

The creation of short-term flexibility in healthcare capacity management

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ABSTRACT

Background: The fact that unpredictable variations in supply and demand for capacity in the healthcare systems creates a need for flexibility is well known. The major types of tools used in the healthcare system to create short-term volume flexibility on the supply side include overtime, temporary staff from internal calling lists, moving staff across units, staff pools, queuing patients, and purchasing services from external healthcare providers.

Objective: The purpose of this paper is to explore where and to what extent the major types of tools for short-term flexibility on the supply side are used in the healthcare system.

Method: A questionnaire was developed and distributed among department managers ($N = 237$; $n = 106$) in the Region Västra Götaland healthcare system. The respondents were asked to indicate on a seven-point Likert-type scale to what extent they used each tool to create short-term flexibility in capacity. Each manager's unit was positioned on an acute/planned scale and on an inpatient/outpatient scale, and classified as primarily medical, surgical or psychiatric. Data were analyzed with multiple regression.

Results: A number of significant tendencies were found, for example, that acute units tend to use overtime and internal staffing pools to create flexibility to a larger extent, and patient queues and external healthcare providers to a smaller extent, than planned units do.

Conclusion: In order to manage capacity efficiently on an aggregate level in the healthcare system, the prerequisites as well as the required managerial approaches differ substantially between different parts of the system. These differences must be addressed when, for example, capacity pools are considered.

1. INTRODUCTION

One of the most challenging aspects of service operations management is that most service operations “process” customers, meaning simultaneous production and consumption (Johnston and Clark 2009). Efficient planning of the available capacity is required when the service is performed in real-time and when the customer demand and company’s resources must exist simultaneously (ibid.). Not only will the ability to match capacity and demand directly affect both cost and the quality of the service delivered, but also performance indicators such as accessibility and customer satisfaction. This is especially apparent in the healthcare sector, where the matching between the healthcare demand and healthcare capacity directly affects the outcome of the healthcare delivered (Petros 2014), and failing to align these two can in a worst-case scenario have fatal consequences (Kumar et al. 2018).

Matching capacity and demand can be a difficult task when there is variation in a system, and becomes even more challenging in healthcare organizations where a complex network of facilities, equipment and trained workforce must be coordinated (Powers and Jack 2008). For example, resources at a hospital specialty department must be coordinated to manage a specific type of medical treatment. Several specialty departments share resources, which makes the planning even more complex (Gemmel and Van Dierdonck 1999, Green 2012) and requires resource coordination at the hospital level (Villa et al. 2009, Vissers et al. 2001).

The most significant source to variation in healthcare systems is variation in capacity and demand (Walley et al. 2007). The short-term variation in healthcare capacity is caused by for example sick leave, temporary leaves and vacancies, while the fluctuating demand have varying explanations (e.g. Svalund et al 2018, Wright and Bretthauer 2010). In some healthcare sectors there is typically a seasonal variation in demand, and planning for this type of variation therefore involves some degree of predictability. For example, orthopedic departments will have a peak in number of patients the first day of winter and emergency departments will experience an increase during the flu season. However, all healthcare departments suffer from variation in healthcare demand due to random causes that cannot be explained. These fluctuations cannot be foreseen and requires that the capacity can be adapted to the situation within a short time frame. Managing these variations in a short-term perspective is challenging, but crucial for both controlling the cost related to capacity, and for achieving the best possible outcome for the patients. Furthermore, the ability to managing short-term variations is also crucial in a long-term perspective, when linking long-term and short-term planning with each other in a hierarchical production and capacity planning process. The planning thus proceeds from an overall level with a longer time horizon to a detailed level with a shorter time horizon (Alvekrans et al. 2016, Jonsson and Mattsson 2009). Consequently, the realization of plans on long-term planning levels is highly dependent of an effective response to short-term variations in supply and demand on short-term planning levels.

According to e.g. Slack et al. (2010) there is a trade-off in Operations Management between operational flexibility and cost objectives, and in the healthcare sector this reasoning can be translated to that in order to achieve a flexible capacity management, staffing costs in terms of capacity levels must be generous. However, there is a general lack of capacity in the healthcare sector in Sweden, while healthcare demand continues to increase (SKL 2019). An international comparison shows that the quality of Swedish healthcare is sufficient, but that the accessibility to healthcare organizations is lacking (SKL 2015). The insufficient capacity is an issue in both acute and non-acute care and in both smaller rural hospitals and larger university hospitals (Väntetider.se 2019-05-30). Hence, alternative solutions to achieve operational flexibility while

experiencing insufficient capacity must be designed.

One example of such a tool for increasing operational flexibility in healthcare with maintained resources is capacity pools (e.g. Cattani and Schmidt 2005, Dziuba-Ellis 2006, Mahar et al. 2011, Kuntz et al. 2015, Terwiesch, et al. 2011), which is a general capacity that can be allocated to parts of the system where the existing workload and demand for capacity is unusually high (Hopp and Lovejoy 2013, Kuntz et al. 2015, Vanberkel et al. 2012). This concept will not be further elaborated upon in this paper; however, this study is a part of a larger research project that aims to investigate how capacity pools can be organized and implemented in healthcare systems. In order to understand how capacity pools should operate to meet the demands of short-term flexibility in healthcare departments, an important insight is what tools managers in the healthcare system use today and to what degree they are used to achieve short-term flexibility in healthcare capacity management. According to Kumar and Singh (2019) little research exists to explain the dynamics of flexibility in healthcare. There is also an overall need for more empirical research on flexibility in service industries, such as identifying and analysis key tools used for creating volume flexibility (e.g. Combe et al. 2012, Jack and Raturi 2002, Slack 2005, Gerwin 2005). Therefore, the purpose of this paper is to explore where and to what extent various types of tools for short-term volume flexibility on the supply side are used in the healthcare system.

The rest of this paper is organized as follows. Section 2 contains a literature review of tools for short-term volume flexibility in healthcare systems. Next, in Sections 3, we present the empirical setting and research methodology. We present the empirical findings and discuss the results in Section 4 and 5. Finally, in Section 6, we present our conclusions with recommendations for future research.

2. LITERATURE REVIEW

In our literature review we have found seven commonly used tools for short-term flexibility in healthcare capacity management: the use of overtime, calling in temporary staff, moving staff between units, using internal staffing pools, using external staffing pools, queueing patients, and purchasing care from external providers. These sources is often used as a reactive ad-hoc solution to fill in gaps in staff schedules (Svalund et al. 2018, Wright and Bretthauer 2010).

2.1. The use of overtime

According to several studies that we found in our literature review, one of the staffing options to handle shortage of staff is to use costly overtime solutions (Brusco and Showalter 1993, Kortbeek et al. 2015, Jack and Powers 2004, Gul et al. 2011, Wright and Bretthauer 2010). There are examples in the literature from different types of organizations of the healthcare sector, for instance hospitals (Brusco and Showalter 1993), primary healthcare practices (Dobson et al. 2011) and surgical procedure centers (Gul et al. 2011). Using overtime when capacity is lacking is close at hand since required capacity is already available at the unit or clinic, but can in the long term have negative consequences for the workforce, since there is a limit to what extent employees manage to work more than initially agreed upon (Sebastiano et al. 2017).

2.2. Calling in temporary staff using calling lists

On-call temporary staff such as part-time nurses and per diem staff is frequently used in healthcare organizations to respond to variability in demand (Bloom et al. 1997, Jack and Powers 2009, Kortbeek et al. 2015, Sebastiano et al. 2017, Svalund et al. 2018). Temporary staff can for example be nurses that previously was employed at the specific unit and have granted pension, but still desire to work extra hours for various reasons. This solution is similar to the use of overtime; it allows for flexibility in allocation of employees already part of the workforce that are required within short notice, although it is a less costly strategy of doing so since for example overtime fees are not disbursed (Bloom et al. 1997).

