How to analyse HoNOS data:

The purpose of this document is to understand how to effectively analyse and interpret the HoNOS data. The first section of these slides illustrates how to analyse HoNOS **profiles** and the second section illustrates how to analyse HoNOS using **categorical change**.

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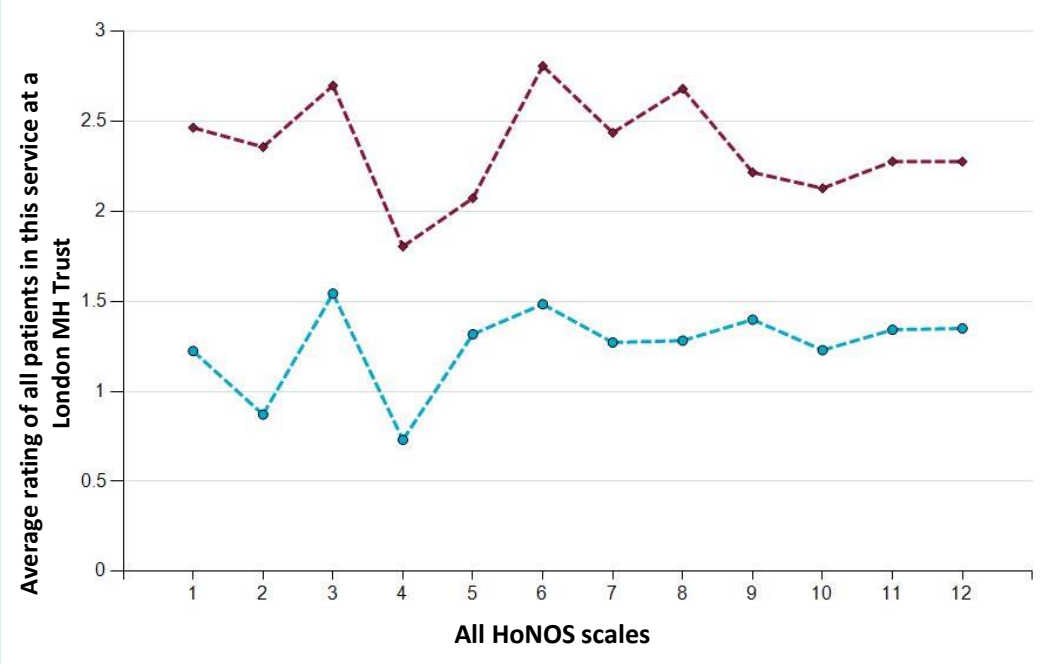
Approaches to analysing HoNOS

The following slides show the aggregated average HoNOS scores of all the people receiving a particular service in a London Mental Health Trust. The aggregated profile gives an overall view of progress during their treatment within a particular service or team. Aggregated HoNOS scores can be used for a particular service type for example, community based services, inpatient units, Home Treatment Teams, Early Intervention in Psychosis teams etc.

The profile can also be viewed for an individual, to provide a view of that person's progress during treatment.



The red line is when the person first enters the service

The blue line is when the person is discharged from the service.

N.B In most cases the first (red) and last (blue) score will include a HoNOS near the start (assessment) and near the end (discharge) however this may not always be the case.

