that most functional outcome measures have-not been validated in a MPU setting up to now. An instrument should be useful in clinical practice, sensible for small short-term improvements in functional status and have a good internal and external validity (16). Literature search showed that the Care Dependency Scale (CDS) and the Health of the Nation Outcome Scales (HoNOS) measure ADL, limitations and psychological and social functioning and they meet the previously mentioned criteria (17–19). These instruments therefore may be suitable for measuring functional status in a MPU. Both instruments have been validated, but never studied in a MPU (14,18).

In the validation of existing measurement instruments in a new setting, construct validity is an important outcome (20,21). Construct validity was defined as 'the degree to which the scores of a measurement instrument are consistent with hypotheses, e.g. with regard to internal relationships, relationships with scores of other instruments, or differences between

relevant groups' (20,22). Convergent construct validity means that scores are related to measures that theoretically should be related to each other (23).

Aim

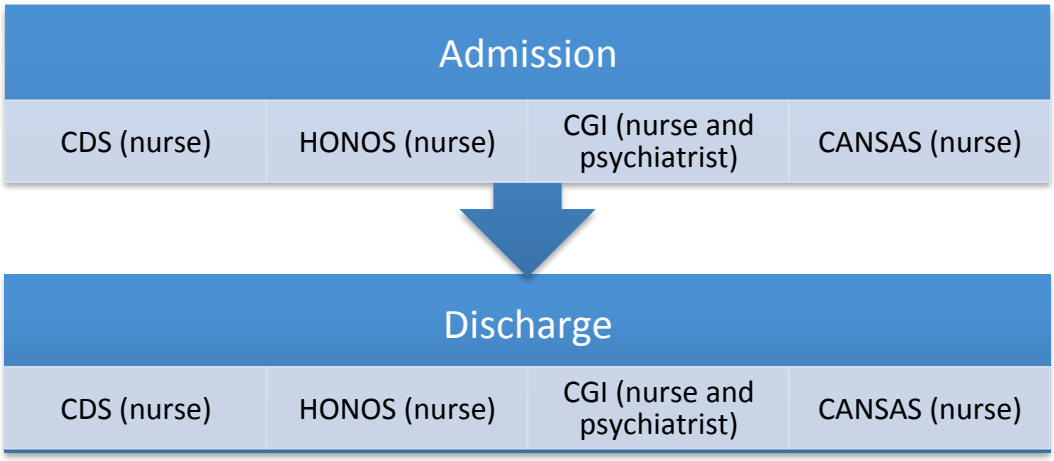
The aim of this study was to examine the validity of the HoNOS and CDS to measure functional outcomes in a MPU. An instrument should be able to measure improvement or deterioration of functional status according to the clinical observations. This will be expressed in construct validity (23). The construct validity of the HoNOS and CDS in measuring improvement was assessed by comparing them to improvement as measured by the Clinical Global Impression (CGI) and Camberwell Assessment of Needs Short Appraisal Schedule (CANSAS). The hypothesis of this study was that the CDS and/or the HoNOS are able to assess improvement or deterioration in functional outcomes of patients after a short admission to the MPU and that they have a moderate to good correlation with clinical observations expressed in the CGI and measured by the CANSAS.

Method

Study design and population

This construct validation study was based on a single-centre observational prospective design, investigating construct validity of the CDS and HoNOS (see *flowchart 1*). The study was carried out in the Medical Psychiatric Unit of a Dutch general hospital. The unit was started to improve the quality of care for patients with severe psychiatric and somatic comorbidity, in order to improve both health status and functional outcomes (5,6). The indications for admission to a MPU are: 'obstruction of somatic diagnosis and/or treatment' or 'disruption of a somatic ward' due to psychiatric and/or behavioural problems (5,6). The study population consisted of patients admitted to the Medical Psychiatric Unit from January 2015 to April 2015. Patients who were admitted for less than 24 hours were excluded, because in these cases only one measurement would be possible.

Flowchart 1 Study design



Data collection

In this study the CDS and HoNOS were assessed. The CDS has previously been validated in nursing homes and geriatric hospital settings, and was used in a geriatric psychiatry population (14,17,24). The HoNOS has previously been validated in psychiatric populations, in general hospital settings and consultation liaison psychiatry (18,25,26). Precisely MPU patients have combined problems and limitations due to somatic and psychiatric illness (1,6). After intensive reviewing the instruments could be concluded that they both partly measure different domains. Therefore a design with two different instruments was chosen.

