A way forward: Process mapping and the delivery of mental health services

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ABSTRACT

Introduction: This paper demonstrates the practical application of process mapping principles as a model for evaluating NHS improvement. The NHS improvement in question was the merger of three crisis resolution teams within an NHS trust in 2012. The aims were to improve overall operational efficiency and enhance multidisciplinary working to meet operational targets. This paper examined changes following the merger to capture the effects of service improvement and the reality of the patient journey. **Methods:** A pooled cross-sectional approach, using six years of aggregated hospital data, was taken. To achieve operational efficiency, a process map of referrals, readmissions, length of stay and waiting times for crisis resolution team assessments was examined. Prevalence of clinical referral rates and disease classification before and after the merger were compared. **Conclusion:** Between 1 April 2009 and 30 March 2015, length of stay and readmissions for patients to crisis resolution team rates reduced. Operational sustainability and capacity was enhanced through the redistribution of clinical human resources. Multidisciplinary skill mix (e.g. through improved team composition) also improved.

Key Words: Process map • Merger • NHS improvement • Crisis resolution • Home treatment

This research study used process mapping to evaluate the productivity and efficiency of services before and after a merger of clinical mental health teams. It is a pragmatic change improvement technique used in the NHS and, increasingly, worldwide to identify inefficiencies in care and areas for improvement with a clear goal in mind (McLaughlin et al, 2014; Pluto and Hirshorn, 2003).

It is generally well known that leading and managing change and implementing research findings in healthcare is complex (Phillips and Simmonds, 2013), and process mapping aids the understanding of organisational cultures by modelling the relationships between activities, people and resources (Taylor and Randal 2007). Making fundamental system changes without truly understanding how the processes within it work or relying on assumptions can be costly and create conditions that make it difficult for staff to work effectively.

Process mapping adds clarity by separating the management of a single condition into a series of steps, which may include activities, interventions or interactions with staff. The sequence of these steps is seen as the patient pathway or process of
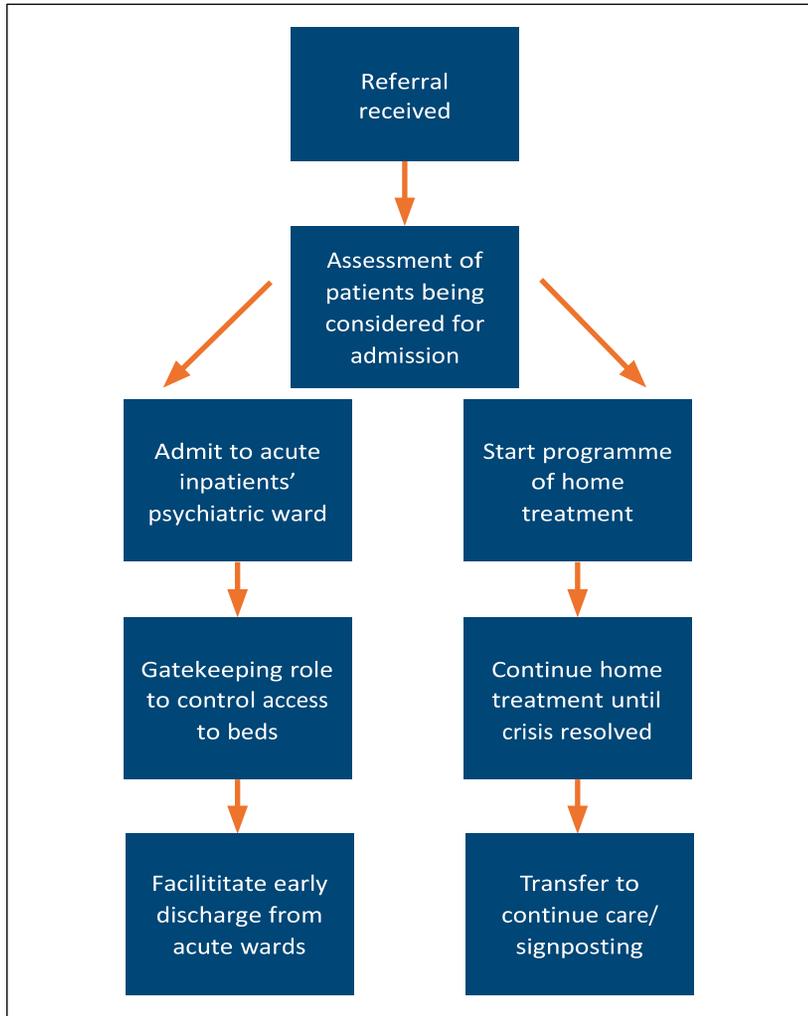
Figure 1. Service process map

which all staff have been involved ensures staff are aware their opinions are fundamental to any change process (Taylor and Randall, 2007).

Local context

Crisis resolution teams aim to provide rapid assessment in mental health crises and offer, where possible, intensive home treatment as an alternative to acute admission (Department of Health, 2001).

In this context, each of the three teams under analysis comprise specialist mental health professionals who respond to psychiatric emergencies by providing intensive home-based treatment and support as a safe alternative to admission as an inpatient. These teams are formally known as crisis resolution and home treatment teams (CRHTs).

The teams also act as 'gatekeepers', facilitating admission to inpatient care and early discharge by providing intensive community-based support. If hospital admission is required, the aim is to keep the length of admission to a minimum by supporting early discharge in agreement with service users and/or carers. In 2012, the NHS trust merged the three teams to increase overall efficiency, improve multidisciplinary working and help meet the trust's strategic objectives.

The aim of this research was to evaluate and reflect the impact of the merger in further increasing efficiency and adopting a culture of continuous improvement. Process mapping enabled an understanding of the processes and referral pathways of the three CRHTs. It was hoped that this would facilitate the identification of accurate data sources that most reflected the service.

Methodology

The first stage of a process map is the physical mapping out of referral pathways, teams and staff who patients come into contact with. This was done through researchers discussing the layout and referral patterns of each of the three teams with their clinical staff. The referral pathway is outlined in *Figure 1*.

Involving clinical staff in this way is seen as the briefing session of a process map, seeking

care (Phillips and Simmonds, 2013).

Pragmatically, process mapping encourages data to be collection from sources relevant to the patient pathway, which may involve interviewing staff and patients or analysing data on the frequency of admissions. Process mapping therefore acts as an aid to see a whole pathway through the patient's eyes while simultaneously encouraging ideas from staff who may not always have the opportunity to contribute to service organisation but know how things work. This alters the focus of any proposed changes towards what will be most valuable to the patient (Trebble et al, 2010).

Although process mapping is generally a tool used by NHS trusts or commissioners, backing up research findings with a process map in

engagement and mutual acknowledgement of people representing different roles and functions associated with the clinical pathway (Phillips and Simmonds, 2013). Once a visual representation had been clarified, the researchers used this as a tool to select the most representative data sources for analysis so they could compare the situation before and after and evaluate the impact of the change project.

It was decided hospital data (at an aggregated, anonymous level), including waiting times for assessment, length of patient stay, readmission and Health of the Nation Outcomes Scales (HoNOS) (Wing et al, 1996) scores, were most appropriate to assess any changes that took place over the period of the change programme. This was done by comparing HoNOS scores before and after admission.

HoNOS (Wing et al, 1996) consists of 12 rating scales on which service users with severe mental illnesses are rated by clinical staff. Each rating is scored in the following order: 0=no problem; 1=minor problem requiring no action; 2=mild problem but definitely present; 3=moderately severe problem; 4=severe to very severe problem.

This scale was intended to be used repeatedly before and after treatment or intervention, so provides the equivalent of a clinical outcome measure. HoNOS (Wing et al, 1996) has the dual purpose of individual service user assessment and the utility to aggregate results across caseloads or whole services. This assists staff in recognising changes in service user diagnoses and use of interventions over time (Royal College of Psychiatrists, 2016).

Cohen's effect size was used to determine whether differences in admission and discharge HoNOS scores were statistically significant. It is suggested that d=0.2 are considered a small effect size, d=0.5 a medium effect size and d=0.8 a large effect size (Ellis, 2010).

Data collection

A trust clinical outcomes team dataset was used to generate a view of activity by the CRHTs during the period under examination. This allowed the researchers to compare activity before and after the service reconfiguration. The data was extracted from the electronic patient

Table 1. Accepted referrals by year	
Year	**Number of referrals**
2009	197
2010	505
2011	702
2012	827
2013	805
2014	642
2015	324
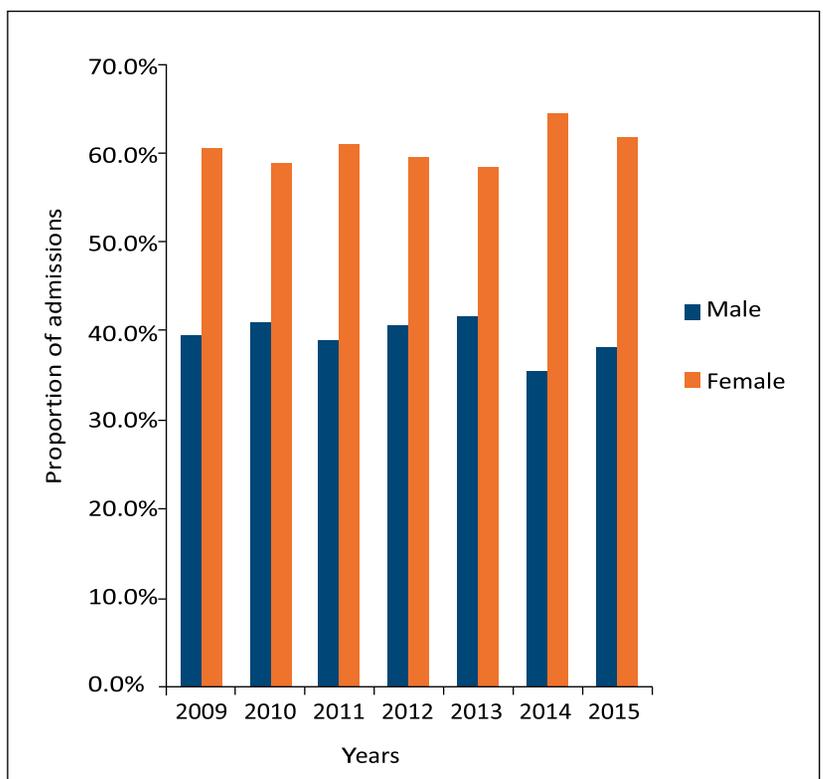
Figure 2. Admission by gender

journey system (ePJS), the trust's patient records system for the patients on the three teams' caseload over the six-year study period.

Service users referred to the three CRHTs were characterised as having a 'problem profile' if they had a score of 3 or above for depressed mood, other symptoms (such as sleep disturbance anxiety) and relationship problems. Service users who met problem profile criteria were included in the clinical outcomes team dataset. There was a total sample size of 4 000 cases. Service

Table 2. Referrals by gender

Year	Gender	
	Male	Female
2009	39.6%	60.4%
2010	41.0%	59.%
2011	38.9%	61.1%
2012	40.6%	59.4%
2013	41.5%	58.5%
2014	35.4%	64.6%
2015	38.0%	62.0%
Total	39.3%	60.7%

users were given a HoNOS score on admission and at discharge. Ratings were compared by year, gender, diagnoses characterised by ICD–10 classification and length of stay. *Table 1* outlines accepted referrals by year.

Results

Figure 2 demonstrates admissions by gender. Admissions were consistently higher for women than men, with female admissions peaking in 2014 and 2015, when male referrals were at their lowest in these two years. *Table 2* outlines referrals by gender, which were again higher for females in 2015 and 2016 but lowest for males in the same two years. *Figure 2* and *Table 2*

show that male referrals peaked in numbers in 2012, and have since reduced as a proportion of total referrals to the crisis team. There was no difference in outcome based on gender in this large sample of the unit's home treatment episodes.

Table 3 shows diagnoses per year by ICD–10 chapter, which were highest overall for F20–29, which concern schizophrenia, schizotypal and delusional disorders. Since the 2012 merger, referrals of patients with schizophrenia, schizotypal and delusional disorders reduced as a proportion of total referrals. However, the proportion of patients with a missing diagnosis increased in the same period. Mood disorders were the second most frequently diagnosed conditions.

Figure 3 demonstrates there has been a significant reduction in average length of stay since 2009. There was a reduction in total number of accepted referrals since the merger.

Table 5 demonstrates Cohen's d effect size which compares mean HoNOS score before and after admission for each year of data collection. All effect sizes are large (above 0.8), indicating a significant difference between admission and discharge HoNOS scores. An overall mean HoNOS score of 11.8 score suggests patients were generally in crisis but below the threshold for acute admission (an average HoNOS score of above 13). The average score at discharge was 6.8, which mean that patients generally did not

Table 3. Diagnoses by ICD–10 chapter

Chapter	F00–	F10–	F20–	F30–	F40–	F50–	F60–	F70–	F80–F99	Missing	Non F code	Z
2009	2.0%	2.1%	47.2%	33.0%	6.1%	0.0%	1.5%	0.0%	0.0%	2.5%	0.0%	5.6%
2010	1.4%	2.6%	39.0%	41.0%	5.5%	0.4%	2.8%	0.0%	0.0%	1.8%	0.0%	5.5%
2011	0.6%	6.8%	41.0%	38.9%	5.8%	0.2%	2.6%	0.2%	0.1%	0.7%	0.1%	3.0%
2012	0.7%	7.0%	40.6%	34.4%	7.1%	0.8%	3.7%	0.4%	0.2%	1.7%	0.0%	3.4%
2013	0.4%	4.7%	42.9%	32.8%	8.1%	0.9%	4.8%	0.2%	0.0%	1.1%	0.1%	4.0%
2014	0.9%	4.0%	37.1%	35.4%	6.9%	0.5%	6.2%	0.2%	0.0%	3.4%	0.9%	4.5%
2015	0.9%	4.6%	32.1%	34.0%	6.5%	0.6%	6.8%	0.0%	0.0%	9.6%	0.0%	4.9%
Total	1.0%	4.5%	40.0%	35.6%	6.6%	0.5%	4.1%	0.1%	0.0%	3.0%	0.2%	4.4%

meet the criteria for routine review. This suggests a reduction in the severity of symptoms from admission to discharge. There is an average five point reduction in total HoNOS score between admission and discharge.

Analysis

The mean score of the first HoNOS being below the threshold for acute admission reflects how the three CRHTs originated. They had been developed as an inclusive service embedded within community teams, unlike other home treatment teams in the trust, which had been set up as standalone services.

The process mapping technique showed that this inclusive model promoted good working relationships with other community teams and continuing care, so patients were referred to the teams when relapse indicators were present but did not necessarily require admission to hospital. This meant the teams had a greater chance of successfully working with patients to prevent disruption to their lives.

However, being so embedded within the community teams meant that the relationship with the psychiatric liaison team and inpatient wards was not as strong. This had an impact on the gatekeeping role and facilitating early discharge, with the teams tending not to work in partnership with other practitioners or wards when service users required admission to or discharge from hospital.

The process map has reflected how the service is functioning, so a greater focus was put on clinical management and a review of patient pathways (Layton et al, 1998). This can also be seen as enhancing the contribution of steps that provide value and can be built on, while removing steps that do not (George et al, 2005).

Before the three CRHTs were merged, referrals remained fairly stable from 2010 to 2011 and intake scores increased in 2012. There has been a small increase in exit scores over time (last HoNOS rating in the episode), which should be considered in the context of the reduction in average length of stay. Cohen's d suggests there has been an improvement of critical clinical importance, providing valuable practice-based evidence of the clinical effectiveness of the teams.

Table 4. Key for ICD–10 chapters	
ICD–10 chapter	**Clinical term**
F80–F99	Disorders of psychological development
F70–F79	Mental retardation
F60–F69	Disorders of adult personality and behaviour
F50–F59	Behavioural syndromes associated with physiological disturbances and physical factors
F40–F48	Neurotic, stress-related and somatoform disorders
F30–F39	Mood disorders
F20–F29	Schizophrenia, schizotypal and delusional disorders
F10–F19	Mental and behavioural disorders due to psychoactive substance use
F00–F09	Organic including symptomatic mental disorders

Limitations

Potential limitations included access to key stakeholders, recruitment of participants, access to the hospital data required, problems in defining patient-related outcomes and establishing clear links to them and establishing the appropriate time for post-intervention limitations.
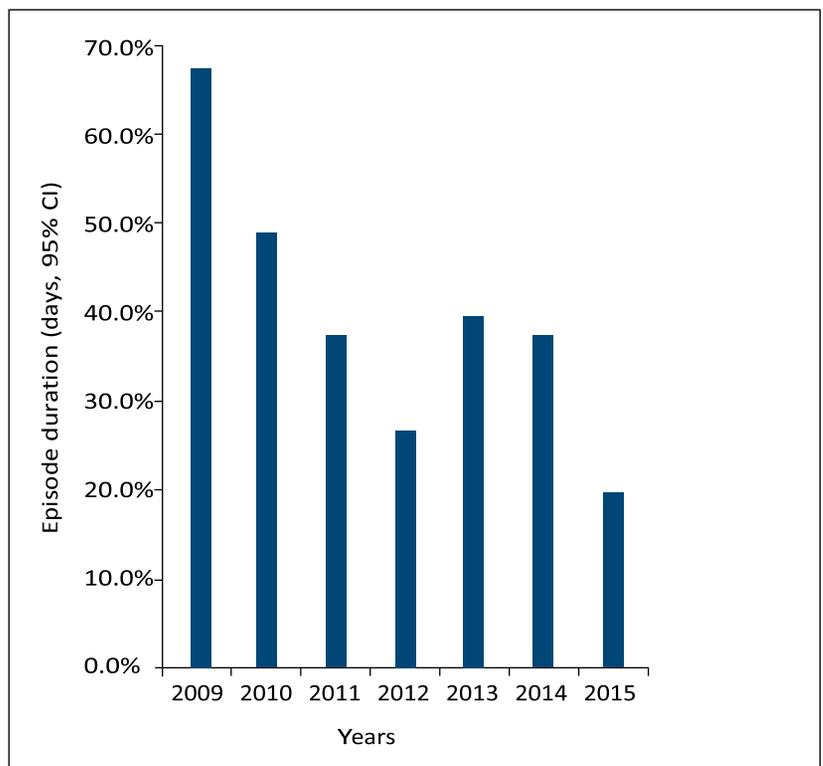

Figure 3. Length of stay by year

Table 5. Difference in effect size of HoNOS scores			
Year	Total HoNOS score	Mean (SD)	Effect size(d)
2009	Admission	–	–
	Discharge	–	
2010	Admission	10.51 (4.98)	1.03
	Discharge	5.37 (4.00)	
2011	Admission	10.28 (5.12)	0.85
	Discharge	5.94 (4.91)	
2012	Admission	10.61 (5.09)	0.88
	Discharge	6.11 (4.86)	
2013	Admission	10.63 (4.96)	0.90
	Discharge	6.18 (4.44)	
2014	Admission	10.69 (4.66)	0.88
	Discharge	6.58 (4.53)	
2015	Admission	11.22 (4.27)	0.99
	Discharge	6.98 (4.16)	

The limitation in using a pooled cross-sectional design such as this is that it can only be used for exploratory purposes and does not take into account temporal changes in the prevalence of disease.

Additionally, it was difficult to disentangle cause from effect. In this case, a snapshot of a referral pathway was provided, which forms a basis for understanding the service and forms a framework for more detailed study.

Conclusion

The data suggests that between 1 April 2009 and 30 March 2015 length of stay and readmissions for patients to crisis resolution team rates fell.

KEY POINTS

- Problems were pinpointed within the NHS trust
- The use of process mapping allowed the reduction of unnecessary procedures
- Process mapping was used to refine the process
- Process mapping created new practice

Positive results have been experienced by the introduction of process mapping, which has more strategic and operational impacts than suggested by simply reworking processes. This may reflect the previous absence of a mechanism to review processes holistically in this trust.

The process map demonstrated there were positives of the merger in that an inclusive model was adopted but weaker relationships with psychiatric liaison teams.

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