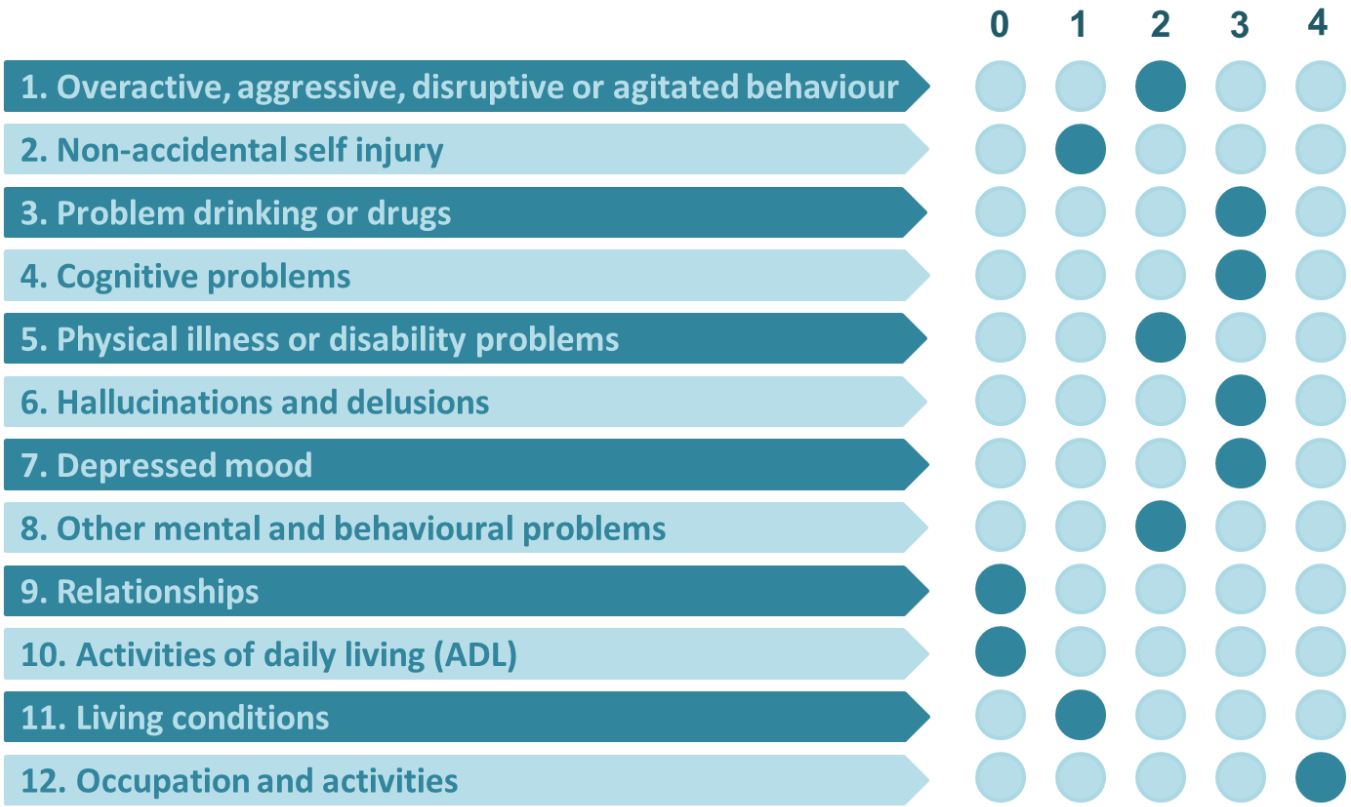
If the blue line is lower than the red line, it means that there has been an improvement for that scale (i.e. there has been progress in the person's scores in that area).

In the next slides we will look at HoNOS profiles for different mental health services to better understand how to analyse the data effectively.

HoNOS scales

Using HoNOS as a clinician reported outcome measure allows clinicians to build a picture of service users' needs across a range of areas including depressed mood and other mental health difficulties, physical health, relationships and housing.

The 12 scales can been seen below, with example scorings:

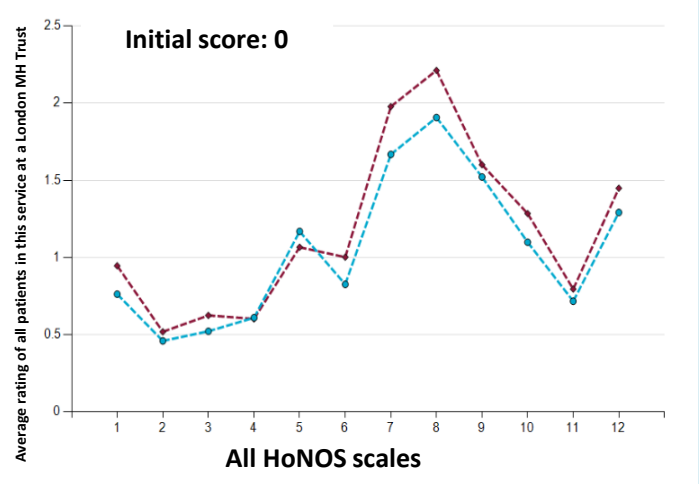


Severity description	Level
no problem	0
minor problem requiring no action	1
mild problem but definitely present	2
moderately severe problem	3
severe to very severe problem	4

Setting a minimum score

Services which provide for a varied caseload will have a large variation in HoNOS scores. Some people will have no problem (score of 0) or a minor problem requiring no action (scoring 1) for some of the HoNOS scales. Where the initial score is 0 or 1, the second score is also likely to be 0 or 1. When looking at the average team score for each scale, if results with an initial score of 0 or 1 are included, they can dilute the average change for the team and can mask the improvement made by people who score highly in a given scale.

One way around this is to only include in the analysis the HoNOS scales which were scored 2 or above in the initial rating.

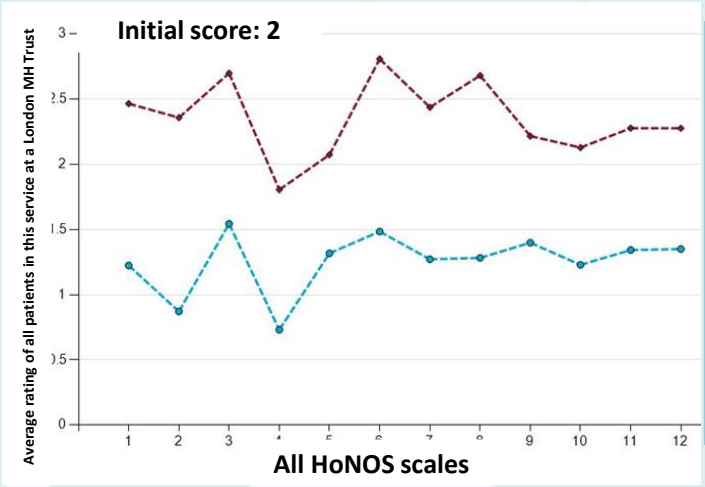


This chart shows the profiles with all patient scores included – i.e. including any **initial scores of 0 or 1** when calculating the team average. This can have the effect of masking the improvements made by people who do score highly in a given scale. You can see in this chart there is little difference between initial and final scores.