The CDS is a 16-items instrument, with per item a 5-points Likert-scale (14). A higher score indicates less care dependency. The scores are summed to a sum score. The CDS has a high internal consistency: a Cronbachs alpha value of .97, a Rho coefficient of .97 and a H-coefficient of 0.70 (27). The Cohens kappa for inter-rater reliability is moderate: .50 (range between items: .39-.60) and good for test-retest reliability .66 (range between items: .53-.75) (27). A Dutch validation study showed that the CDS has moderate diagnostic accuracy, with an area under the receiver operating characteristics of .81 (28). A study in a German hospital found a correlation between the CDS score and a nursing determining of care dependency (17).

The HoNOS is a 12-items instrument, with per item a 5-points scale. A lower score indicates fewer problems. The scores are summed to a sum score. In a Dutch validation study in a psychiatric hospital, the HoNOS showed an acceptable Cronbachs alpha value

of .78 (19). The intraclass-correlation coefficient for inter-rater reliability is good: .92 (range between items: .42-.95) (19). Earlier studies found good correlations between de HoNOS and clinical expectations and other scales (19,29).

For the determination of the construct validity is, in principle, compared to a golden standard (23). The golden standard for clinical observations including the assessment of severity and improvement of illness is the Clinical Global Impression (CGI) scale. Because there is now no instrument used in the MPU is also chosen for the widely used Camberwell Assessment of Needs Short Appraisal Schedule (CANSAS) for a clinical assessment of needs and unmet needs (30,23,31–33).

The CGI consists of two questions (7-points scale): the first question is about the severity of illness (assessed at admission). The second one about improvement (assessed at discharge) (34,35). Kadouri et al. found good inter-rater reliability correlations of .64 to .94 (36). Berk et al. found good a significant correlation of .71 between severity and improvement scores (33).

The CANSAS is a 22 items scale, measuring (unmet) care needs on ADL and psychiatric and social functioning (37). A higher score indicates more care needs. The scores are summed to a sum score. The CANSAS is frequently used in psychiatric care settings (37,38) and nursing homes (39,40), where patients often have limitations in several areas. The CANSAS showed a high level of agreement between raters: Rho coefficient .98 (37). Test-retest reliability showed a moderate correlation: rho coefficient .71 (37).

During the inclusion period the responsible registered nurse of the MPU assessed the CDS, HoNOS, CANSAS and CGI, within 12 hours after admission and at discharge. The assessment was based on information gathered from the nursing anamnesis and nursing discharge notes. All nurses were trained in using the questionnaires prior to the study. Because of the different domains and perspectives of nurses and physicians, the resident in psychiatry of the MPU assessed the CGI at admission and discharged too (41). The prospective design, with measurements at admission and discharge, enabled assessment of functional status before and after admission (23,42). Due to this, the change in scores of the CDS and HoNOS could be compared to the change of the CGI and CANSAS. The change showed if there was improvement or deterioration.

Statistical analyses

When validating a questionnaire, it is important that the sample used is representative of the population in which the instrument is to be used. There are no general criteria for the required sample size in a validation study, which is typically based on the assumption that the number of respondents should exceed the number of items in the questionnaire by at least a factor of three (20,23). The sample size was based on the instrument with the largest number of items. The HoNOS has 15 items; the CDS 16 items. So, based on 16 items of the CDS, at least 48 patients were required. Due to the admission and discharge measurement, 48 patients yield 96 measurement points.

Demographic characteristics were described with mean and standard deviation or median and range for continuous variables and with frequencies and percentages for categorical variables. Convergent construct validation assesses whether the underlying construct of the CDS and HoNOS resembles the construct of the other instruments (CANSAS and CGI), within the use of Spearman's correlation coefficient (20,23). A Spearman's correlation was chosen because of the ordinal CGI scale. Correlations were studied in the clinical change (difference between admission and discharge) scores. A correlation <.25 can be interpreted as poor, .25-.50 as fair, .50-.75 as moderate to good, and >.75 as good to excellent (43). Finally the significance of the difference between the correlations was calculated by Zou's confidence interval for the comparisons between the correlations (44). Hereby was only tested and assured the strength of the correlation, not the direction. For this, all correlations were formulated as positive values. The statistical analyses were performed using SPSS version 22 for Windows. Cases with missing data were excluded. Additionally correlations in admission and discharge scores were calculated to explorer any deviations or outliers.