2.3. Moving staff between units

Jack and Powers (2004) found in their study that one mean to cope with scarce capacity is to reallocate staff between units. This usually means that some employees are cross-trained to work in different departments and therefore with short notice can be reallocated to a unit where the need of capacity is high (Qin et al. 2015). The trained employee usually has one unit where he or she is stationed primarily and only move to another unit under particular circumstances. This strategy is less costly compared to the use of overtime, but requires that one or several employees have the training and are continuously updated on the various routines and procedures at the different clinics to be able to move between units within a short time frame (Qin et al. 2015).

2.4. Using internal staffing pools

Internal staffing pools can be used as a strategy to create short-term flexibility in healthcare organizations (Adams et al. 2015, Bates 2013, Lebanik and Britt 2015) and there are several examples in the literature (e.g. Bates 2013, Lebanik and Britt 2015, Linzer et al. 2011, Ruby and Sions 2003). The examples we have found in our literature review are situated in hospital organizations, although there are no implications that internal staffing pools could not be used in for example primary care centers. The use of internal staffing pools is similar to the use of moving staff between units, with the main difference that employees in an internal staffing pool do not belong to a specific unit but rather the pool itself and is allocated to different units each day.

2.5. Using external staffing pools

External staffing agencies are commonly used in both Swedish and international hospital organizations to cope with shortage of staff. For example, approximately 75 % of US hospitals use staffing agencies as a short-term strategy to resolve staff shortages and to create flexibility in staff planning (Adams et al. 2015). Several studies indicate problems, in addition to the financial issue, when using external staffing agencies in healthcare organizations, for example impaired patient safety, deteriorating work environment and less effective wards (Adams et al. 2015, Bates 2013, Dziuba-Ellis 2006, Mazurenko and Perma 2015). Using external staffing pools is a costly solution; the cost incurred by the Swedish regions for temporary agency staff increased from SEK 1.9 billion in 2010 to SEK 4.6 billion in 2016, and continued to rise the subsequent years (SKL.se 2018-05-09). Due to this development, all 20 regions in Sweden operate in accordance with an agreement within Sveriges Kommuner och Landsting (SKL) since the beginning of 2017, with the goal to become independent of agency staff in the healthcare sector.

A measure to reduce the cost of external agency staff is to replace agency staff with less costly internal staffing agency in order to maintain the flexibility that such capacity pools create in staff scheduling (e.g. Adams et al. 2015, Bates 2013, Dziuba-Ellis 2006, Diaz et al. 2010, Lebanik and Britt 2015, Roach et al. 2011). For example, Region Västra Götaland in Sweden has decided to establish a region-wide internal staffing pool in order to become independent of costly temporary agency staff.

2.6. Queueing patients

The number of patients on waiting lists will increase when healthcare demand is higher than the available capacity (Alvekrans et al. 2016). This issue is present in all types of healthcare organizations and is an increasing problem in Sweden (Väntetider.se 2019-05-30). There are several examples in the literature, for example of surgical units where routine patients are queued due to lacking resources (Kim et al. 2000, Chow et al. 2011, Dobson et al. 2011). One issue with this solution is that, compared to other short-term solutions to create flexibility in capacity management, there is a risk that patients will not achieve healthcare within the statutory time frame. In worse case scenarios queueing patients can lead to fatal consequences for the patients (Kumar et al. 2018, GP.se 2018-02-20, DN.se 2018-01-30).

2.7. Purchasing care from external providers

A short-term flexibility solution that is commonly used among Swedish healthcare organizations is purchasing care from external providers (Dagensmedicin.se 2019-05-10, Sydsvenskan.se 2019-04-23, Regionorebrolan.se 2015-03-26). According to Kumar et al. (2018) strategic alliances between healthcare providers result in flexible operations and reduced variability in healthcare delivery. They further argue that rural hospitals depend on urban hospitals for specialty services, which is also the situation in Swedish healthcare organizations, where parts of healthcare supply is allocated to a few centers in the country. Jack and Powers (2006) found in their study that academic medical centers are reluctant to outsource volumes to external sources.

3. METHOD

3.1. The setting

Region Västra Götaland deliver care to approximately 1.7 billion inhabitants and is thereby accounting for 17 % of Sweden's population (Regionfakta.se 2019-09-01). The region consists of four multihospital groups with 12 individual hospitals, including 4 university hospitals and 8 rural hospitals, and 4 stand-alone hospitals. There are also 202 primary health centers and 28 emergency centers in the region. In addition, there are four private hospitals with contractual agreement with the healthcare provider in the region. There are capacity pools linked to specific parts of the healthcare system in the region, such as primary care and single hospitals.

Sahlgrenska University Hospital is one of the four multihospital groups in the region and also the biggest university hospital in Sweden, with 50 specialties. It covers all the specialties in the region and account for approximately 50 % of total healthcare costs in the region. The hospital has approximately 16,500 employees and 2,000 beds. It has 50 specialty departments such as Cardiology, Clinical Physiology, Children's medicine, and Psychiatry. A designated manager

heads each specialty department and the specialty department managers have the overall responsibility for the departments' capacity planning. Sahlgrenska University Hospital includes four hospitals and has also an internal staffing pool of mainly nurses and assistant nurses.

Different healthcare departments treat different patient groups with varying needs, and will therefore have diverse prerequisites for short-term flexibility in healthcare capacity management (Kumar et al. 2018). For example, primary care centers can book patients to waiting lists when the demand for healthcare is high, while emergency departments usually cannot reject patients when they appear in the emergency room. Hence, the differences between clinics affect which tools that can be used to achieve short-term flexibility in healthcare capacity management, and therefore a distinction between different departments is necessary. Healthcare departments can be differentiated on four levels, which in turn result in that the departments can be divided into different clusters depending on type of care:

- *Specialty*; mainly 1) surgical, 2) medical or 3) psychiatric care. Surgical patients usually require some kind of surgical procedure, while medical patients are in need of medical management that does not require surgical input. Psychiatric patients suffer from mental, emotional and/or behavioral disorders that require psychiatric help. In Sweden the classification of specialties is controlled by The National Board of Health and Welfare (SOSFS 2015:8).
- *Length of patient stay*; mainly 1) inpatient or 2) outpatient care. Inpatient care usually requires submission to a hospital ward, while outpatient care can be delivered at for example primary care centers or hospital receptions. The definition of inpatient and outpatient care is in Sweden outlined in the Swedish Health and Medical Service Act (HSL 2017:30).
- *Level of urgency*; mainly 1) acute or 2) planned care. Acute patients require immediate attention, usually within 24 hours, while planned care can be handled within a longer time frame (Socialstyrelsen.se 2019-09-01).
- *Type of organization*; 1) primary care center, 2) rural hospital or 3) university hospital. Primary care centers are responsible for the population's basic need for care and treat patients regardless of their age or illness. Hospitals deliver specialized care that cannot be supplied in primary care centers, and the difference between rural and university hospitals is primarily that university hospitals are responsible for education and usually conduct more extensive research (Socialstyrelsen.se 2019-09-01).

3.2. Design and data collection

The research was conducted in two steps. Firstly, a pre-study was conducted with personal interviews with ten specialty department managers at Sahlgrenska University hospital in order to determine relevant tools for volume flexibility. In order to ensure sample representativeness in this study, the specialty departments at the hospital were first classified dichotomously in three different dimensions: 1) mainly acute or mainly planned activities, 2) mainly inpatient or mainly outpatient activities, and 3) mainly medical or mainly surgical activities. The ten respondents were chosen from the total of 50 specialty department managers so that all eight possible combinations of dimensions, presented in figure 1 below, would be covered during the interviews. For example, combination one includes mainly medical specialties with mainly inpatient and acute activities.

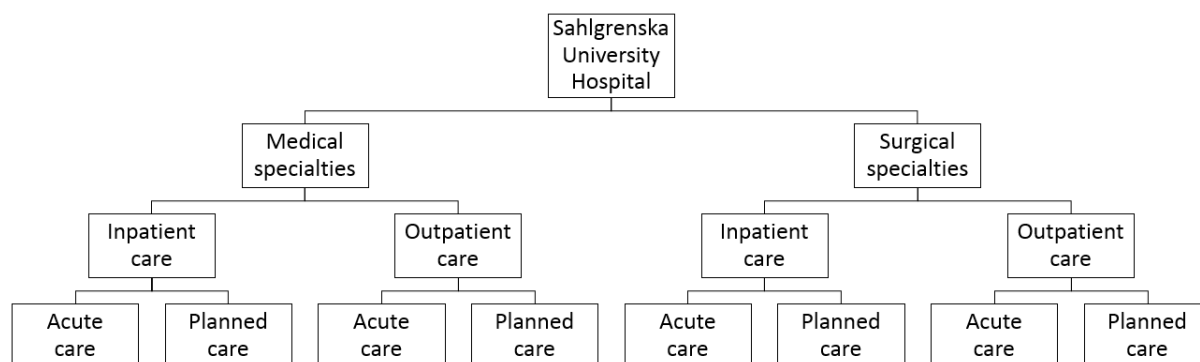


Figure 1: Eight types of specialty departments

Moreover, department managers at the primary health centers in the region was added to cover the local aspect of the healthcare system. The respondents described, among other things, what tools they use for short-term flexibility in capacity management. All interviews were recorded, transcribed and used as the basis for the data analysis through qualitative content analysis (Graneheim and Lundman 2004). Secondly, a survey study was conducted in order to validate the results from the interviews. Based on the results from the interviews together with our literature review, seven different tools were defined and selected to the questionnaire:

1. Overtime
2. Temporary staff from internal calling lists
3. Permanent staff moving between units
4. Internal staffing pools
5. External staffing agencies
6. Queuing patients
7. Purchase care from external healthcare providers

A web-based questionnaire was developed with questions regarding to what extent they use the seven different tools for short-term capacity management. The respondents were presented to the seven tools, and a seven-point Likert scale was used to record answers for each tool, where a lower value meant a lower level of usage. General questions regarding if the department has mainly acute/planned care, inpatient/outpatient care, and surgical/medical/psychiatric care were also asked. The purpose of that question was to validate the pre-classification of the specialty departments.

The questionnaire was tested on the interviewees in the interview study before distribution and after minor adjustments it was sent to 237 department managers in Region Västra Götaland. The questionnaire had a response rate of 44.7 % and the distribution of specialties represented by the participating respondents was in line with the distribution of specialties in the Region Västra Götaland. Hence, we proceeded under the assumption that the data were not characterized by nonresponse bias.

3.3. Data analysis

The general regression model used in the analysis of data was

$$y_t = \beta_0 + \beta_1 ACUTE + \beta_2 OUT + \beta_3 SUR + \beta_4 MED + \beta_5 RUR + \beta_6 UNI + \varepsilon$$

where

- y_t is the respondent's estimated value for tool item t
- *ACUTE* is the percentage of acute care (in contrast to scheduled care) at the unit where the respondent works
- *OUT* is the percentage of outpatient care (in contrast to inpatient care) at the unit where the respondent works
- *SUR* is a binary variable indicating whether the respondent works at a unit that primarily deals with surgical care (= 1) or primarily medical or psychiatric care (= 0)
- *MED* is a binary variable indicating whether the respondent works at a unit that primarily deals with medical care (= 1) or primarily surgical or psychiatric care (= 0)
- *RUR* is a binary variable indicating whether the respondent works at a rural hospital (= 1) or not (i.e., at a university hospital or in the primary care) (= 0)
- *UNI* is a binary variable indicating whether the respondent works at a university hospital (= 1) or not (i.e., at a rural hospital or in the primary care) (= 0)

Note that the respondent works at a unit that primarily deals with psychiatric care if $SUR = MED = 0$. Also note that the respondent works in the primary care if $RUR = UNI = 0$.

4. RESULTS

Table 1 displays descriptive statistics for the seven tools. As the mean values indicate, some tools are used to a larger extent than others. A repeated measures ANOVA rejected the null hypotheses that all groups have the same mean value ($F = 79.5, p < 0.001$).

Table 1: Descriptive statistics for the seven tools

Tool	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1. Using overtime	4.16	0.12	3.92	4.40
2. Calling temporary staff from internal calling lists	4.03	0.14	3.75	4.32
3. Moving staff between units	3.95	0.13	3.70	4.21
4. Using internal staffing pools	2.67	0.13	2.41	2.93
5. Using external staffing agencies	1.62	0.09	1.44	1.79
6. Queuing patients	3.03	0.13	2.77	3.30
7. Purchasing care from external providers	2.03	0.11	1.82	2.24

Seven different regression models were run in order to evaluate how the seven tools are used in different healthcare settings. The results are displayed in table 2. The VIF values were generally low, indicating that multicollinearity was not an issue.

Table 2: Results (standardized beta values) from the regressions

Variable	Model						
	1	2	3	4	5	6	7
<i>ACUTE</i>	0.246***	0.265***	0.027	0.251***	0.014	-0.267***	-0.116 ^δ
<i>OUT</i>	-0.075	-0.111*	-0.089 ^δ	-0.124*	-0.061	0.081	0.03
<i>MED</i>	0.229***	0.056	-0.015	-0.323***	0.057	-0.006	0.006

<i>SUR</i>	0.280***	0.224***	0.072	-0.156*	0.023	0.146*	0.310***
<i>RUR</i>	0.149*	0.041	0.192*	-0.134	-0.024	-0.039	0.211*
<i>UNI</i>	0.152*	-0.041	0.280***	-0.057	-0.266**	-0.114	0.158 ^δ
<i>R²</i>	0.15	0.14	0.07	0.14	0.06	0.12	0.120
<i>F</i>	13.5***	11.2***	5.2***	9.8***	3.9**	7.5***	6.7***
Note: *** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$ ^δ $p < 0.10$							

The results from the regressions can thus be summarized:

- The use of overtime is significantly positively correlated with a larger proportion of acute care. Further, overtime is used to a significantly larger extent in medical and surgical units, and it is significantly more common at rural and university hospitals.
- Calling in temporary staff from internal calling lists is significantly positively correlated with a larger proportion of acute care, but significantly negatively correlated with a larger proportion of outpatient care. This approach is also used to a significantly larger extent in surgical units.
- Moving staff between units is significantly more common at rural and university hospitals.
- The use of internal staffing pools is significantly positively correlated with a larger proportion of acute care, but significantly negatively correlated with a larger proportion of outpatient care. Such pools are also used to a significantly lower extent in medical and surgical units.
- External staffing agencies are used to a significantly lower extent at university hospitals.
- Queuing patients is a tool that correlates significantly negatively with a larger proportion of acute care, but it is a significantly more common strategy at surgical units.
- Purchasing care from external providers is significantly more common in surgical units and at rural hospitals.

5. DISCUSSION

In our study we found that the use of overtime is more common in healthcare organizations that provide mainly acute care. These findings are not surprising; the nature of this type of care implies that healthcare capacity is required within a short time frame, and in acute situations other short-term staffing solutions might not even be possible to apply. Moreover, we found that the use of overtime is significantly more common in rural and university hospitals compared to primary care centers, although we found in our literature review that overtime is used in all kinds of healthcare organizations (Brusco and Showalter 1993, Dobson et al. 2011, Gul et al. 2011). This result might be due to two reasons. Firstly, primary care centers usually have shorter bookings of patients, where each appointment lasts a limited amount of time, while

rural and university hospitals can have patients admitted to hospital wards for several days up to weeks. Planning capacity for shorter bookings ought to be an easier task than planning capacity for admissions that can vary between days and weeks, why overtime might be used less in primary care centers. Secondly, primary care centers are usually receiving patients only during daytime Monday through Friday, while hospitals usually are open for admissions both day and night, weekdays and weekends. Hence, if patients are admitted to hospital wards and capacity is lacking, it might be the easiest solution to use overtime, while primary care centers can have both time and prerequisites to find other short-term staffing solutions.

Although the use of overtime can provide a flexible solution to staff shortage and can improve service delivery (Jack and Powers 2004, Kortbeek et al. 2015), the solution is costly and there is a practical limit to what extent overtime can be used and accepted within a workforce (Brusco and Showalter 1993). According to Sebastiano et al. (2017) extensive use of overtime can result in for instance poorer job satisfaction and burnouts. The use of overtime is also a costly solution to short-term staffing and should therefore have a limited use. It is of importance to find alternative solutions for the healthcare departments that are significantly more often applying overtime, for example the use of capacity pools.

As found in our literature review, the use of on-call temporary staff is a similar solution compared to using overtime since it allows for flexibility in allocation of employees already part of the workforce that are required within short notice (Bloom et al. 1997). Hence, it is not surprising that we found that healthcare organizations which provide mainly acute care more commonly use temporary staff from calling lists as well as overtime. Another finding was that the use of temporary staff from calling lists is negatively correlated with a larger proportion of outpatient care. One explanation might be that inpatient facilities provide healthcare throughout the day which requires staff present at all times, while outpatient clinics have limited opening hours and can redirect patients to other healthcare providers instead of using costly short-term capacity solutions. Finally, we found that temporary staff using calling lists is more commonly used in surgical units. This might be a result of our sample; the surgical units might have a better access to former employees that are willing to work extra hours compared to other clinics in our sample. For example, one manager stated in the questionnaire that “we do not have any temporary staff to call”. Using temporary staff is a less costly solution compared to overtime (Bloom et al. 1997), but requires both the access to part time or per diem employees and that these employees are continuously updated on new routines and procedures. Furthermore, according to Sebastiano et al. (2017) the approach to use temporary part-time employees should be preferred compared to the use of overtime, since it reduces the risk of fatigue and decreased job satisfaction among the employees, which in the long-term leads to a more stable workforce and reduced costs.

In our study we found that moving permanent staff between units is significantly more common at rural and university hospitals compared to primary care centers. One reason for this might be that hospital departments usually have one or more hospital wards close in geography, often within the same building, which makes it more feasible to reallocate staff within a short time frame. Primary care centers are usually more isolated, both organizationally and geographically, and hence it is more complex to move staff between units. According to Qin et al. (2015) cross-training can result in benefits such as lower labor costs, higher quality and increased production flexibility. However, it requires that one or several employees are cross-trained and continuously updated on new routines and procedures to be able to move between units within a short time frame.

Internal staffing pools can be used to manage variations in the system and reduce workload when demand is unusually high, which in turn can lead to an enhanced work environment (Hultberg 2007, Kuntz et al. 2015, Mahar et al. 2015, Noon et al. 2003). In our study we found that the use of internal staffing pools is significantly correlated with a larger proportion of acute care. One reason might be that, if resources are scarce at several wards simultaneously, internal staffing pools could be directed from top management to prioritize wards with mainly acute care. We further found that the use of internal staffing pools is negatively correlated with a larger proportion of outpatient care, and the results of our study indicate that internal staffing pools to a lower extent are used in medical and surgical units. These findings might be a result of that several clinics in our sample currently are not connected to internal staffing pools. For example, one manager stated in the questionnaire that “internal staffing pools are not available for ‘my’ profession but would be a really good idea”. Moreover, medical and surgical units might prefer other short-term staffing solutions to using internal capacity pools for several reasons that is not revealed by the questionnaire. One manager answered that “we often contact the internal staffing pool but rarely get help from them”. The use of internal staffing pools is a measure to reduce the use and cost of overtime (Brusco and Showalter 1993, Bates 2013, Adams et al. 2015).

External staffing pools are costly solutions to manage variations in healthcare systems. As stated above, all 20 regions in Sweden operate in accordance with an agreement within Sveriges Kommuner och Landsting (SKL) aiming to become independent of external agency staff in the healthcare sector. This agreement most likely affects the result of our study, since all departments in Region Västra Götaland actively have been working towards reducing the amount of external staffing solutions. In our study we found that external staffing agencies are used to a significantly lower extent at university hospitals. One explanation to our findings might hence be that external staffing agencies have shortcomings when it comes to these areas at university hospitals, which often produce highly specialized care, and hence are used less frequent. Not only is the use of external staffing agencies a costly solution; several studies indicate other problems, in addition to the financial issue when using temporary agency staff in healthcare facilities (Adams et al. 2015, Bates 2013, Dziuba-Ellis 2006, Mazurenko and Perma 2015).

When healthcare demand and capacity are not balanced, a result is that queues will increase (Alvekrans et al. 2016). In our study we found that queueing patients is a tool that correlates significantly negatively with a larger proportion of acute care, which is an expected result due to the nature of urgent care. Moreover, we found that queueing patients is significantly more common at surgical wards. One reason that surgical wards are overrepresented under these circumstances might be that the surgical process is often quite complex with multiple actors involved, and when there is a lacking capacity in just one part of the chain, the surgery must be cancelled and therefore patients will be added to the waiting list. This is also found in the literature and there are several examples in the our literature review of surgical units where routine patients are queued due to lacking resources (Kim et al. 2000, Chow et al. 2011, Dobson et al. 2011).

Purchasing care from external providers were found in our study to be more common in rural hospitals, and according to Kumar et al. (2018) rural hospitals often depend on urban hospitals for specialty services. Moreover, according to Kumar et al. (2018) strategic alliances between healthcare providers result in flexible operations and reduced variability in healthcare delivery. Jack and Powers (2006) found that academic medical centers are reluctant to outsource volumes to external sources, which might be the reason to why purchasing care from external providers

was not significantly more common at university hospitals. Another finding in the study was that surgical units more commonly purchase healthcare from external providers. Shorter surgical interventions are quite convenient to outsource, since it usually results in a limited length of stay and often is a one-time intervention for the patient.

6. CONCLUSION AND FUTURE RESEARCH

In this study we have found where and to what extent the major types of tools for short-term flexibility is used among healthcare department managers. The results will have implications in future research on how capacity pools can be organized and implemented for different healthcare departments in order to increase operational flexibility and use resources more efficient. For example, the use of overtime is not only a costly solution for the healthcare departments, but also has a negative effect on work environment. It is therefore of importance to find alternative short-term staffing solutions to the departments that significantly more often apply the use of overtime. Moreover, departments that are overrepresented in queuing patients when capacity is lacking should find alternative solutions, especially if the healthcare is not provided within the required time frame. These departments are examples of clinics that could benefit from the use of a capacity pool, why future research should focus on how capacity pools could be designed, implemented and managed for clinics that use these types of short-term solutions. The results also have managerial implications for healthcare providers, since departments that apply costly short-term solutions for flexible capacity management would benefit from other less expensive and more efficient alternatives.

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