People with scores of 0 or 1 require no active medical or formal psychological treatment for those areas/scales, so will not receive an intervention from specialist (secondary) mental health services

The red line is when the person first enters the service

The blue line is when the person is discharged from the service.



A **minimum initial score of 2** has been chosen (mild problem but definitely present) to set the minimum threshold for analysing aggregated HoNOS profiles for each service. This score reflects the severity of symptoms or difficulties that would normally be treated in a Mental Health service.

In this graph only the scales where 2 or above has been scored have been included in this data. This now demonstrates significant difference.

Trusts should agree what they will set the minimum initial score as

Effect size

It can be hard to judge the size of the improvement just by looking at the graphs.

Using 'effect size statistics' such a Cohen's *d* can aid interpretation because it calculates the significance of the change:

$$\text{Cohen's } d: \quad \frac{\text{Mean difference}}{\text{Standard deviation}} \quad \text{or} \quad \frac{\text{Mean}_2 - \text{Mean}_1}{\text{Pooled standard deviation}}$$

Effect Size (Cohen's *d*)	Interpretation	
-0.8 or lower	Improvement of critical clinical importance	Clinically significant improvement
-0.5 to -0.8	Improvement of moderate clinical significance	
-0.2 to -0.5	Small or clinically negligible improvement	
-0.2 to 0.2	No change	
0.2 to 0.5	Small or clinically negligible deterioration	
0.5 to 0.8	Deterioration of moderate clinical significance	Clinically significant deterioration
0.8 or higher	Deterioration of critical clinical importance	

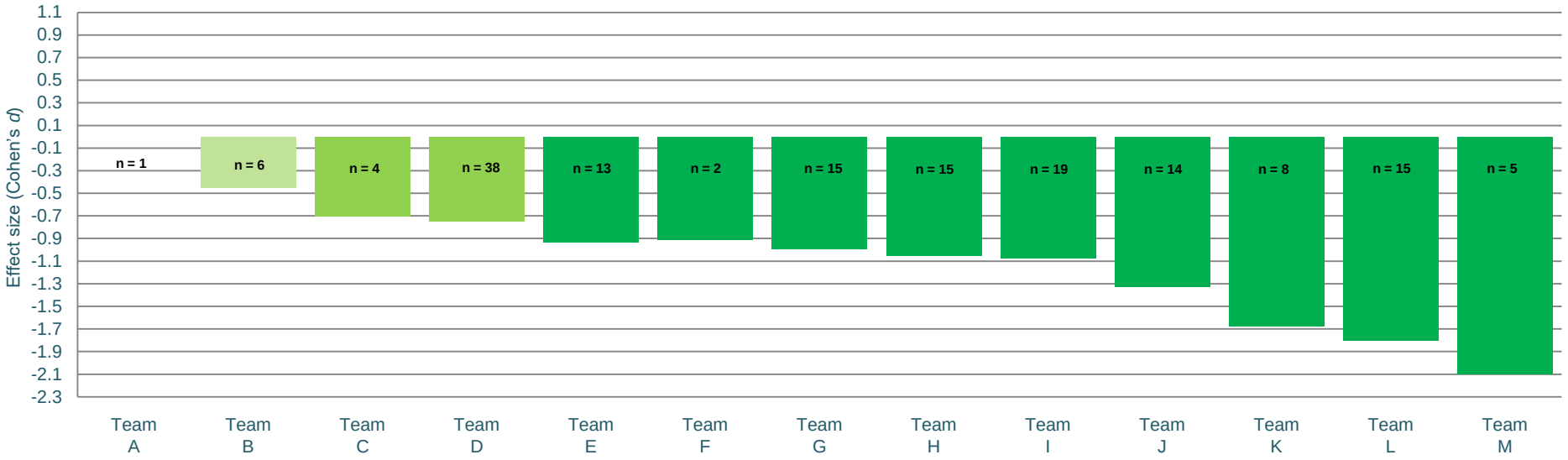
The more extreme the effect size (positive or negative), the more statistically significant we would determine the change to be.

Analysing an effect size

Trusts may want to look in more detail at particular scale(s), patient characteristics or diagnoses, to explore any unwarranted variation in the impact of treatment on people using a service.

The chart below provides an example of how effect size for scale 2 (non-accidental self-injury) can be looked at across different teams within a community mental health service.

