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DOING MORE WITH LESS: A CLIENT-CENTRED APPROACH TO HEALTHCARE LOGISTICS IN A NURSING HOME SETTING

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ABSTRACT

Doing More with Less: A Client-Centred Approach to Healthcare Logistics in a Nursing Home Setting

Dutch nursing homes are currently confronted with two seemingly incompatible goals: a more client-centred approach and the necessity to reduce costs at the same time. It is becoming increasingly apparent that healthcare logistics can contribute to providing high-quality care and

support at a reasonable cost. Moreover, care and support which takes the client's preferences as starting point. A literature study revealed that there is very little in terms of a framework for healthcare logistics that embodies both aspects. Therefore, the authors developed a conceptual framework that meets both requirements. Existing insights on client-centredness and healthcare logistics were used to develop the framework, which offers a structure for both future research and practice in healthcare logistics in nursing home care. This paper reveals that further empirical research is needed to better understand how variability, volume and predictability are interrelated and how they influence the plannability of healthcare activities in terms of what, when, where and by whom.

Keywords

Healthcare Logistics, client-centred care, client perspective, customer perspective, healthcare planning, variability, volume, predictability

SAMENVATTING

Meer met minder doen: een cliëntgerichte benadering van zorglogistiek in een verpleeg- en/of verzorgingshuissetting

Nederlandse verpleeg- en verzorgingshuizen zien zich geconfronteerd met twee schijnbaar tegengestelde opdrachten: het vergroten van de invloed van de cliënt op de zorgverlening en zorglevering, ook wel vraagsturing genoemd en het reduceren van de kosten. Steeds duidelijker wordt dat zorglogistiek een belangrijke bijdrage kan leveren aan het betaalbaar houden van een kwalitatief goede zorg- en hulpverlening. Zorg- en hulpverlening die bovendien de wensen van cliënten als vertrekpunt kiest. Uit literatuuronderzoek blijkt dat er geen zorglogistiek denkraam voor een verpleeg- of verzorgingshuissetting bestaat waarmee beide opdrachten gelijktijdig kunnen worden beschouwd. Deze constatering is voor de auteurs aanleiding geweest om een denkraam of model te ontwikkelen dat wel aan deze eis voldoet. Daarbij is gebruik gemaakt van bestaande inzichten over vraagsturing en (zorg)logistiek. Het gepresenteerde model biedt aanknopingspunten voor toekomstig onderzoek en praktijkbeslissingen op het gebied van zorglogistiek in een verpleeg- en/ of verzorgingshuissetting. Deze paper laat zien dat toekomstig onderzoek nodig is om meer inzicht te krijgen in hoe variabiliteit, volume en voorspelbaarheid onderling samenhangen en de mate van planbaarheid van zorgactiviteiten in termen van wat, wanneer, waar en door wie.

Trefwoorden

Zorglogistiek, vraaggestuurde zorg, cliëntperspectief, klantperspectief, variabiliteit, volume, voorspelbaarheid

INTRODUCTION

Healthcare that defines the client's needs and preferences as a starting point in shaping care delivery practices and all supporting services seems logical and necessary. Although Dutch healthcare providers increasingly recognize client-centredness as a major quality-of-care goal (Van der Eijk, Faber, Aarts, Munneke & Bloem, 2012), in general, the influence of clients on the actual delivery of healthcare is still very limited (KPMG-NIVEL, 2010). Dutch nursing home residents in particular, who are often highly dependent on assistance with basic activities in daily living, still have little or no influence on their daily routine (Hamers, 2011). For example, if a nursing home resident requires assistance with toileting, it should be available 24 hours a day. In practice this is often not the case, which is an important reason why one out of five residents suffer from faecal incontinence and one out of six urinary incontinence within the first three months of their stay (Van Houten, 2008).

