Which factors are driving increasing demand for community nursing? A qualitative System Dynamics approach

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Abstract

Demand for community nursing services is increasingly significantly. With increasing economic pressures, services are struggling to meet increases in demand, and are looking to become more proactive in planning for future demand. Traditional quantitative forecasting methods have limited use, because of the complexity of inter-linking factors that potentially drive demand for community services.

Qualitative System Dynamics approaches can be useful to model the complex interplay of causal factors leading to an effect, such as increased demand for services, and identify particular areas of concern for future focus. We ran a facilitated qualitative System Dynamics workshop with representatives working across community nursing services in Cornwall. The generated models identified seven key areas of concern that could be significantly contributing to demand for community nursing services. We outline the identified problem areas in this paper, and discuss potential recommendations to reduce their effects based on causal links identified in the models.

Keywords : Demand, Planning, Modelling, System Dynamics, Workshop

Key Points

- Demand for community nursing services is increasing, but the key contributors to rising demand are unclear
- We ran a workshop to enable those working in community nursing to develop models that identify causal links and areas contributing to demand growth
- We identified seven key areas of concern from the models that could help focus planning strategies for community nursing

Introduction

Community nurses provide a service delivering care in patients' homes which is a vital component of the sustainable future of the NHS (NHS England, 2014, Ham et al., 2012). As the population ages, community nursing services are facing increasing levels of demand and complexity of caseloads (Maybin et al., 2016). However, increasing economic pressures across health and social care services have led to flatlining or declining capacity to meet such demand (Maybin et al., 2016). Consequently, community nursing services are becoming increasingly stretched (Maybin et al., 2016).

The increasingly broad range of patients and conditions seen by community nurses leads to difficulties forecasting future demand for services (Wittenberg and Hu, 2015), which inhibits planning. Current planning is highly reactive (Goodman et al., 2003), and traditional forecasting methods have limited use because of the multitudinous potential drivers of demand that are unlikely to be sufficiently captured by simple trend analysis (Wittenberg and Hu, 2015). Therefore, methods that consider such complexities are needed in order to improve the strategic level planning necessary to ensure the sustainability of community nursing services. Unfortunately, the nature and range of the potential drivers of demand for these services mean that quantitative data can be difficult to obtain or collate, particularly as many of these drivers may be more qualitative in nature (McDonald et al., 1997).

System Dynamics is a modelling approach that captures the dynamics within a system in terms of the flows between its key elements (Forrester, 1994). The method is commonly applied to model large-scale systems to inform strategic decisions (Lattimer et al., 2004). However, the approach can also be used to capture more abstract systems such as the drivers of demand (Chalk et al., 2016). This allows for 'softer' qualitative aspects of a system to be explored, particularly in terms of identifying areas of concern (Powell et al., 2016).

In this paper, we present the results from a facilitated qualitative System Dynamics workshop held with representatives from community nursing services in Cornwall. We also talk about the workshop itself, and the implications of the results on thinking about future planning for community nursing services.

Methods

We ran a three hour workshop on 14th July 2016 at Camborne and Redruth Community Hospital, Cornwall. The workshop was attended by 16 people working across community nursing services in Cornwall, representing Community Nurses, Community Matrons, Community Nurse Team Leaders, Community Nurse Team Managers, Community Therapists, Community Psychiatric Nursing, Specialist Nurses representing Dementia, Cardiac and Palliative Care services, representatives from Nursing Care Homes and the Acute Hospital, Finance, Public Health and Education. The aim of the workshop was to facilitate the creation of qualitative System Dynamics models that could shed insight into the likely principal drivers of demand for community nursing services, thereby indicating areas of recommended focus to inform future strategic planning.

At the start of the workshop, participants were introduced to the concept of qualitative System Dynamics, and were taught the fundamental structural elements of a qualitative System Dynamics model. Specifically, participants were introduced to the concept of a Causal Loop Diagram with links and directionality of influence indicated between identified influencing factors (Lattimer et al., 2004). Participants were also introduced to Reinforcing Loops, which are loops of causality that lead to 'vicious circles' of increasing or decreasing impact, and Balancing Loops, which are loops of causality that balance themselves out and lead to no net impact (Sterman, 2001). Reinforcing Loops typically indicate areas of concern in a system, because they represent causal factors that are leading to uncontrolled escalation

of the problem (Sterman, 2001). Participants were shown an example of each type of loop to aid their understanding (figure 1).