Effect size within Adult CMHT for scale 2: Non-accidental self-injury (minimum initial score = 2)



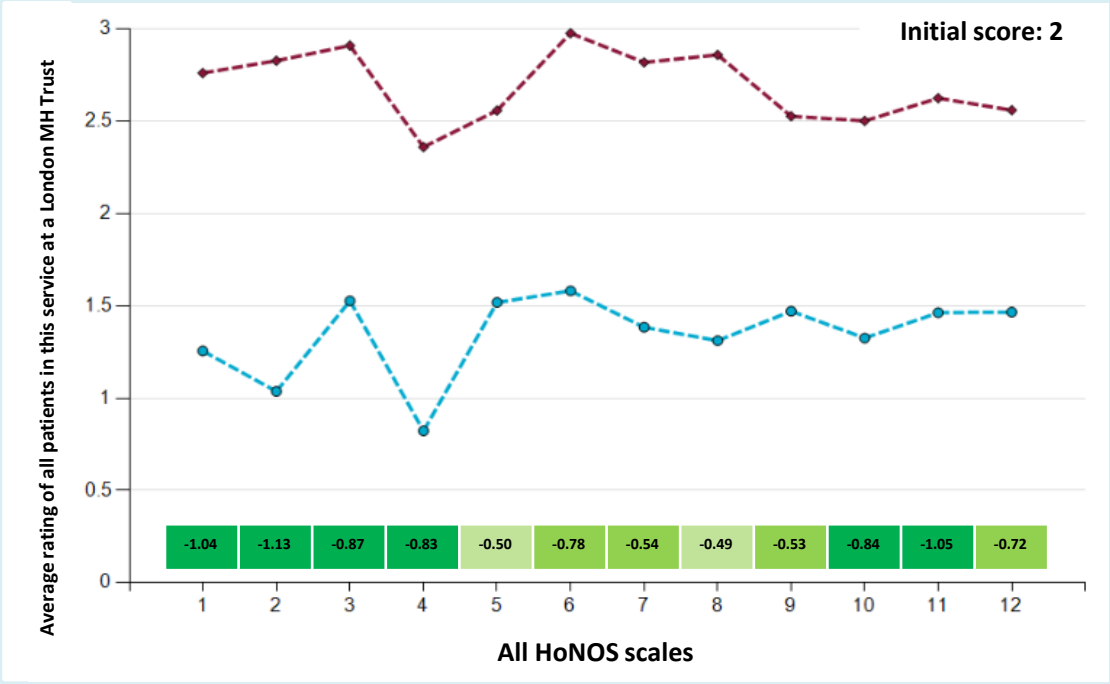
Here, you can see the variation across teams. These differences can be accounted for by various factors such as:

- number of paired measures ('**n**')
- data quality
- variation in the recording practices of different teams
- staffing levels
- caseload of various teams
- complexity of people seen by the service/different teams
- clinical practices and clinical pathways

The above analysis provides a starting point for discussion and should enable the clinician to ask questions about the differing outcomes of the services notwithstanding the data quality. The example provided here is looking at a particular HoNOS scale, however the grouping could be done at any level including protected characteristics (ethnicity, gender etc.) or diagnosis, and could in future be used to complement discussions about equity of access to care.

Adult Acute

This data shows the improvement or progress people have made whilst in an inpatient unit (using aggregated profiles).



The red line is when the person first enters the service
The blue line is when the person is discharged from the service
Effect size (Cohen's *d*)

N.B the above graph only includes ratings with an initial minimum score of 2.

Looking at the HoNOS profiles and effect size for adult acute inpatients, the most significant improvements are in agitated behaviour (1), self-harm (2) and living conditions (11).