In addition to the pressing need for a more client-centred approach, the Dutch healthcare system is also challenged by increasing costs. According to former finance minister Jan Kees de Jager, rising healthcare costs is the matter of most concern to the Dutch treasury:

> We will survive the European debt crisis. And the 18 billion euros in cutbacks that this cabinet wants to carry out will also succeed. But my biggest concern is ever-growing healthcare costs. The costs of healthcare have risen by four percent per annum over the past decades, where the average GDP growth has been two percent. This is mathematically unsustainable. (Netherlands Info Service News Bulletin, 2011)

The share of public spending on long-term care has become a central issue. This is due to an expected significant rise in demand for long-term care, which will increasingly exceed the supply of care workers over the next decades (Geerts, Willemé & Mot, 2012). As Dutch nursing homes play an important role in the provision of long-term care for dependent elderly, they are confronted with two seemingly incompatible goals: a more client-centred approach and the necessity to

reduce costs at the same time. Due to the increasing financial pressure, there is a considerable risk of decisions being made hastily and without a sound rational basis. When decisions are made more or less arbitrarily without clear guidance, they often lead to suboptimality and/or only temporary improvements.

It is commonly believed that logistics can contribute to providing high-quality care in a more cost-efficient manner (Bakker, 2004; Luijks, Putters & De Roo, 2005; Nachtmann & Edward, 2009; Verkooijen, 2006). As such, we believe a conceptual framework for healthcare logistics combining a client-centred approach and the efficient use of resources is an important means of providing guidance for both future research and the key decision-makers in nursing homes.

This study aims to outline the current status of research on healthcare logistics for nursing home care and to integrate the related literature to develop a conceptual framework that provides guidance for both future research efforts and practice.

As the term "conceptual framework" can be confusing it is important to define the meaning of the phrase. For this study, we defined "conceptual framework" as "a simplified representation of selected aspects of a phenomenon aiming to conceptualize this and to allow explanations of relationships to be framed and tested" (Miller & Wilson, 1983). The conceptual framework presented in this article is designed to provide a more structured and integral approach to the understanding of the aspects that are of importance when it comes to healthcare logistics in a nursing home setting.

DESIGN AND METHODS

The objective of this study was achieved through a three-step research process:

1. Conducting a comprehensive literature review on frameworks, models or concepts in "healthcare logistics", designed for, or of use in, organizing healthcare activities in a nursing home setting.
2. Defining the key concepts of this study, i.e. "client-centred care" and "healthcare logistics".
3. Building the conceptual framework, with the results of steps 1 and 2 as a starting point. To give further substance to the separate elements of the framework, we made use of generally accepted and applied concepts/theories, practical experience and logical reasoning.

A LITERATURE REVIEW

This section describes our systematic review of the literature on existing frameworks for healthcare logistics designed for, or of use in, organizing healthcare activities in a nursing home setting.

Search strategy

Existing models of "healthcare logistics" were identified through an electronic search of the literature using the databases PubMed, ScienceDirect and Google Scholar from January 2003 to April 2012. The following Boolean combination was used for the search: "(healthcare logistics OR health care logistics OR patient logistics OR patients logistics) AND (framework OR model OR concept) AND (customer centered OR client centered OR patient centered OR demand led OR customer led OR patient led OR patient driven OR user driven OR demand driven OR customer driven)". We performed the literature search on 8 April 2012.

All of the literature identified (including grey literature) was examined. Derived from the background and purpose of this study, we set our inclusion criteria as follows:

- The models, frameworks or concepts found should include both the needs/preferences of individual clients and efficiency as relevant aspects of healthcare logistics.
- They should be designed for, or of use in, organizing healthcare activities in a nursing home setting.

Finally, the references from the literature selected were screened thoroughly for possibly relevant studies or literature using the same criteria cited above (also known as the "snowball method").

Search outcome and conclusions

The search method resulted in a total of 125 "hits". We then examined the titles and/or abstracts of these "hits" to determine their match with the inclusion criteria. Only one publication met the inclusion criteria. We analysed the full text of this study and screened the references for possible relevant publications. This search strategy resulted in only two usable publications.

Based on this literature study we can conclude that there is very little available in terms of a conceptual framework for organizing nursing home care, let alone a framework which embodies a

client-centred approach as well as the logistic aspects involved. The vast majority of the literature available on healthcare logistics focuses on care provided in a hospital setting. The OERmodel (Verkooijen, 2006), which is also used in the study by Moeke and Verkooijen (2010), was the only concept we found that uses a client-centred approach for organizing healthcare activities in a nursing home setting. Therefore, the knowledge gained from these two publications was used as initial guidance in the development of the conceptual framework. The OERmodel is the result of a doctoral dissertation study and can be described as an action and organization model which uses a client-centred approach to organize healthcare activities. It provides concrete guidance to healthcare workers in both nursing homes and homecare organizations.