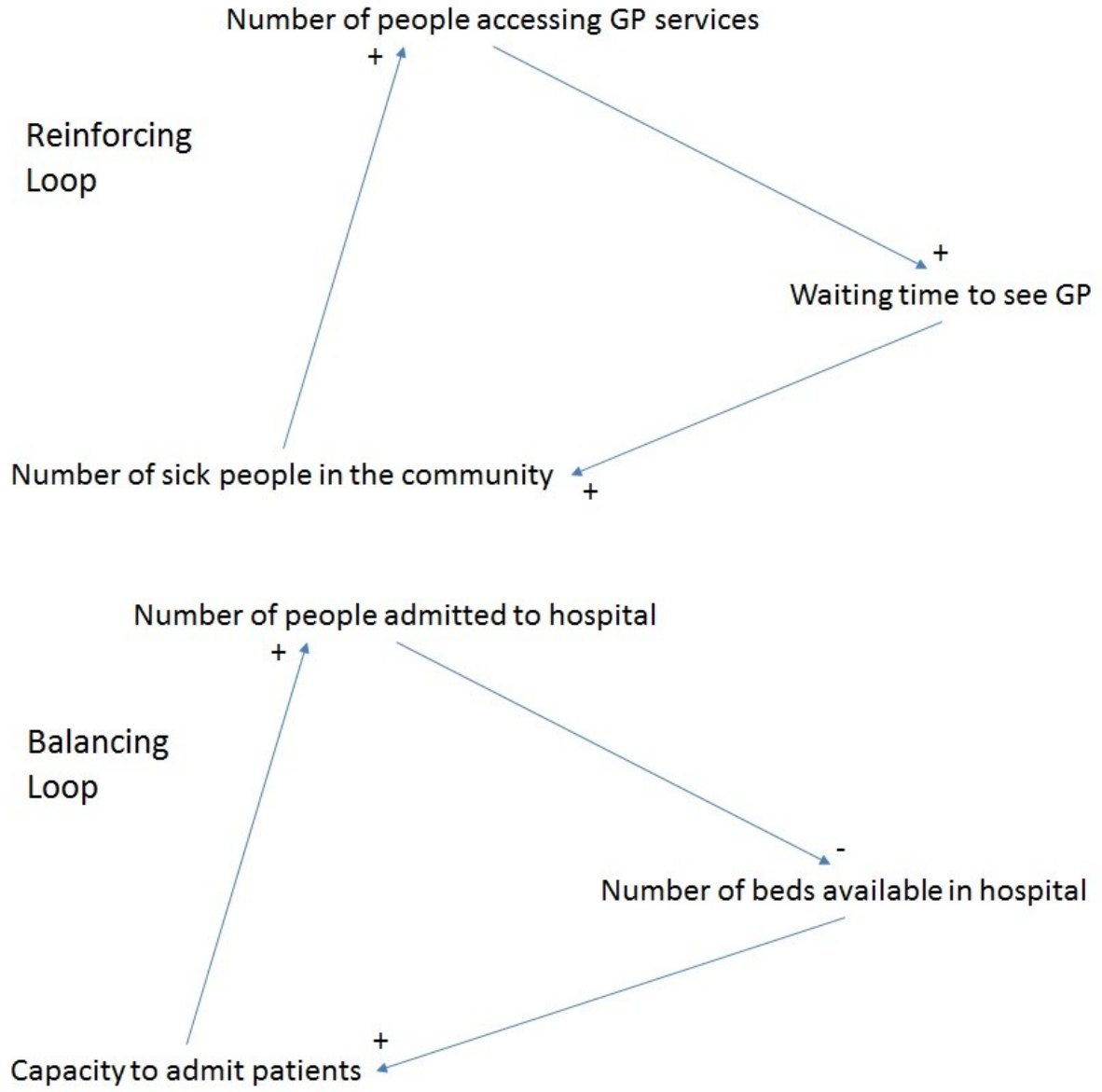

Figure 1. Example loops shown to workshop participants before they began to build their qualitative System Dynamics models. The links between causal factors indicate the direction of causality, as well as whether the factors move in the same direction as one increases or decreases (a + symbol) or opposite directions (a – symbol). The top loop is a Reinforcing Loop, because there is an even number of opposite direction relationships (in this case, zero). The loop says that as the number of people accessing GP services increases, the