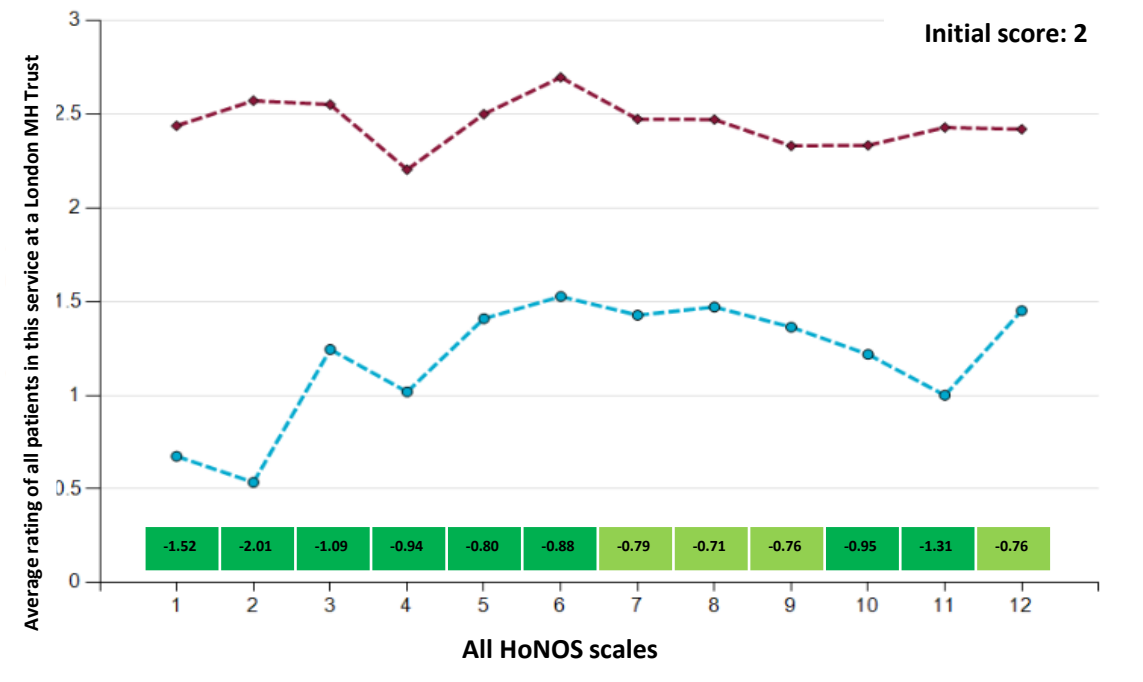
This would be expected as people who are admitted to acute wards are more likely to be agitated or distressed, and/or have recently experienced an incident or thoughts of self-harm. It would be expected that treatment on the ward would help reduce scores for both of these.

N.B Treatment from an inpatient unit would not necessarily directly improve accommodation but in order to support discharge planning there would be need to be stable accommodation and so accommodation status (11) should improve during an admission.

Early Intervention

This data shows the improvement or progress made whilst using in Early Intervention in Psychosis (EIP) services (using aggregated profiles).

As seen on this chart, the change from initial scores (red line) and discharge scores (blue line) as measured by effect size, are similar to those seen in adult acute. The initial scores are slightly lower than for adult acute across all HoNOS scales.



The red line is when the person first enters the service

The blue line is when the person is discharged from the service

Effect size (Cohen's *d*)

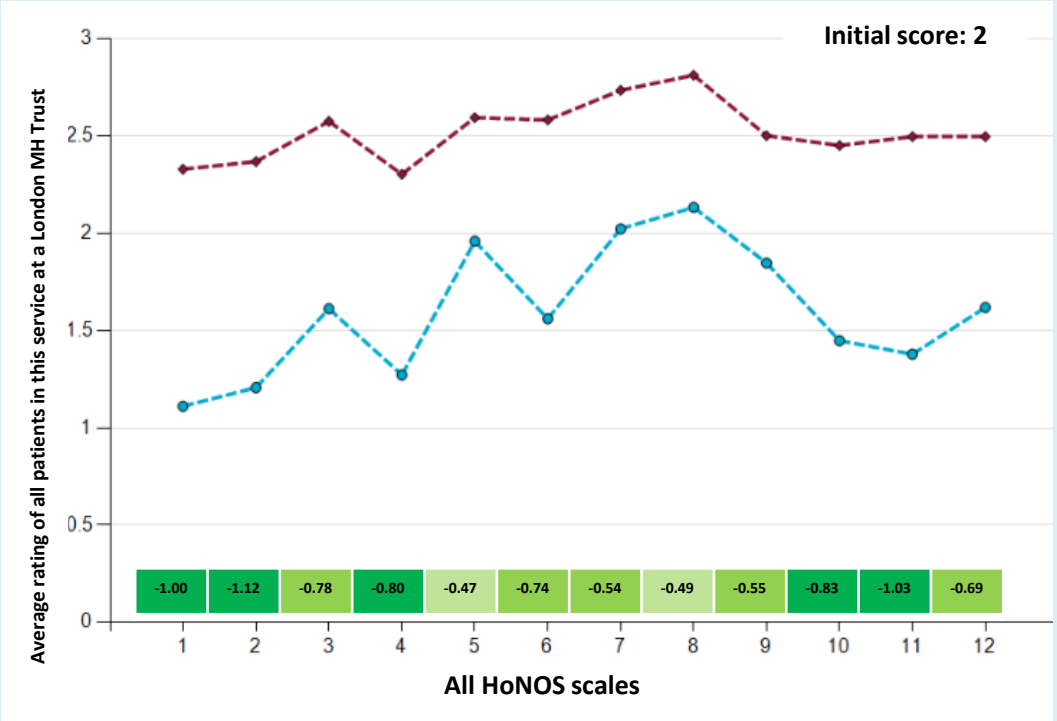
N.B the above graph only includes ratings with an initial minimum score of 2.

Looking at the HoNOS profiles and effect size for EIP, there are clinically significant improvements across every HoNOS scale.

The most significant improvements are in agitated behaviour (1), self-harm (2), problem drinking and drug use (3) and living conditions (11). On this chart there is also improvement in psychotic symptoms (6) but perhaps surprisingly this is not the largest improvement.