The current study was conducted according to the principles of the Declaration of Helsinki (version October 2013) (45). The study is not covered by the WMO (Medical Research Involving Human Subjects Act (in Dutch: Wet Medisch-Wetenschappenlijk onderzoek met Mensen)), because this study investigated measurement instruments in a observational design. However, the Medical-Ethical Committee of the Onze Lieve Vrouwe Gasthuis reviewed the research protocol before start of the study.

Results

Between January 5th and April 28th 2015, 62 patients were admitted to the MPU. 50 patients were included and 12 were excluded: 10 patients because of an admission <24 hours and 2 patients (4%) because of a missing admission measurement. There was no missing data.

Demographic statistics

The study population is described in detail in *table 1*. The mean±SD age of the 50 patients was 61.42±16.38, and 68% were male. The median(range) length of stay at the MPU was 5(1-36) days. A majority of the patients was admitted for the internal medicine (60%, N=30). The primary somatic ICD-10 diagnosis was in a third (32%, N=16) '*injury, poisoning and certain other consequences of external causes*', followed by '*certain infectious and parasitic diseases'* (18%, N=9). The main psychiatric DSM-IV diagnoses were 'schizophrenia and other psychotic disorders (26%, N=13), '*delirium, dementia and amnestic and other cognitive disorders'* (26%, N=13) and '*mood disorders'* (20%, N=10). 10 MPU nurses assessed the measures. They have a mean±SD work experience of 7.70±7.04 years, and 90% (n=9) have a bachelor's degree.

Outcomes

The main objective was the ability to detect change in functional status between admission and discharge. The Spearman correlations on difference (discharge-admission) scores are shown in *table 2*. The mean±SD difference score of the CDS was 8.24±14.77, and of the HoNOS -4.64±6.49. The correlation between the CDS and CANSAS was moderate negative in difference scores (-.629). The correlation between the CDS and CGI was moderate to good in difference scores (residents' CGI: -.668, nurses' CGI: -.599). The HoNOS showed a good positive correlation with the CANSAS in difference scores (.704). Fair correlations were found between HoNOS and CGI in difference scores (residents' CGI: .419, nurses' CGI: .439).

Also at admission and discharge moderate to good correlations were found between the CDS/HoNOS and CGI/CANSAS. The correlation between the CDS and HoNOS was moderate at admission (-.584) and difference scores (-.629) and good at discharge (-.783).

A Zou's confidence interval was calculated to compare the correlations. The several comparisons of the correlations of difference scores showed no significant difference between (nurses' CGI, CDS) and (nurses' CGI, HoNOS): 95% confidence interval (CI): -.0437; .3798, and between (CANSAS, CDS) and (CANSAS, HoNOS): 95% CI: -.2629; .0983. The 95% CI for the difference between (residents' CGI, CDS) and (residents' CGI, HoNOS) was .0537; .4720. This confidence interval does not include 0, so this difference is significant. This indicates that the correlations between the CDS, HoNOS, CANSAS and nurses' CGI do not have a significant difference. The CDS correlates significantly stronger with the residents' CGI than the HoNOS.

The scatterplots (see *Figure 1*) show some contradictory cases: three patients showed deterioration on the HoNOS, whereas the CGI showed improvement. Medical record analysis of these patients indicates that these patients were very ill and impaired at admission.

Discussion

To our knowledge this is the first study to focus on outcome measurement of functional status in a MPU. The CDS and HoNOS have been validated before, but in different settings. This study shows that the CDS and HoNOS both have a moderate to good correlation with the CGI and CANSAS in difference scores, as previously hypothesized. The CDS and HoNOS show to be consistent with clinical observations and indicate moderate to good construct validity. This study shows that the CDS and HoNOS are capable to assess improvement or deterioration in functional outcomes of patients after a short admission to the MPU. The correlations did not have a significant difference, with one exception: the CDS correlates significantly stronger with the residents' CGI than the HoNOS.

Although this is the first study in a MPU, a previous study in mental health service found similar correlations between clinician rated HoNOS and CANSAS scores (30). A study in Liverpool general psychiatric services found that the CGI scores were broadly consistent with HoNOS scores (46). The CDS showed validity and suitability in a German study in a elderly patients in a general hospital (17).

Further exploration of the three outliers indicates that these patients were very ill and impaired at admission. Because of this, the psychiatric symptoms were possibly masked and limited present at examination. At discharge their functional status was improved, whereby the psychiatric symptoms increased. This could explain why some HoNOS scores could be higher even though the functional status improved. The CDS en HoNOS are fairly to moderate correlated, which indicates that they do not fully measure the same constructs but complement each other. This may be explained by their different origins. Based on our results it looks like both the CDS and HoNOS are necessary for functional status outcome measurement in MPU patients. Together they give a good indication of functioning.

Strength of this study is that it gives the first insights in valid outcome measures of functional status in a MPU population. The sample is representative for the MPU were the study took place. The single centre design with a relative small sample size does not make it possible to generalize to all the MPUs. It was not possible to distinguish at length of stay or diagnoses. Possibly, several diagnoses ask for different outcome measures. This study used disease-transcending tools assessing the overall functional status. The used design, where the same nurse did not always do admission and discharge measurement, increases the generalizability to clinical practice. The inter-rater unreliability that occurs, may affect the clinimetric results.

Despite ROM is on the rise, and proven effectiveness, there are still many barriers to use (8,11,47–49). One of these barriers is the heterogeneity of the MPU population since that is a complicating factor in determining the right measures (49). At both admission and discharge, scores on functional status are influenced by somatic and psychiatric problems. Both can influence each other (50,51). A European survey on routine outcome measurements confirmed that there is a wide variety of measures (52). A study on outcome measurement for older persons with multiple chronic conditions showed that symptom burden, depression, anxiety and daily activities are good short follow-on measures (54). Up today there is no single instrument available for measurement of limitations in functioning in MPU patients.

The current study shows that the CDS and HoNOS have moderate to good correlations with reference tests. It can be concluded that the CDS and HoNOS may be suitable

instruments to measure changes in functional status. Because the CDS and HoNOS correlate moderately, it can be concluded that they complement each other. The availability of a single measure would be preferable to enhance clinical utility (48). Future research should focus on the purpose to come to one useful instrument.

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Table 1 demographic characteristic

	Included patients (n=50)
Age *mean (SD) years*	61.42 (16.38)
Male *N (%)*	34 (68)
Length of stay at MPU *median (range) days*	5 (1-37)
Length of hospital stay before MPU admission *median (range) days*	.0 (0-15)
Referral *N (%)*	
– Emergency Department	22 (44)
– Ward	17 (34)
– Home	5 (10)
– Intensive Care Unit	3 (6)
– Other hospital	3 (6)
ICU admission during hospitalization *N (%)*	5 (10)
Planned admission *N (%)*	7 (14)
Somatic specialism *N (%)*	
– Internal medicine	30 (60)
– Surgery	5 (10)
– Neurology	4 (8)
– Orthopaedics	3 (6)
– Pulmonary medicine	3 (6)
– Other	5 (10)

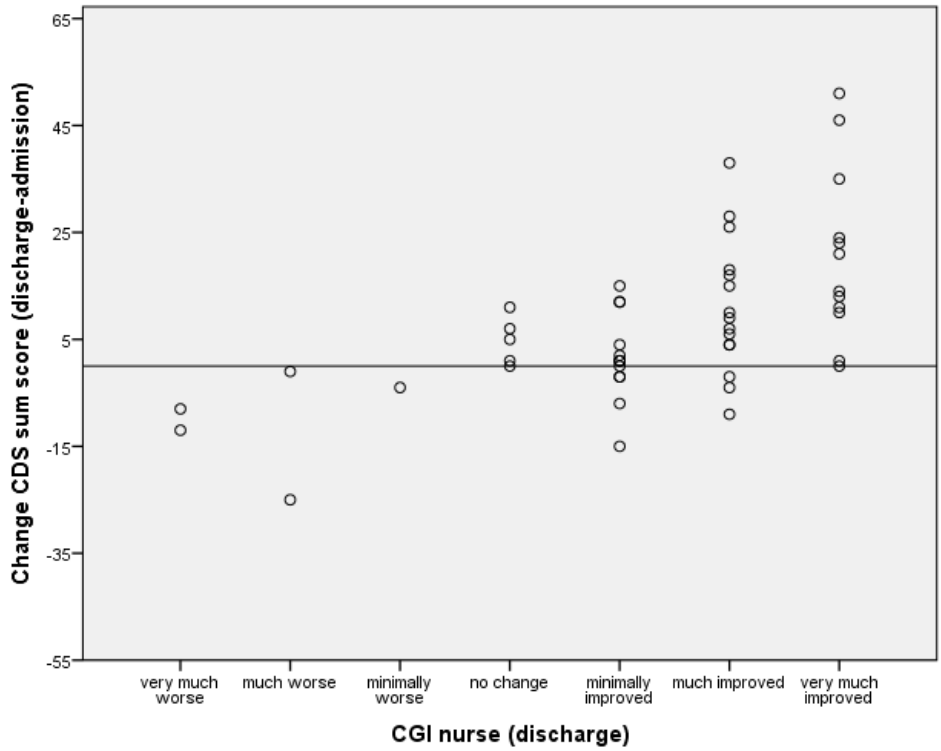
ICU: intensive care unit; MPU: medical psychiatric unit; SD: standard deviation

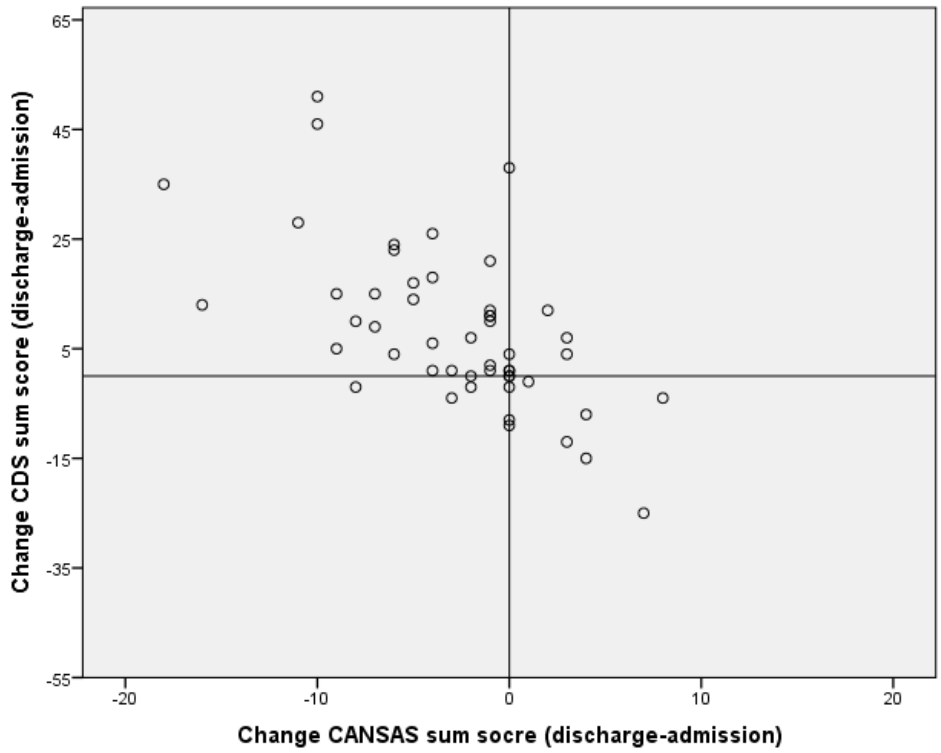
Table 2 Spearman correlation difference scores

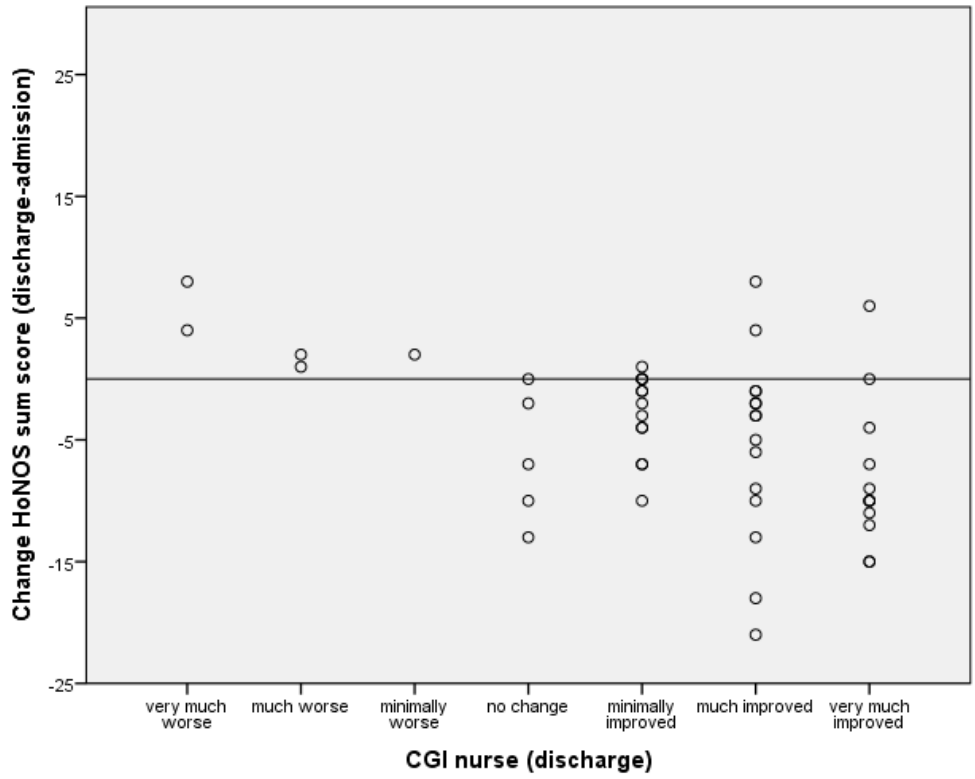
	CDS sum score change	HoNOS sum score change	CANSAS sum score change	CGI discharge (nurse)	CGI discharge (resident)
CDS sum score change	1				
HoNOS sum score change	-.618**	1			
CANSAS sum score change	-.629**	.704**	1		
CGI discharge (nurse)	-.599**	.439**	.496**	1	
CGI discharge (resident)	-.668**	.419**	.550**	.804**	1

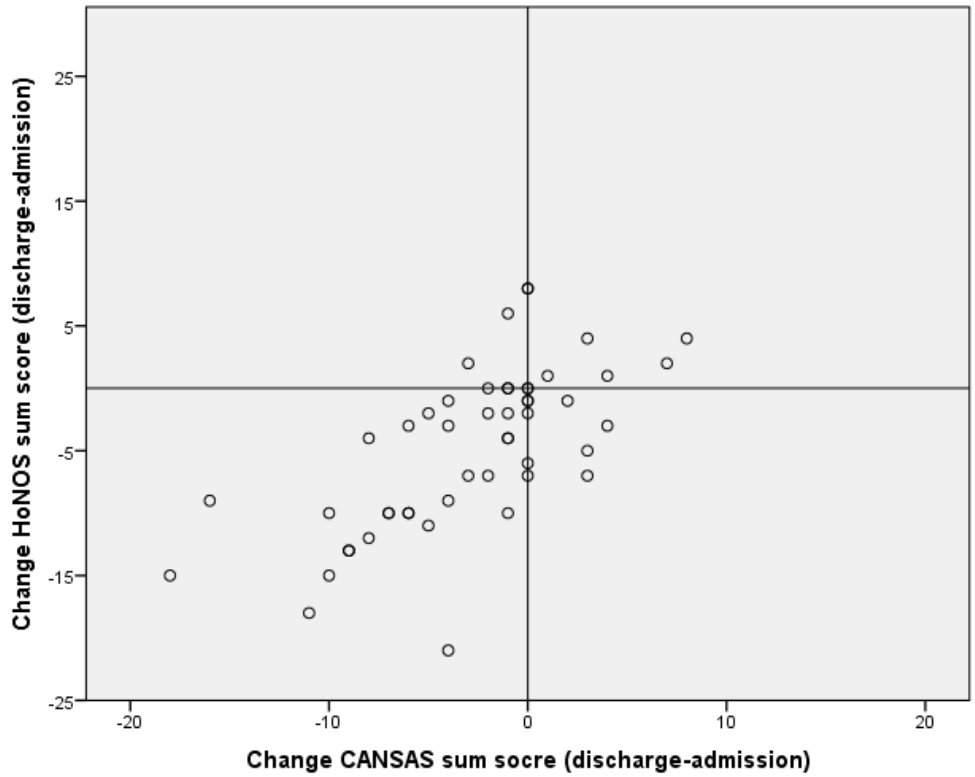
CANSAS: Camberwell assessment of needs short appraisal schedule; CDS: care dependency scale; CGI: clinical global impression; HoNOS: health of the nation outcome scales.
** Correlation is significant at the 0.01 level (2-tailed)

Figure 1 Scatterplots






Change HoNOS sum score (discharge-admission)
25
15
5
-5
-15
-25
very much worse
much worse
minimally worse
no change
minimally improved
much improved
very much improved
CGI nurse (discharge)


Change HoNOS sum score (discharge-admission)
25
15
5
-5
-15
-25
-20
-10
0
10
20
Change CANSAS sum socre (discharge-admission)