waiting time to see a GP increases. As this increases, the number of sick people in the community increases. As this increases, the number of people accessing GP services increases. The bottom loop is a Balancing Loop, because there is an odd number of opposite direction relationships (in this case, one). The loop says that as the number of people admitted to hospital increases, the number of beds available in the hospital decreases. As this decreases, the capacity to admit patients decreases. As this decreases, the number of people admitted to hospital decreases.

Once the principal elements of qualitative System Dynamics had been taught, participants were asked to spend 10 minutes working individually to list as many different factors as they could think of that might be contributing to demand for community nursing services. Participants were then asked to assemble themselves into groups of four to five people, and to start building a Causal Loop Diagram that incorporates the elements identified individually, and the links between them. It was recommended that, for each factor added to the diagram, the group considers whether it influences or is influenced by any of the other factors on the diagram, and then whether there are additional relevant factors not yet identified that it influences or is influenced by. Participants were given two hours to build their Causal Loop Diagrams. After this time, participants were asked to draw insight from their maps by identifying the reinforcing and balancing loops in their maps, reflecting on what they meant and how the effect of the reinforcing loops might be mitigated.

Results

Table 1 describes all of the reinforcing loops identified in the causal loop diagrams generated at the workshop. Figure 2 shows a selection of the diagrams generated by participants. We collated the findings from the workshop into seven problem areas, which we describe here by translating the information from the causal loop diagrams. Specifically, we look at each

reinforcing loop and identify external factors that are being influenced by factors within the loop (which are potential areas that are being impacted by the reinforcing effect), and external factors that are influencing factors within the loop (which are feeding the reinforcing effect).

We outline our recommendations for each problem area in the Discussion section.

Problem 1 : Increasing Complexity of Need

A growing ageing population means more people with more complex needs, which increases the range of treatments available at home, thereby helping people to live longer, increasing the reinforcing effect. This reinforcing effect is also likely to be increasing the number of patients and carers who are housebound, increasing the rate of change of best practice guidelines, directly increasing demand for community nursing and reducing capacity for community nurses to promote good medication adherence. Decreased length of stay in hospital leads to patients with more complex needs, and increasing changes to best practice guidelines leads to a greater diversity of treatments that need to be offered at home – both of these feed the reinforcing effect.

Increasing complexity of patient needs increases the demand for specialist services, which increases delays from mental health / social service to review cases, leading to increased hospital admissions and in turn increasing complexity of patient needs. This cycle can increase the demand for community nursing and lead to increased early discharges from hospital. The cycle is exacerbated by increases in long term conditions, decreased lengths of stay in hospital, lack of specialist services, increases in closures of walk-in centres and a decrease in timely reviews by GPs.

Problem 2 : Increasing Patient Expectations

People's expectations increase as they access more information about their condition and associated guidelines, which can increase public interest in these areas, leading to more changes in guidelines (such as NICE guidelines) and people's inclination to access information about their condition. This cycle can increase demand for community nursing and the number of treatments that need to be offered at home. The cycle may be exacerbated by the increasing complexity of patient needs.

Problem 3 : Staff Stress Levels

Reduced capacity leads to increased stress for staff, leading to more sickness, which in turn exacerbates the capacity problem. This cycle can also increase A & E attendances, decrease community resilience and increase the inconsistency of working practices. The cycle may be exacerbated by increasing inconsistency of working practices, increasing numbers of unfilled vacancies, increasing administrative and travel time burdens, increasing demand for community nursing, and an increasing rate of changes to best practice.