Adult CMHT

This data shows the improvement or progress people have made whilst in a community mental health team (CMHT) using aggregated service profiles.



The red line is when the person first enters the service

The blue line is when the person is discharged from the service

Effect size (Cohen's *d*)

N.B the above graph only includes ratings with an initial minimum score of 2.

One would expect that the initial scores (when a person enters the service) would generally be lower than for adult acute services.

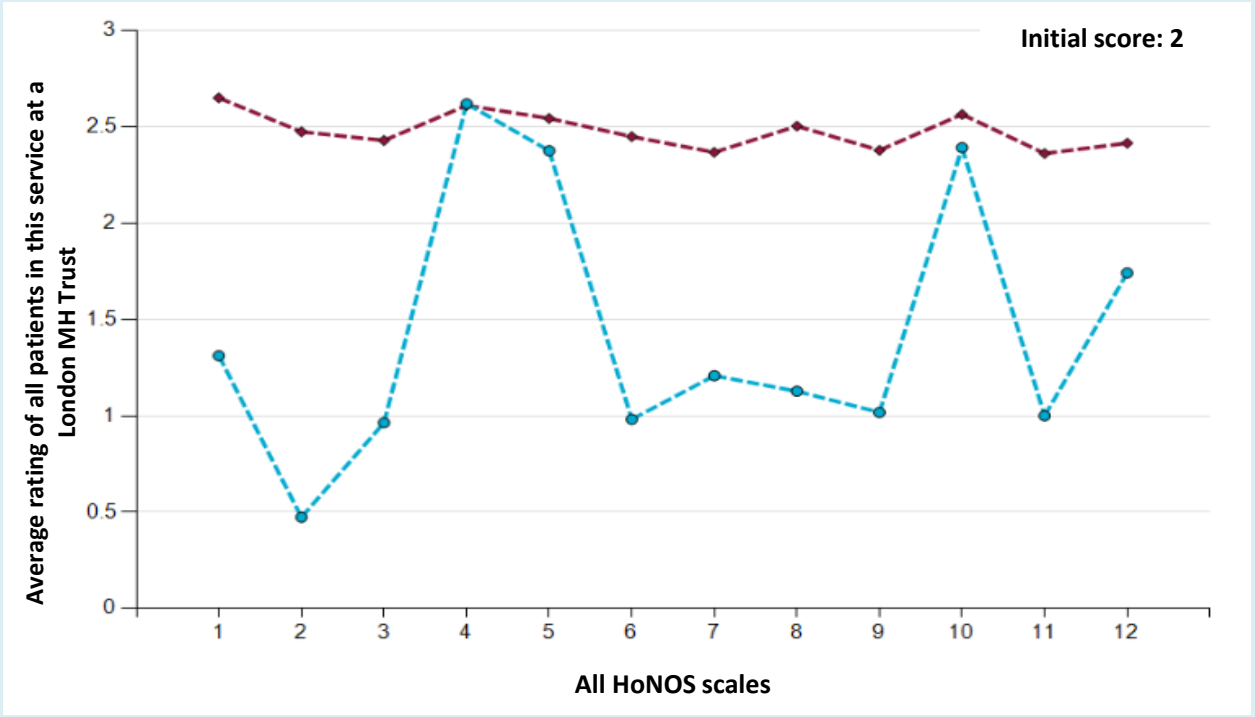
The case-mix of CMHT teams is likely to be broad, with a wide range of needs. This graph provides an aggregated view of a London Trust CMHT service, covering all diagnoses. Trusts may wish to further analyse their CMHT data cut by diagnostic code.

Looking at the HoNOS profiles and effect size for people using CMHT there are clinically significant improvements across many HoNOS scales.

There are clinically significant improvements in some areas such as agitated behaviour (1), self-harm (2), cognitive problems (4), ADLs (10) and living conditions (11).

Older Adult

This data shows the improvement or progress people have made whilst in an Older Adults service (aggregated scores), which is a service for treating mood and psychotic disorders as well as cognitive disorders.



The red line is when the person first enters the service
The blue line is the last HoNOS completed within the last 12 months.