CLIENT-CENTRED CARE AND HEALTHCARE LOGISTICS

This section provides an explanation of the key concepts of the conceptual framework: "client-centred care" and "healthcare logistics".

Client-centred care

There is growing recognition that client-centred care, also referred to as patient-centred care, is fundamental to high-quality healthcare. In most Dutch nursing homes, client-centred care is one of the overarching goals, in addition to more influence of the client on the actual delivery of healthcare. Schoot, Proot, Ter Meulen and De Witte (2005) state that "clients experience care as client-centred when they feel recognized and respected by caregivers and when they experience autonomy with respect to the way in which care is delivered". In practice, this means that clients do not want to adjust their lives to the schedule of care workers, but want to influence the delivery of healthcare.

The degree of influence an individual client desires is strongly related to the need for "self-directing". Self-directing in a healthcare setting is defined by Verkooijen (2006) as "the organization and/or coordination of one's own life with the objective of having a good life – in one's own opinion". Personal and environmental factors determine the extent to which a client feels the need for "self-directing". According to the OERmodel (Verkooijen, 2006), every client has their own specific preferences: it is not the average client, but the individual who is the measure. Multiple studies show that especially among nursing home residents, there is a strong need for self-directing because they often depend on assistance with basic activities in daily life, due to chronic physical conditions or mental disability (Van Bilsen, Hamers, Spreeuwenberg & Groot,

2006, 2008). In accordance with this need for self-directing, Verkooijen (2006) concluded that client-centredness can be understood as the extent to which the healthcare delivery meets the client's preferences, in terms of:

1. The moment (day and time) at which the care is delivered (*When?*).
2. The place where the care is delivered (*Where?*).
3. The person who provides the care (*Who?*).
4. The form and content of the care delivered (*What and how?*).

From a caregiver's perspective, the OERmodel is consistent with the concept of "empathy in nursing", which is defined by Vanlaere, Timmerman, Stevens and Gastman (2012) as: "an interactive and dynamic process in which caregivers develop feeling for and generate insight into what is at stake for the client, which is then reflected in their actions". According to Vanlaere *et al.* (2012), empathy consists of three dimensions: 1) a cognitive dimension, 2) a behavioural dimension, and 3) an affective dimension.

The OERmodel only encompasses the cognitive and behavioural dimensions of empathy. The cognitive dimension refers to the fact that caregivers should develop insight into the client's perspective and their frame of reference. In addition to a cognitive dimension, both concepts include a behavioural dimension: the caregiver uses skills to communicate to the client that they are understood. According to the concept of "empathy in nursing", a caregiver should also be affectively moved by what is happening to the client and should be internally motivated to understand the client. This so-called affective dimension is not discussed by Verkooijen (2006).

Healthcare logistics

Healthcare logistics is a relatively new and multidisciplinary field of research. In a search for more clarity and focus, we have decided to use a client-centred approach to define and conceptualize healthcare logistics. Therefore, in this study healthcare logistics is defined as: "the control of treatment/care/support activities and the related staff planning, information and flow of goods in such a way that the preferences of clients/patients will be met cost effectively" (Moeke & Verkooijen, 2010). In this definition the preferences of the individual client are taken as the starting point. This definition of healthcare logistics forms the foundation of the conceptual framework, together with the concept of client-centredness as presented in this section. Figure 1 shows how the preferences of a client influence healthcare activities in terms of moment, place, person and form and content.

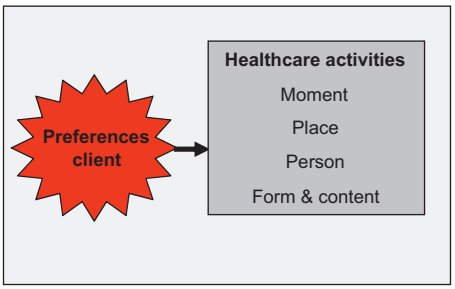

Figure 1: The influence of client preferences on healthcare activities.

BOUNDARIES TO A CLIENT-CENTRED APPROACH

Since healthcare always takes place within the "client-healthcare professional-organization" triangle, client-centred care is never a matter of "you name it, we've got it". This section discusses four important boundaries.

Verkooijen (2006) states that the following boundaries are of importance when it comes to organizing healthcare:

1. The professional responsibility of the caregiver.
2. The organizational responsibility of the healthcare provider.
3. Generally accepted norms and values.
4. The healthcare budget and/or the client's own financial resources.

With regard to the Dutch healthcare system, these boundaries have all been translated into laws and regulations.

The professional responsibility of the caregiver

First of all, the influence of an individual client is limited by decisions made by caregivers based on professional guidelines and insights (Verkooijen, 2006). These guidelines and insights mainly relate to the form and content (what and how) of healthcare activities (see Figure 2).

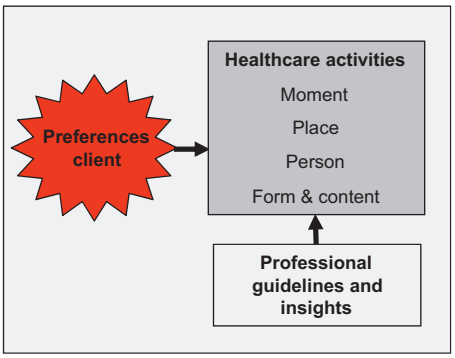

Figure 2: The influence of professional guidelines and insights on healthcare activities.

Organizational responsibility and generally accepted norms and values

Secondly, the influence of a client is also shaped by the organizational responsibilities of a healthcare provider. Although clients are the most important stakeholders, they are definitely not the only ones. A nursing home also has to take the claims of other stakeholders into account, such as employees, other organizations in the supply chain, and society. In other words, a nursing home always has to balance organizational responsibilities towards multiple stakeholders. This limits client influence. In addition, a client should adhere to generally accepted norms and values. As such, these are also regarded as an important boundary.

Organizational responsibilities and generally accepted norms and values should be translated into strategic guiding principles which reflect the principles and priorities of the organization. In the study by Moeke and Verkooijen (2010), a Mission and Vision Statement, Logistics Objectives, a Strategy and a Logistics Control Philosophy are considered to be important guiding principles (see Figure 3).

According to Bart (1999), a "mission statement reflects why an organization exists and what it is trying to accomplish". It should capture the unique and enduring purpose of the healthcare organization, and therefore it rarely changes (Schwartz & Cohn, 2002). When a client-centred approach is considered important by a nursing home, it should be explicitly expressed in the

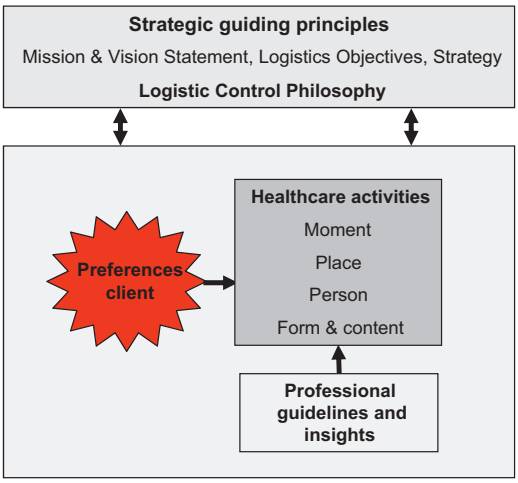

Figure 3: The influence of strategic guiding principles on healthcare activities.

mission statement (Verkooijen & Elderhuis, 2005). The mission statement serves as the basis for the *vision statement*, which can be defined as an aspirational description of what an organization would like to achieve or accomplish – an image of the future the organization seeks to create (Bart & Hupfer, 2004; Levin, 2000; Spallina, 2004).

Logistics Objectives can be seen as a translation of the vision into specific logistics performance goals. In terms of the logistics performance of an organization, both efficiency and effectiveness play a crucial role (Moeke & Verkooijen, 2010; Van Amstel & Verstegen, 1991). From a client-centred care perspective, in which the client's preferences are the starting point for the delivery of care (Bosman, Bours, Engels & De Witte, 2008), effectiveness can be defined as the extent to which the preferences of the client are being met (Moeke & Verkooijen, 2010). Efficiency, on the other hand, refers to the degree to which resources are being used concisely (Chow, Heaver & Hendriksson, 1994). Finding an optimal balance between effectiveness and efficiency is one of the essential tasks of logistics management (Van Amstel & Verstegen, 1991).

Strategy can be described as a long-term approach to achieving the objectives of an organization. The essence of strategy in a competitive environment is to establish a sustainable competitive advantage, that is, combine activities in such a way that they deliver on a unique mix of

values (Porter, 1996). Treacy and Wiersema (1993) proposed the following three generic value dimensions:

1. *Operational Excellence:* organizations pursuing operational excellence focus on making their operations lean and efficient.
2. *Customer Intimacy:* organizations pursuing customer intimacy continually tailor and shape products and services to fit an increasingly refined definition of the customer.
3. *Product leadership:* companies pursuing product leadership strive to produce a continuous stream of state-of-the-art products and services.

Treacy and Wiersema (1993) argue that an organization should focus on a specific value proposition, while meeting threshold standards in the other dimensions of values.

The Mission and Vision Statement, Logistics Objectives and Strategy should be encapsulated in a *Logistics Control Philosophy*, which can be described as the extent to which the preferences of the individual client should be determinative for care delivery. We distinguish three types of logistics control philosophies (Moeke & Verkooijen, 2010): supply-driven, demand-driven and demand-led. "Supply-driven" means that the client has no influence on care delivery in terms of when, where, by whom, what and how. "Demand-driven" care can be positioned between the other two approaches, with client influence often limited to a choice from a set of predefined options. "Demand-led" is regarded as the most extreme form of client-centred care, in which the preferences of the individual client determine care delivery. While the logistics control philosophy should be consistent with the strategic guiding principles and take into account client preferences and the professional guidelines and insights, there is no "one best choice".

The healthcare budget and/or the client's own financial resources

Because of resource limitations, the extent to which individual client preferences are being met always has an optimum: delivered care as a result of the clients' preferences without sacrificing too much efficiency which is another important factor that the healthcare providers must take into account (Bohmer, 2005).

A BALANCE BETWEEN PLANNING AND REACTING

To operate efficiently in an uncertain environment, healthcare facilities should establish an appropriate balance between planning and reacting (Verkooijen, 2006; Merode, 2002). Planning,

in this context, is defined as making informed and detailed decisions about future healthcare activities in terms of when, where, by whom, what and how. Reacting, on the other hand, refers to dealing with random, unexpected healthcare demand. Healthcare facilities can be considered as dynamic systems in constant need of control, coping with the need to be robust and steadfast to ensure a "basic level of efficiency", and at the same time having the ability to deal with the unexpected. Therefore, the need for both planning and a flexible ability to react is always present. Visser and Van Goor (2006) refer to this as "Logistics control".

Insight into the extent to which different healthcare activities in a nursing home are plannable is crucial, as it has consequences for the overall organizational design and for how specific activities should be organized. Therefore, the framework has been extended to incorporate four essential aspects of logistics design: 1) Logistics structure, 2) Logistics ICT, 3) Logistics organization, and 4) Capacity planning (see Figure 4). In terms of the first three aspects of this extension, we made use of the "Integral Logistics Concept" (Visser & Van Goor, 2006), which based on the "Total Logistics Concept" developed by Verstegen (1989). Verkooijen (2006) refers to "Capacity planning" as an important design aspect of healthcare logistics in a nursing home setting. Although we believe these four aspects of logistics design are important, it is not within the scope of this study to describe them more fully.

The optimal balance: a black box

When it comes to determining the optimal balance between planning and reacting in a nursing home setting, the current literature is limited with respect to demonstrating which variables are of importance, and thus this largely remains a black box (see Figure 4). Verkooijen (2006) has also stated that more research is needed to better understand when, why and how working with care routes has positive effects on client-centredness as well as productivity. In the following section we will take a glimpse inside the black box using valuable insights from related areas of research.

A GLIMPSE INSIDE THE BLACK BOX: VARIABILITY, VOLUME AND PREDICTABILITY

Literature on operational hospital planning shows that the plannability of healthcare activities is largely influenced by the following three interdependent variables: (1) variability, (2) volume and (3) predictability (De Bruin, Van Rossum, Visser & Koole 2007; Joustra, Van der Sluis & Van Dijk, 2010; Upshur, Moineddin, Crighton, Kiefer & Mandani, 2005; Van Oostrum, 2009). The following subsections will discuss each of these in more detail. Some examples will serve to illustrate that

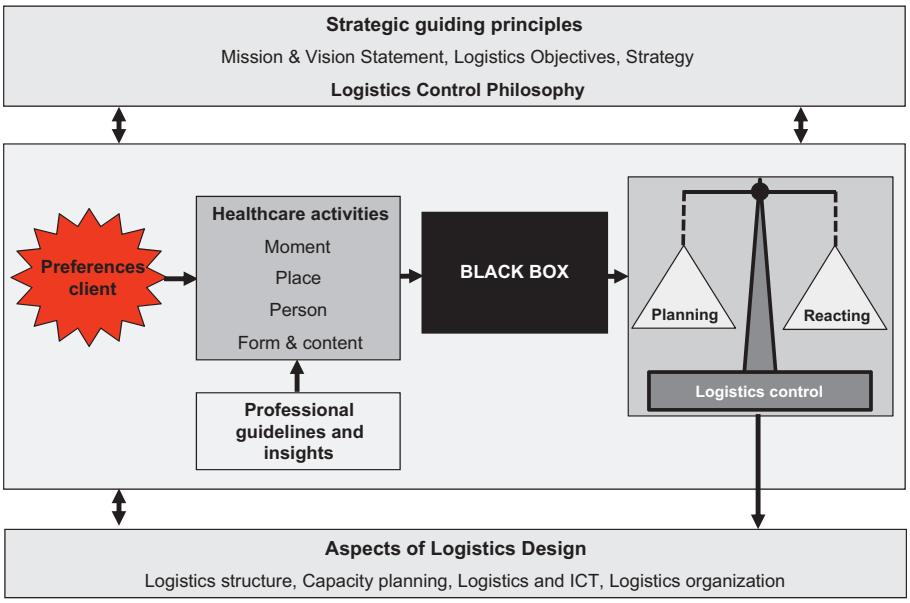

Figure 4: The optimal balance between planning and reacting: a black box.

variability, volume and predictability are of relevance, not only to healthcare planning in a hospital setting but also to the planning of healthcare activities in a nursing home.

Variability

Figure 5 presents the demand for healthcare activities during a regular day (i.e. number of clients in need of support) in a department within a Dutch nursing home facility. It shows that the demand varies during the day. As most clients wake up between 7 a.m. and 10 a.m. and are in need of assistance to get out of bed and with personal hygiene, a high demand can be observed during this time. The figure also shows a peak in demand around 5 p.m., due to an increased need for assistance with toileting after the regular afternoon tea at 4 p.m.

Variation or variability refers to *the degree* to which the required healthcare activities vary over time, with regard to the aspects of when, where, by whom, what and how. The need for reactive capability increases, and the potential for efficient and effective planning decreases, when there is

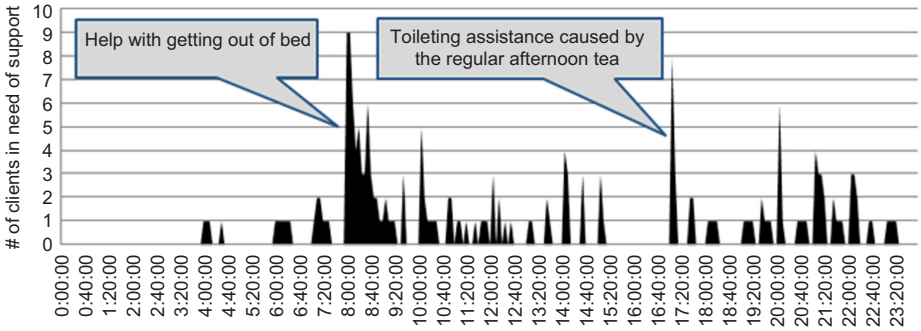

Figure 5: Variability in healthcare activities.

a high variability. According to Litvak and Long (2000), healthcare organizations should distinguish between *natural variability* and *artificial variability.* Natural variability, also known as "common cause variation" (McLaughlin, 1996), is random variation and inherent to the system. This type of variability cannot be eliminated or even reduced, but must be optimally managed. The high demand between 7 a.m. and 10 a.m., due to the need for assistance in getting out of bed and with personal hygiene is an example of natural variability.

Artificial variability, or "special cause variation" (McLaughlin, 1996), is created by the way the system is set up and managed. Unlike natural variability, artificial variability can and should be eliminated. The great need for assistance with toileting around 5 p.m. is an example of artificial variability. The afternoon tea at 4 p.m., initiated by the caregivers, causes an increase in the need for assistance with toileting in the next hour.

The general approach to dealing with variability is 1) to reduce artificial variability in the system and 2) to ensure that the system has sufficient reactive capability to cope with natural variability.

Volume

In this study we define volume as the frequency with which specific healthcare activities are needed (Moeke & Verkooijen, 2010). Variability and volume are interrelated due to the *pooling principle*. The pooling principle suggests variability is reduced when demand is aggregated across different locations, because it becomes more likely that high demand from one client will be balanced by low demand from another. This phenomenon has been researched extensively in the context of inventory

pooling (Cooper & Kim, 2005; Benjaafar & Eppen, 1979; Yang & Schrage, 2009). Figure 6 provides an example of the pooling principle applied in a nursing home context. On the first floor of a nursing home there are four residents in need of care and on the second floor there are three residents in need of care. Each client has their own time preference concerning the delivery of healthcare and two healthcare workers are available. When scheduling both floors separately and assigning one staff member to each schedule, the volume is insufficient to meet the individual preferences. By merging the scheduling of the two floors, thus increasing the volume, it becomes possible to meet all preferences with the same number of staff. Economic advantages that result from carrying out a process on a larger scale are also referred to as "economies of scale" (Koole & Pot, 2006).

1st floor			
Client	Time preference	Actual healthcare delivery	Meeting preferences?
1	7:00	7:00	YES
2	7:30	7:30	YES
3	8:00	8:00	YES
4	**8:00**	**8:30**	**NO**

2nd floor			
Client	Time preference	Actual healthcare delivery	Meeting preferences?
5	7:30	7:30	YES
6	**8:30**	**8:00**	**NO**
7	8:30	8:30	YES

1st + 2nd floor			
Client	Time preference	Actual healthcare delivery	Meeting preferences?
1	7:00	7:00	YES
2	7:30	7:30	YES
3	8:00	8:00	YES
4	8:00	8:00	YES
5	7:30	7:30	YES
6	8:30	8:30	YES
7	8:30	8:30	YES

Figure 6: The pooling principle.

Predictability

Finally, the balance between planning and reacting is also influenced by the *predictability* of healthcare activities. In this study, predictability is defined as the degree to which a correct

prediction or forecast of the required healthcare activities can be made either qualitatively or quantitatively with regard to the aspects of when, where, by whom, what and how.

For example, we know from experience that during the broadcast of an important football match male nursing home residents postpone their toilet visit. Therefore, it can be predicted that there will be an increase in the need for assistance with toileting during the 15-minute break at halftime and at the end of an important match.

The need for reactive capability increases and the potential for efficient and effective planning decreases when healthcare activities become less predictable. In addition, there is a relationship between the predictability and volume or scale. Berg, Schellenkens and Bergen (2005, p. 79) argued that, generally, healthcare activities are better predicted at a more aggregated level:

> Given adequate numbers, even an emergency consultation or admission is predictable at an aggregate level, and can thus be planned for. It can be predicted how many patients will visit an outpatient clinic without a scheduled appointment each day, or how many emergency surgeries come to the hospital daily.

Figure 7 shows how the variability, volume and predictability of healthcare activities are interrelated and how they influence the balance between planning and reacting.

CONCLUSION AND DISCUSSION

Most nursing home residents are in need of ongoing assistance with activities in daily living, due to physical or psychological disabilities. This makes them vulnerable to, and dependent upon the way in which nursing homes are organized and the healthcare workers caring for them. Unfortunately, recent research shows that nursing home residents still have little influence on their daily routine in terms of when, where, by whom, what and how. Hence, nursing homes struggle to give substance to client-centred care. A complicating factor is that most nursing homes are experiencing increasing financial pressure, which in turn increases the risk of an over-emphasis on efficiency at the expense of the client's needs and preferences. In our opinion, the ultimate goal of a nursing home is to facilitate the self-directing of nursing home residents in such a way that it becomes possible for each resident to live the life they prefer. Although we realize that due to increasing resource limitations, this goal can never be fully realized, we do believe nursing homes have the social responsibility to attempt to achieve this goal as best they can. The conceptual framework

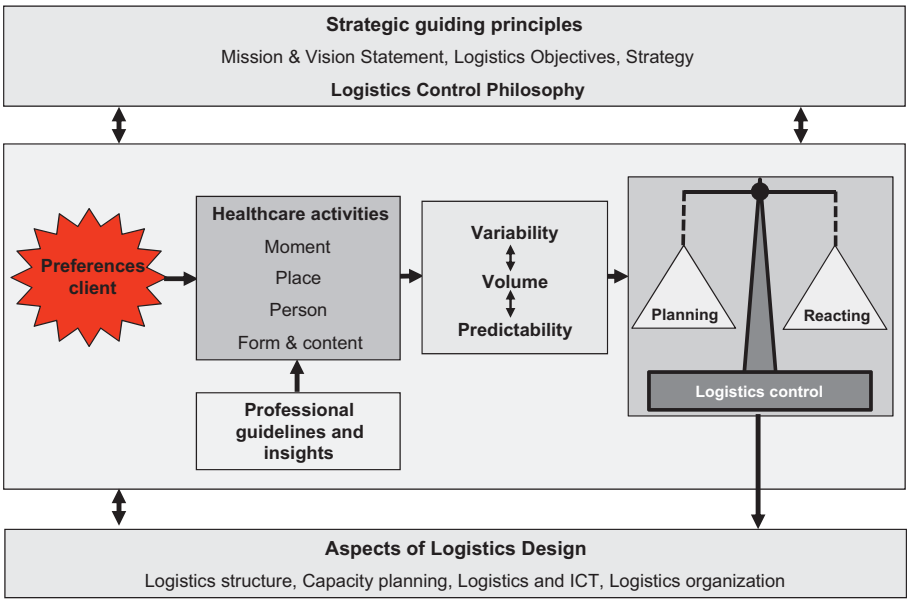

Figure 7: Variability, Volume and Predictability.

presented in this paper provides guidance in the search for a more optimal balance between client-centredness and efficiency.

The literature study revealed that there is very little available in terms of a framework for healthcare logistics which embodies both aspects. As such, we used existing insights on client-centredness and healthcare logistics as a starting point for the development of the framework. Generally accepted and applied concepts/theories, practical experience and logical reasoning were used to give further substance to the separate elements of the framework. As research on healthcare logistics in a nursing home setting remains scarce, we challenge researchers to collaborate on further research in this field.

It can be concluded that further empirical research is needed to better understand how variability, volume and predictability are interrelated and influence the plannability of healthcare activities. However, this should not be simply interpreted and applied as an efficiency-enhancing focus, overlooking the heart of the matter. The biggest challenge for future research will be to not lose

sight of the individual client's needs and preferences with respect to healthcare delivery and in terms of when, where, by whom, what and how as the starting point. Needs and preferences are driven by the desire to enjoy what in one's own opinion is a good life. This is something that should always be kept in mind when conducting research in this area.

The following research questions could be of interest as a starting point for further investigation:

1. How does volume or scale affect the plannability of healthcare activities in a nursing home setting in terms of effectiveness and efficiency?
2. How does variability influence the plannability of healthcare activities in a nursing home setting in terms of effectiveness and efficiency?
3. How predictable are the healthcare activities, when taking the nursing home residents' preferences as the starting point?
4. How can the optimal balance between planning and reacting be determined?
5. How are the aspects of variability, volume and predictability interrelated?

Finding usable data constitutes another challenge for future research in this field, as reliable and valid information on the when, where, by whom, what and how of healthcare activities is scarce and seldom collected.

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