Problem 4 : Movement from a Pro-active to a Reactive Service

Increasing complexity of treatments required to be delivered by community nurses reduces their time to promote self-care, which can increase morbidity and the complexity of treatments needed. These effects may be exacerbated by an increasing rate of changes to best practice.

Increasing mobility problems lead to more demand for community nursing, which means less time is spent on care to prevent falls, leading to increased mobility problems. In turn, decreased mobility can lead to problems with pressure ulcers / trauma wounds. The cycle may be exacerbated by increasing levels of frailty.

Lack of time to do preventative work leads to an increasing number of people with pressure ulcers / trauma wounds, thereby increasing the reporting requirements and reducing the time

to do preventative work still further. Increasing reporting can lead to increased stress (and in turn, sickness and capacity issues). The cycle is exacerbated by decreasing levels of mobility.

Problem 5 : Decreasing Community Resilience

Decreased capacity in community nursing can reduce community resilience and increase the number of patients and their carers who are housebound, thereby increasing the demand for community nursing and reducing capacity. This cycle can also increase A & E attendances and stress levels amongst staff. The cycle may be exacerbated by an increasing ageing population, increasing complexity of patient needs, increasing rates of change of best practice guidelines and increasing patient expectations.

Problem 6 : Decreasing GP Capacity

Increased community nursing demand can lead to review not being undertaken in a timely manner, leading to increasing A & E attendances, increasing unsafe discharges as the hospital struggles to cope, and a consequential increase in demand for community nursing. This cycle is exacerbated by decreasing numbers of GPs.

Problem 7 : Early Hospital Discharges

Early discharges from hospital lead to increasing numbers of patients being readmitted, increasing the demand for medical resources and leading to more early discharges. This cycle can increase the demand for community nursing. The cycle may be exacerbated by an increasing number of people with comorbidities.

#	Description of Reinforcing Loop	External Factors Affected by the Loop	External Factors that Exacerbate the Loop
1	As complexity of patient needs increases, the diversity of treatments available at home	- An increasing ageing population leads to more patients and their	- Complexity of patient needs is increased with decreasing length of stay in hospital.

	increases. As this diversity increases, the ageing population increases. As this population increases, the complexity of patient needs increase.	carers becoming "enforced housebound". - Increasing complexity of patient needs leads to increased demand for community nursing, and increased rate of changes to best practice.	- Diversity of treatments available at home is increased with an increasing rate of change to best practice guidelines.
2	As the number of people accessing health information themselves increases, patient expectations increase. As expectations increase, the rate of changes to best practice increase. As this increases, the number of people accessing information for themselves increases.	- Increasing patient expectations can directly increase demand for community nursing. - Increasing rates of changes to best practice increases the diversity of treatments available at home (diversity of treatments available at home itself is part of a Reinforcing Loop - #1)	- Rate of change to best practice guidelines is increased with increasing complexity of patient needs (itself part of a Reinforcing Loop - #1)
3	As community nursing capacity decreases, stress levels increase. As stress levels increase, sickness increases. As sickness levels increase, community nursing capacity decreases.	- Decreased community nursing capacity leads to increased A & E attendances and decreased community resilience. - Increased stress levels increase inconsistency of working practices.	- Community nursing capacity is decreased with increasing inconsistency in working practices, increasing numbers of vacancies, increasing administrative burden, increasing travel times, increasing demand for community nursing and increasing rate of changes to best practice. - Stress is increased by increasing administrative burden and increasing travel times.
4	As inconsistent working practices increase, community nursing capacity decreases. As capacity decreases stress levels increase. As stress levels increase, inconsistent working practices increase.	Linked to Reinforcing Loop #3, so : - Decreased community nursing capacity leads to increased A & E attendances and decreased community resilience. - Increased stress levels increase inconsistency of working practices.	Linked to Reinforcing Loop #3, so : - Community nursing capacity is decreased with increasing inconsistency in working practices, increasing numbers of vacancies, increasing administrative burden, increasing travel times, increasing demand for community nursing and increasing rate of changes to best practice. - Stress is increased by increasing administrative

			burden and increasing travel times.
5	As the number of treatments needed increases, the time to promote medication regimes decreases. As this time decreases, morbidity increases. As morbidity increases, the number of treatments needed increases.	- Increasing numbers of treatments required leads to an increasing ageing population size.	- The number of treatments required is increased by increasing complexity of patients' needs, and an increasing rate of changes to best practice. - Morbidity is increased through an increasing lack of information to self-care
6	As mobility levels decrease, demand for community nursing increases. As demand increases, the time spent on falls prevention and care decreases. As this decreases, mobility levels decrease.	- Decreased mobility can lead to increasing pressure ulcers / trauma wounds.	- Increased frailty and increases in long term conditions can lead to decreased mobility.
7	As capacity for community nurses to do preventative work decreases, the number of patients requiring treatment for pressure ulcers / trauma wounds increases. As this number increases, reporting requirements increase. As reporting requirements increase, capacity for community nurses to do preventative work decreases.	- Increasing reporting requirements (administrative burden) lead to increasing stress levels.	- Pressure ulcers / trauma wounds can be increased by decreased mobility.
8	As capacity for community nursing decreases, community resilience decreases. As community resilience decreases, the number of patients and their carers who are "enforced housebound" increases. As this number increases, the demand for community nursing increases. As the demand for community nursing increases, community nursing capacity decreases.	- Decreased community nursing capacity can lead to increased stress levels and increased A & E attendances.	- The number of patients and their carers who are housebound is increased with an increasing ageing population size. - Increasing demand for community nursing may be brought about by increasing complexity of patients' needs, increasing rates of change of best practice guidelines and increasing patient expectations.
9	As the complexity of patients' needs increases, the demand for specialist services increases. As this increases, delayed reviews by mental health and social services increases. As this increases, the number of A	- Increased complexity of needs leads to increasing demand for community nursing - Increased A & e admissions leads to increased early	- Complexity of needs is increased by an increase in long term conditions and a decrease in hospital length of stay - Demand for specialist services is increased with an increasing lack of

	& E / urgent care / hospital admissions increases. As this increases, the complexity of patients' needs increases.	discharges	specialist services - A & E admissions are increased with an increasing closure of walk-in centres and a decrease in timely reviews by GPs.
10	As the number of people with long term conditions increases, the complexity of patients' needs increases. As this increases, the number of treatments provided increases. As this increases, the elderly population size increases. As this increases, the number of people with long term conditions increases.	- As the number of treatments provided increases, the capacity for community nurses to promote medication regimens is decreased	- As lack of preventative measures increases, the prevalence of long term conditions increases
11	Increasing demand for community nursing decreases the number of timely reviews that can be undertaken. As this decreases, the number of A & E attendances increases. As such attendances increase, the number of unsafe discharges increases. As this increases, demand for community nursing increases.		- As the number of GPs decreases, increased demand is put on community nursing resources.
12	As the number of early discharges from hospital increases, readmission rates increase. As these rates increase, demand for medical resources increases. As this increases, the number of early discharges increases.	- Increased early discharges from hospital increase demand for community nursing - Increased demand on medical resources increases demand for community nursing	- Increased numbers of people with comorbidities increases the demand on medical resources

Table 1. Reinforcing Loops identified in the qualitative System Dynamics models developed at the workshop. For each loop, the causal cycle is described, along with the external factors identified as being directly affected by the loop, and the external factors identified as directly feeding into the loop.

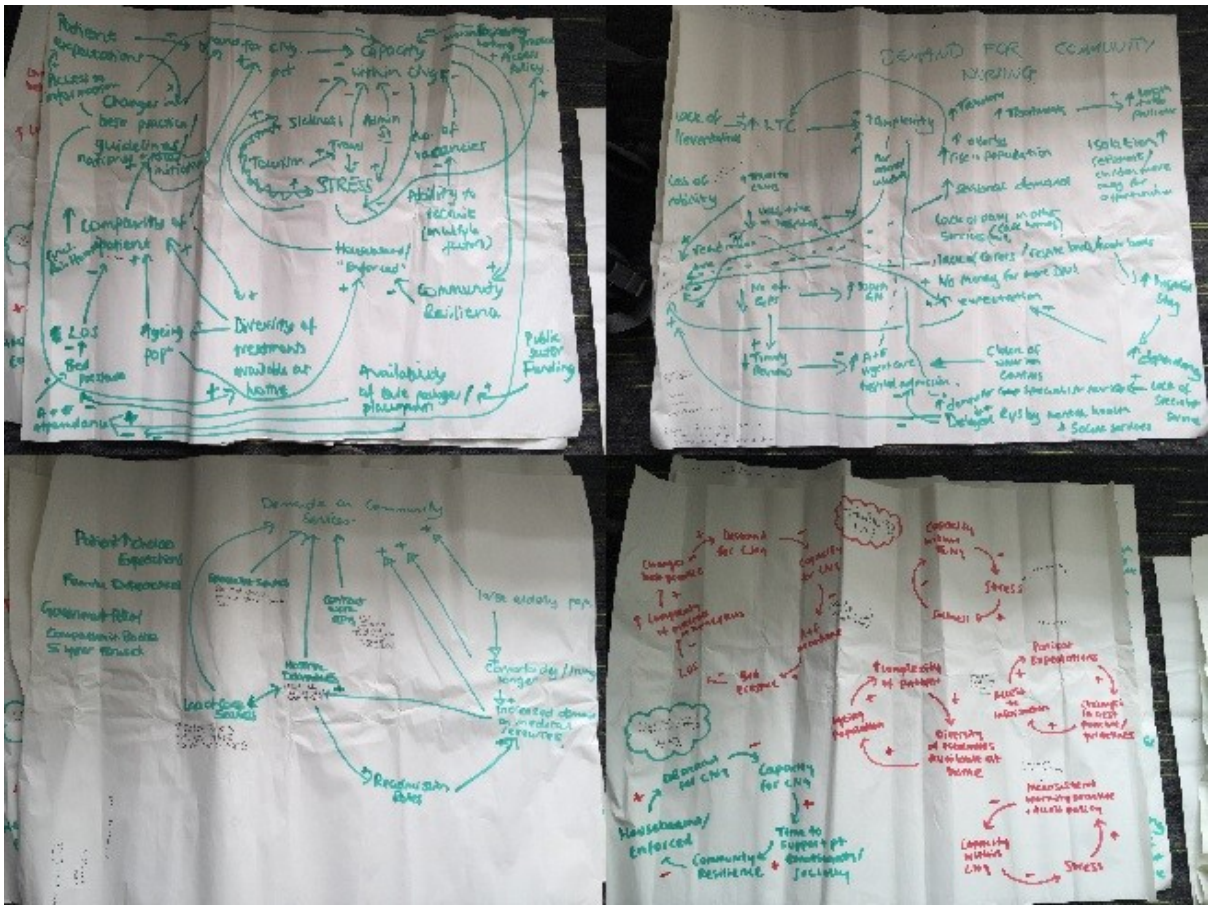

Figure 2. A selection of causal loop diagrams and identified reinforcing loops generated by the workshop participants.

Discussion

The facilitated qualitative System Dynamics workshop identified seven key problem areas that are likely to be significant contributors to rising demand for community nursing services. As well as helping to identify the problem areas, the structure of the causal loop diagrams can help to inform recommendations for how these problems might be mitigated, because they provide insight into the driving forces behind the problems, and other problems that might be in turn exacerbated.

Increasing complexity of need was a commonly identified causal factor across the diagrams that were developed, and is a common theme in the literature (Ham et al., 2012). The

identified relationships suggest that reducing the number of people who are discharged too early from hospital could help to reduce the number of patients with complex needs and reduce the effect of this cycle. In addition, reducing the rate of change to best practice guidelines, or recognising the additional resource needs to comply with changing guidelines could help to better manage the reinforcing effect. Ensuring timely reviews by GPs, mental health services and social services could significantly reduce demand for community nursing, and reduce increased burdens on A & E departments and hospital beds. Ensuring the availability of specialist services could help here too. Building capacity to allow community nurses to take preventative actions (such as identifying early signs of long term conditions, preventing the secondary complications from long-term conditions and promoting good medication regimes and adherence) could have a significant impact on reducing morbidity and long-term community nursing demand.

Increasing patient expectations was identified as a potential area of concern, which has been identified before (Luker and McHugh, 2002). Proactively providing timely and relevant information that meets the needs of patients could help to manage expectations and counter this cycle.

Rising staff stress levels were identified as a reinforcing contributor to community nursing demand, and has long been studied (Fagin et al., 1995, Snelgrove, 1998, Karimi et al., 2014). By analysing the factors driving this increase in stress amongst the workforce, we would suggest that maintaining consistency in working practices, optimising travel times, and reducing administrative burden where possible could not only reduce demand for community nursing but also reduce A & E attendances and help to increase self-care in the community.

A number of identified reinforcing effects suggested that there had been a significant movement away from pro-active community nursing, and towards a more reactive service,

which has been suggested before (Goodman et al., 2003). The models indicate that maintaining consistency in working practices and providing more (and timely) self-care information could help to push against the escalating cycle of morbidity that results from decreasing pro-activity. Increased investment in time and resources to deliver falls prevention could significantly reduce spiralling mobility problems, and in turn reduce the prevalence of pressure ulcers and other trauma wounds. Increased investment in time and resources to deliver preventative work could also be hugely beneficial for reducing stress levels leading to increased levels of sickness and reduced community nursing capacity.

A decreased community resilience (in terms of patients and their carers being able to help themselves) was thought to be contributing to community nursing demand. Strategies to manage patient expectations (for example, by supplying timely and relevant information), and better recognition of the resource needs to meet changing guidelines could help to reduce escalating demand for community nursing and reduce A & E attendances.

Decreasing capacity for GPs to see patients was identified as problematic for community nursing, because it exacerbates the cycle of losing time to undertake timely reviews, leading to more A & E admissions, more early discharges and increasing community nursing demand. Addressing the problem of decreasing GP numbers could help significantly here, as could building capacity within community nursing to ensure that reviews are undertaken in a timely manner. Both strategies could not only reduce long-term demand for community nursing but also reduce burdens on already stretched A & E departments. Additionally, ensuring that appropriate care packages are in place for those discharged from hospital could mitigate the reinforcing cycle of early hospital discharges.

Some of the recommendations arising from the models could be managed in the shorter term within the control of community nursing, such as rebalancing workloads to ensure time is

given to undertake preventative work and monitoring of clinical indicators, proactively providing timely and relevant information to patients, ensuring consistency in working practices and optimising community nurse travel routes to maximise efficiency. There are also key messages for commissioners and policy makers here – namely, that reducing inappropriate early discharges from hospital, recognising the additional resource requirements needed to meet changes to best practice guidelines, increasing capacity in GP, mental health and social services and reducing the administrative burden for community nurses could not only have a significant impact on reducing demand for community nursing, but also reduce burden on other components in the health and social care system, such as A & E.

Clearly, there are limitations when building qualitative System Dynamics models in this way. In particular, it should be reiterated that the causal factors identified here are based on perceptions and opinions of those who participated in the workshop, and as such may misunderstand or missed aspects of the real world system. However, these perceptions and opinions are at the heart of the strength of such modelling techniques too, because they allow for the exposure and capture of qualitative aspects of a system that may be overlooked in quantitative analysis (Forrester, 1994), and because they reflect the observations of those who are working within the service on a daily basis.

It is particularly interesting that a significant number of the problem areas identified in the modelling were identified independently across the groups participating in the workshop, and have been identified in the literature before. The results have enabled the community nursing locality to focus limited resources on the areas that will have the greatest benefit and have encouraged them to have a louder voice in shaping services.

Traditional focus on service improvement in the NHS has largely ignored community nursing services (Ham et al., 2012). If progress it to be made to truly improve the health and social care service as a whole, it will require whole-systems thinking, and a recognition that services such as those delivered by community nurses play a vital role, not just for the wellbeing of patients, but for the system as a whole.

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