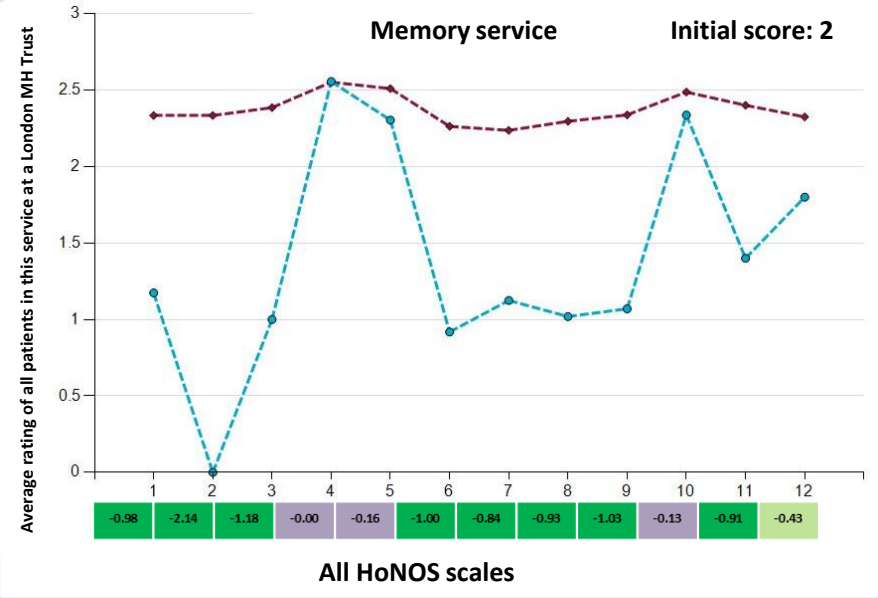
N.B the above graph only includes ratings with an initial minimum score of 2.

Looking at the HoNOS profiles and effect size for Older Adults, there are clear improvements on some symptoms such as self-harm (2), hallucinations and delusions (6), relationships (9) and living conditions (11).

There may be no (or limited) improvement in scales such as cognitive problems (4), physical health problems (5) and activities of daily living (10). This may be due to the nature and life course of conditions in older people. For example, Dementia is a progressive illness where some of the symptoms may not improve or may even deteriorate following the initial assessment and treatment.

Splitting the data

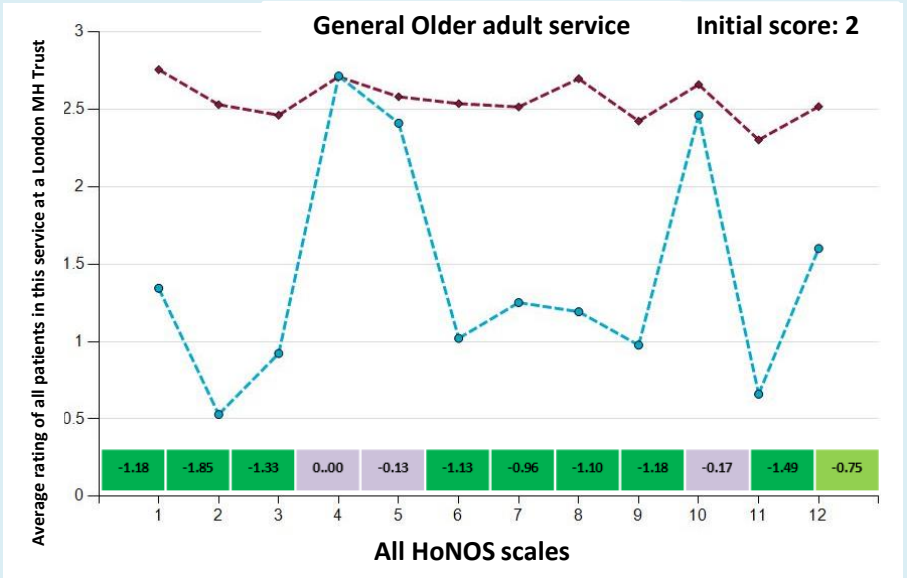
The case-mix of older adult services is likely to be broad, as it treats both mood and psychotic disorders as well as cognitive disorders. Trusts may wish to split their data into 'memory service', which would primarily treat cognitive disorders, and 'general older adult service' to see if there are different profiles and outcomes. We have done this here, as an example.



On review, the profiles for both graphs are very similar, however this may not be the case for Older Adult services within other Trusts. Trusts can carry out analysis and decide whether it is worthwhile to split up the data for individual services, for example by team type or diagnosis.

- The red line is when the person first enters the service
- The blue line is when the person is discharged from the service
- Effect size (Cohen's *d*)

N.B the graphs only include ratings with an initial minimum score of 2.

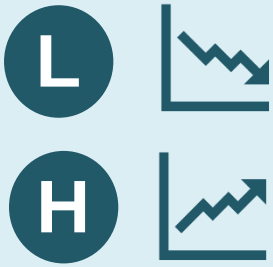


N.B this data includes Older Adult CMHTs and the Older Adult challenging needs service which may also include people with Dementia.

Categorical Change

The Categorical Change method is another way of looking at changes in HoNOS score.

It uses a scoring method which groups the answers scored for each question into two categories:



Low (L) severity – scores of 0-2

High (H) severity – scores of 3-4

Severity description	Level	
no problem	0	**Low (L) severity**
minor problem requiring no action	1	
mild problem but definitely present	2	
moderately severe problem	3	**High (H) severity**
severe to very severe problem	4	

Categorical Change

It gives a visual way of showing how many people have **improved** in a particular scale ('high to low'), have **deteriorated** ('low to high') or have remained **unchanged** ('high to high' or 'low to low') on each scale, comparing first and last ratings.

- High to High (HH) – Unchanged
- High to Low (HL) – Improvement
- Low to High (LH) – Deterioration
- Low to Low (LL) – Unchanged

This example shows the string of HoNOS scores collected at two points for a person. Each question is individually assessed for improvement.

HoNOS on admission (entry)

HoNOS scale	1	2	3	4	5	6	7	8	9	10	11	12
Score	3	1	1	3	3	1	2	1	4	3	3	2
Cat change	H	L	L	H	H	L	L	L	H	H	H	L

HoNOS on discharge (exit)

HoNOS scale	1	2	3	4	5	6	7	8	9	10	11	12
Score	1	0	1	3	1	0	1	1	2	1	1	3
Cat change	L	L	L	H	L	L	L	L	L	L	L	H

HoNOS scale

1	2	3	4	5	6	7	8	9	10	11	12
HL	LL	LL	HH	HL	LL	LL	LL	HL	HL	HL	LH

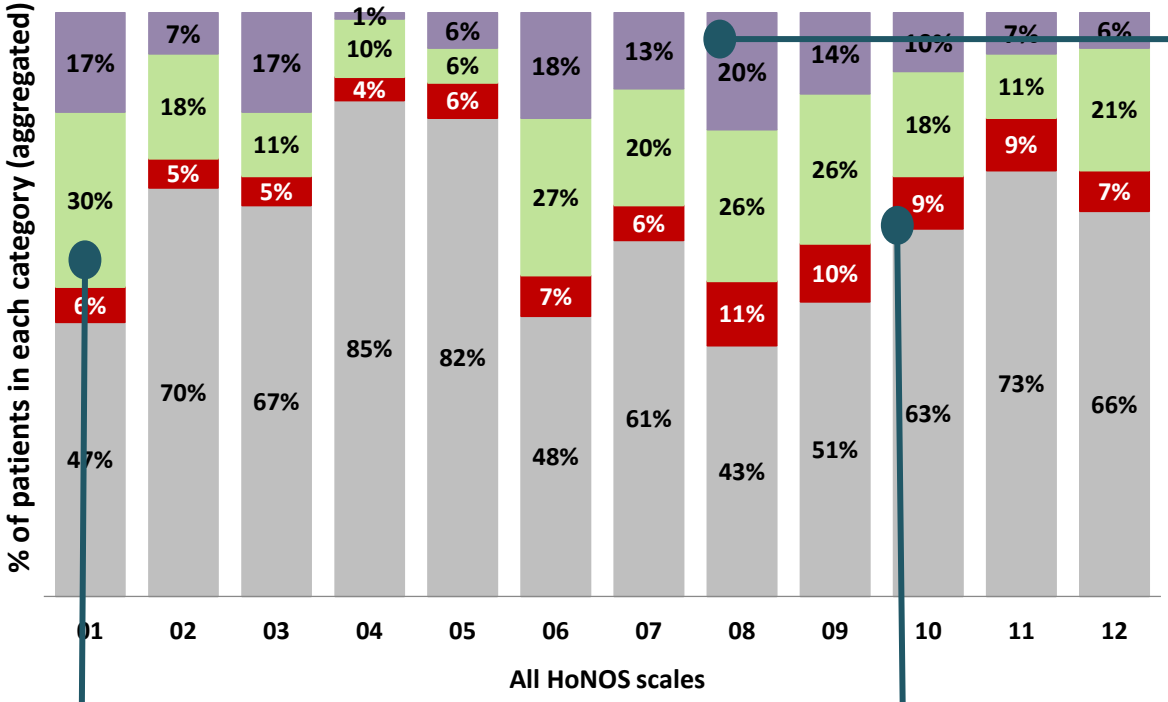
Example: The scores for Scale 1 (Overactive, aggressive, disruptive or agitated behaviour) shows an 'entry' score of High and an 'exit' score of Low. When put together there has been an improvement in that area for this person (HL).

How the data is presented

Categorical change has been developed based on feedback from staff looking at HoNOS data for the first time. It can be useful as it shows change in an easy to visualise format, and shows the dynamic nature of change.

The data can be visualised in a chart, as shown below:

Categorical change model by questions: Inpatient admission to inpatient discharge (aggregated scores)



HH – This is one to be curious about.
If this is something which was a problem at the outset, could we have done more to help the person with it?

- High to High (HH) – Unchanged
- High to Low (HL) – Improvement
- Low to High (LH) – Deterioration
- Low to Low (LL) – Unchanged

HL – This is one to be positive about.
This shows people improving.

LH – This is one to be concerned about.
Whilst this can sometimes be the case, a large number of people moving from low to high scores may need attention

Setting a minimum score

Having a minimum cut off (i.e. removing LL scores) in a categorical change chart can help with looking at average HoNOS change in teams.

This can make it easier to focus on areas where meaningful change is taking place. The example below shows the same chart as before with the LL scores removed: