

# Customization and personalization in clinical pathways using a modular perspective

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## Abstract

We study if and how personalization affects the way modularity enhances customization in cancer care, i.e. oncological care pathways. In earlier research, customization and personalization in modular service offerings have been investigated in elderly care. In our research, we build on this in the context of cancer care. Moreover, instead of taking existing treatment offerings as given, we put patients' needs and wants at the center of interest in the modular (re-) design of care pathways. In this way the current study contributes to the call for research on how the implementation of modularity influences the customers' service experience.

**Keywords:** Modularity, Customization, Personalization

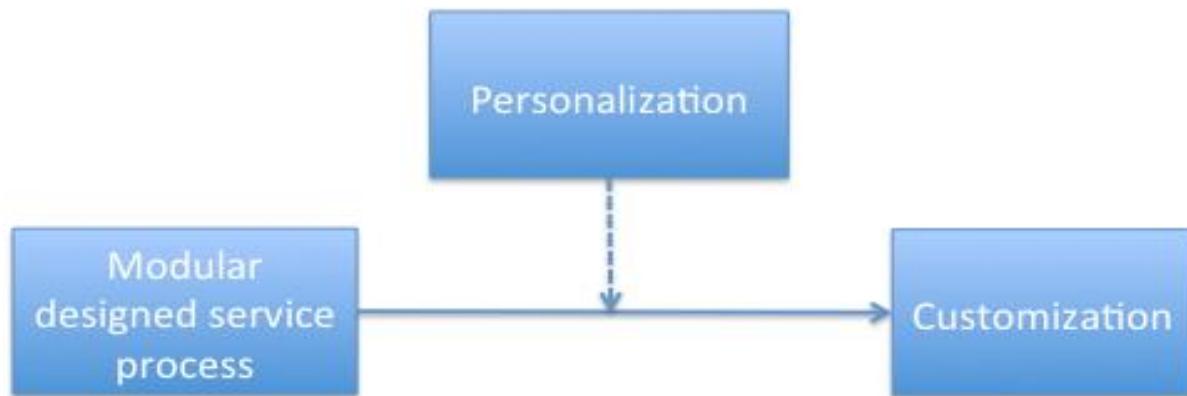
## Introduction

Modularity emerged in a manufacturing environment and is increasingly investigated in service settings (Bask et al., 2010, Brax et al., 2017). It concerns the decomposition of a product or service in *components* that can be managed independently and used interchangeably (Eissens-van der Laan et al., 2016). Those components can be mixed-and-matched in a variety of ways and combined to form a functional whole (Vähätalo, 2012).

Modularity is well-known for its potential to enhance variety in product offerings without major cost increases. This variety is needed to achieve *customization*. Gobbi & Hsuan (2012) researched customization in cancer care and found that it may take place in the specification of the clinical pathway, when different components of modular cancer care are combined. De Blok et al. (2013) investigated how *personalization* may further stimulate customization in modular service provision. They argue that both personalization and customization are used to tune something to individual client preferences. “For customization, this is the content of the service: the ‘what’ of service provision. For personalization, this is the way in which the service is delivered to the customer: the ‘how’ of service provision” (p.18).

### *Research objective*

In this paper we study if and how personalization affects the way modularity enhances customization in cancer care, i.c. oncological care pathways. In earlier research (De Blok et al., 2013), customization and personalization in modular service offerings have been investigated in elderly care. In our research, we build on this in the context of cancer care. Moreover, instead of taking existing treatment offerings as given, we put patients’ needs and wants at the center of interest in the modular (re-) design of care pathways.



*Figure 1: Conceptual framework*

### **Theory**

Modularity emerged in a manufacturing environment (Starr, 1965), and a few studies have investigated the concept in service settings (e.g. Voss & Hsuan, 2009). In recent years, modularity has gained attention in healthcare as it can help address the pressing societal demands in this sector (e.g. Bohmer, 2005), including cost containment and at the same time achieving patient centeredness (De Blok, 2010, Van der Laan, 2015).

Modularity concerns the decomposition of a product or service in components that can be managed independently and used interchangeably. Interfaces are linkages shared among components. They manage the interactions and connections of components when they are combined into a final offering (Peters et al., 2018). Those components can be mixed-and-matched in a variety of ways and, during a service specification process, combined to form a functional whole. Therefore, modularity can enhance variety in service offerings without major cost increases (De Blok, 2010, Van der Laan, 2015, Silander et al., 2017). This variety is needed to achieve *customization* (De Blok et al., 2013, Minvielle et al., 2014).

We define customization as a method to meet the individual needs of customers by constructing products or services (Pine, 1993). To achieve customization and address heterogeneous customer demands, organizations develop largely standardized components and modules that can be employed efficiently in a variety of configurations (Salvador, 2007). The

application of modularity in service provision is influenced by human behavior since services generally come into existence in close interaction between producers and customers (e.g. Sampson and Froehle, 2006). During these encounters service employees adapt the service offering in accordance with customers' needs and requirements (e.g. Gwinner et al., 2005). In modular services, thus, customization is often achieved by service workers who collect and configure the necessary components for each client (Meyer and DeTore, 2001, Voss and Hsuan, 2009). Two different manners can be recognized regarding the way in which customization is effectuated in modular service delivery processes (De Blok et al., 2013):

- Combining menu components: modularity is applied via a range of options from which several components are combined or arranged according to customer specification.
- Changing dimensions of the prototype: modularity can also be applied by a prototype of components which can be tailored to suit customer requirements. Here the components of the prototype are modified or unique modules are created and added to the prototype to provide a service package according to customer specification.

Service provision is heavily dependent on the close interactions between health care providers and patients. Thus, besides the mixing-and-matching of components to individualize customers' needs, modular service provision should also be about responsiveness and interactions to the needs and values of patients (McLaughlin & Kaluzny, 2000). To achieve these individualized interactions and better match the needs of customers, *personalization* should be applied. Personalization focuses on 'how' services are delivered (De Blok et al., 2013). It is defined as the adaptation of employee interpersonal behavior such that it suits a customer's preferences (Gwinner et al., 2005). The aim of personalization is to individualize the way in which services are delivered. Personalization can be applied during the specification of the desired service package offered (Piller, 2007; De Blok et al., 2013) or during the service delivery (Gwinner et al., 2005; Gobbi & Hsuan, 2012). For example, Surprenant and Solomon (1987) recognized two different types of personalization in the service delivery process, namely:

- Pro-forma personalization: the way services are personalized by adapting aspects such as small talk. An employee is often adapting a routinized and efficient script while doing this; this mode of application is rather standardized.
- Attentive personalization: the way services are personalized by tuning interactions and communication to the specific and individual needs of the client. This is established by adapting and combining interpersonal behavior aspects, such as vocabulary. In the health care industry, the ability of professionals to adjust their interpersonal behavior in a situationally manner increases patient satisfaction and compliance (Gwinner et al., 2005).

Both customization and personalization are used to serve the specific and individual needs of customers. However, both concepts work towards this outcome from a different perspective. Customization defines the content of the service to be delivered to a client (the 'what' of the service provision). Personalization, however, defines the way in which services are delivered (the 'how' of service provision).

To achieve customization in care provision, it is essential to understand the individual needs of patients. In turn, this can be achieved by personalization. In health care an initiative to achieve more personal relationships is case management. This means that a relationship can be realized by supporting patients when coordinating them through a clinical pathway (Wiederholt, Connor, Hartig, & Harari, 2007, Walsh, et al., 2011).

Customization and personalization are complementary to each other in tuning modular care and service offerings to individual needs and preferences of clients. However, to achieve overall tuning of care provision, a structural integration of customization and personalization aspects is required. In a health care context, it is advisable and desirable to practice the methods of customization and personalization simultaneously (De Blok et al., 2013).

## Method

A literature study was conducted to construct a conceptual framework on customization and personalization in modular service provision. We chose a case study approach for our empirical research, primarily due to the nature of the research. Yin (2014) recommends this method when contextual conditions are believed to be highly pertinent to the phenomenon of study.

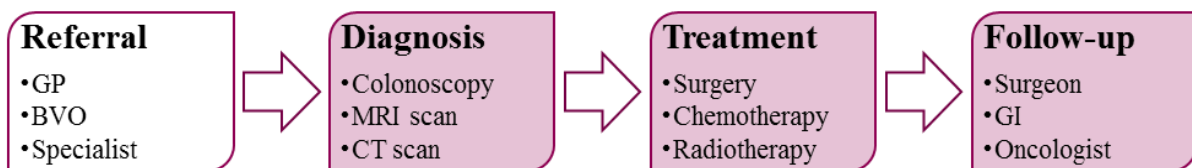


Figure 2 Research Scope

The research subject of this in-depth case study is the introduction of modularity within the colon carcinoma pathway (CCP) in a Dutch hospital. The hospital has chosen to explore the opportunities of modularity to obtain a patient-centered care process, where more variety options are offered by means of modules and components.

Semi-structured interviews were conducted with patients (P) based on a topic list derived from our conceptual framework. In these interviews, we collected insights in patients' needs and requirements during care provision including experiences with customization and personalization. We also performed a focus group with participation from patients and professionals familiar with the CCP (e.g. oncologist, case manager, surgeon, radiologist, secretary, dietitian) to validate the results of the patient interviews. Themes that recurred throughout the interviews were intensified and deepened during the focus group.

Besides, observations and analyses of documents facilitated a process of triangulation.

## Results

Modules were discussed with patients in terms of phases, which are diagnosis, treatment and follow-up. Patients received various items throughout their care provision, referred to as components. In the diagnostic phase, for example, *components* typically were: ultrasound, CT scan, MRI scan, PET scan, X-ray, colonoscopy, and blood samples.

### *Customization: Combining Menu Components*

Regarding *customization*, every patient received a different combination of components. This was depending on how the patient entered the system and the gravity of the disease. The various components in the service package made it customized to the medical needs of the patient. Out of several treatment options, all patients interviewed received different treatment. This was either chemotherapy, which differed in quantity, radiotherapy and/or surgery. During the care process, initial treatment plans were often adjusted. Some patients received less or a different chemo because of allergies. Or chemotherapy was initially not in the treatment plan at all, but preventive chemotherapy was added because of medical needs. For example, the CEA markers increased (P8), if cancer spread to the lymph (P6) or after the treating physician consulted fellow doctors (P4). In addition, changes to treatment plans also included extensions of

discharge date. For example, patient nine mentioned that she has had several extensions of the discharge date and because of that, the follow-up was a disappointment. In addition to various treatment components, some patients received a stoma, vacuum therapy, or incontinence material after surgery. Furthermore, patient one mentioned that because of the biopsy, her chemotherapy had become more customized because the oncologist knew what and where to treat.

The different treatment options have rarely been discussed with patients. Patients mentioned that substantive choices are difficult to make. For example, patient two points out that *“Not everyone can make the choices that you think they could and would make. If you give information and say here are five alternatives, choose one. There are people who can separate those five alternatives, but there are also people who cannot do that. So, if you want to offer a choice, that will work for people that can weigh the positive and negative sides. But if you ask: what do you think yourself, do you want radiotherapy or chemotherapy? I think those kinds of choices are more difficult to make”* (P2). This was confirmed by patient four who completely trusted on the doctors regarding her treatment *“I fully rely on medical science, I assume that if there had been an alternative that would have been discussed”* (P4).

#### *Customization: Changing Prototype Dimensions*

Patients pointed out some non-medical needs, tailored to individual wishes. Such as the preference of a single-bed room instead of a multiple-bed room. Furthermore, patients mentioned that they would like to have more input in the arrangement of the appointments. Some patients agree that it would be nice if the control appointments can all be arranged in one day, or that you have a choice in time slots or days. *“You can offer as a hospital: when would you like to come here, in the morning or in the evening”* (P2). In addition to the planning, patients also point out that they might prefer a specific care provider. Furthermore, some patients mentioned to be interested in video consult via FaceTime. However, this is dependent on the content. For example, patient six mentioned to be interested in consults via FaceTime but *“when it comes to the results of an examination, I prefer to have a face-to-face consult.”* (P6). Sometimes, patients want something at another location because that is more convenient for them. For example, taking a blood sample can be done either in the hospital, or at an external location. Some patients agree that this is a handy option, but they are not all aware of this from the beginning onwards. However, not all patients dared to ask for specific aspects, to fulfill their wishes.

Patients often adjusted the planning of consults or appointments. This had either personal or medical reasons such as illness before a chemo treatment. Patient three mentioned that he asked to plan the CT scan and X-ray earlier than initially planned because he was worried about metastasis. *“I found the time between the colonoscopy and the sequel stressful. In my opinion the time in-between is too long”* (P3).

#### *Pro-forma Personalization*

In terms of *personalization*, all patients interviewed appreciate the guidance from doctors and case managers because it is clear, comprehensive and they have an open-mindset. *“I liked the guidance, the statements they made were clear”* (P6). Patients mentioned that they feel taken seriously and say that they have had good contact with their doctors and case managers. *“Why I liked that is that they are just straightforward ... and you can speak with those people at the same level”* (P2). Patients mentioned also that they feel helped as a person, and do not feel like a number. Additionally, patients pointed out that they also have some small talk with

professionals, but this was mostly with the secretary and nurses. Moreover, they also mentioned that professionals should prepare before an appointment *“because that can affect the conversation with your patient”* (P9).

#### *Attentive Personalization*

When the interaction between the patient and care providers was discussed, patients all agreed that at some point you get a relationship with professionals. *“You literally get a human relationship. You go on an adventure together”* (P1). Patients agree that the care provision is not standard anymore at a given point *“They know me now. In the early days, they assume that your whole life is in the context of that disease, but now they are there for me”* (P1). Furthermore, patients agreed that professionals are aware of the needs of the patients in a personal manner because *“we know each other better now”* (P2).

Patients mentioned that it was easier to have a relationship with case managers, than with doctors. They pointed out that case managers have more time to invest in a relationship. According to them, the case manager really knew what kind of person she was dealing with, but doctors apron this sometimes. *“You do not want to bother a surgeon. I prefer to talk to the case manager, it is way easier, you can just call or e-mail her”* (P4). *“The case manager actually became a friend of ours, it may sound weird, but there was this chemistry between us”* (P8). In contrast, some patients valued the relationship with doctors more.

#### *Missing Personalization*

At the same time, few patients also agree that personalization tends to be missing at some points during care. For example, few patients agree to be missing personal attention that is tailored to their personality. For example, patient three mentioned: *“I am pretty assertive, but someone who is not, may not dare to ask questions and say what they really want. As a specialist, you should take this into account. You have to give people space, or invite them to give input”* (P3). This was supported by patient four who said that she wanted something in her care process, but did not dare to ask for it and she would have liked it if a care provider offered her the option or choice. Furthermore, patients mentioned to be missing the “curiosity” from the hospital to give more attention to the personal lives of patients instead of just curing cancer with medication. *“Nobody ever asked, except for some nurses: what do you do outside the hospital. I miss the curiosity to broaden the care to outside the borders of curing cancer. The curiosity to help people in any way, even if it is not scientifically supported. Do not underestimate the psychological and social aspects”* (P1). According to patients, individual wishes are not considered and personal attention lacks from the hospital. Only that what is internally possible in the hospital is offered. *“Professionals should consider a patient’s personal life. Everyone has their own story around cancer. As a specialist, you must remain human at all times, and you should put yourself in another person’s situation”* (P1). Some patients would have preferred more or less guidance, but it should be personalized to the needs. Few patients agree that guidance lacks in the follow-up phase. E.g., patient one mentioned *“You are completely released from the guidance of the case manager, I have small talk with her now and then”* (P1).

Additionally, some patients mentioned that some professionals seemed often not prepared to make a consult about personal issues as well. The EPD stores information that allows to personalize the conversation, as information by fellow practitioners might have been addressed there. For example, patient two mentioned that the first appointment with the oncologist was uncomfortable because her behavior and approach did not meet the characteristics and needs of the patient. *“I expected that her approach would fit with who I am as a person. I am not the*

average patient of 85 years old who has colon cancer. As a specialist, you should have known that and tailor your attitude to the person you are facing” (P2). Patients prefer that professionals have a look at the EPD and read the story of a patient to enter a genuine conversation, instead of standardized small talk.

#### *Additional results*

During the interviews, another aspect was often mentioned that was not based on theory from the literature study, namely nutrition. Nutrition included all aspects such as food after surgery. According to patient one, the food is not good and not made to her needs “No wishes are considered at all” (P1). Additionally, when speaking about nutrition, patients often mentioned the need to receive personal dietary advice from a dietitian throughout the care provision. The patients interviewed all rather did something with their nutrition instead of adding medication for nausea “Then I prefer to pay attention to what I eat. If I do not need medication, I would rather not have it” (P2).

#### *Focus Groups*

When discussing *appointments and consultations*, patients pointed out that there is a great demand to get results as quickly as possible, because this will decrease uncertainty. This mainly concerns results on metastases (in the diagnosis phase) or results of lab research and scans to know whether the treatment is successful (in the treatment phase). Some patients express the need to obtain results digitally, it mainly concerns results when patients have been in the process for a while. However, patients differ in opinion for this matter. Some patients like to have face-to-face or telephone contact with doctors so that a conversation can take place. Doctors point out that this is a good option, because the results from examinations can then be explained and a treatment plan can be proposed. Besides, some patients requested that both case managers and medical specialists can pass on results. This is appreciated by patients if they will get the results faster. Doctors believe that this brings a lot of responsibilities with it for case managers. According to doctors, patients should be well informed about this, because case managers cannot adequately explain the next steps, medically, and medical specialists are able to do this. Furthermore, patients pointed out that they often have too less information throughout care provision. This concerns information prior to the first interview, information about side effects of medication, or information about alternative treatments, regardless of whether they are scientifically substantiated.

A second major theme in the focus groups was that patients miss *guidance from the hospital when it comes to nutrition*. This is not only regarding information about nutrition before treatment, but also during and after treatment. Health care providers agree that nutrition is an underexposed aspect within the hospital. A dietitian is often only called in for weight loss, but there may still be a need for contact with a dietitian. The standard information on nutrition does not work for each individual. That is why patients have the need to get tailored dietary advice and more information about nutrition and cancer. In addition, patients lack information about the influence of a diet in relation to cancer.

## **Discussion**

#### *Customization*

From the empirical results, it can be concluded that patients received a customized care package. Since different treatment options were combined and adapted to the medical needs of patients. According to De Blok et al. (2013) this is a way of *combining menu components*, to achieve customization according to customer specification. From the empirical results, it can

be derived that mostly professionals give a treatment proposal and patients give the responsibility of combining components to professionals. This may be because patients do not have in-depth knowledge of treatment methods and alternatives. This is also in line with the findings of Gobbi & Hsuan (2012) who found that in service modularity, customization is often achieved by employees who combine components for clients.

The empirical results show that patients themselves customized the non-medical, personal needs, by changing dimensions of the care package. The non-medical needs included mainly preferences to do things differently as indicated initially. For example, the need to have digital or phone-call consults instead of face-to-face consults. Many patients modified something, on their own initiative, in their care package so it would better suit their needs. According to De Blok et al. (2013) this is defined as *changing dimensions of the prototype*, where modularity is applied to tailor a care package. It can be concluded, that combining menu components is achieved to customize a care process for the medical needs, while customization by changing dimensions is achieved for non-medical, or personal, needs of patients. The majority of the patients interviewed put emphasis on customization with a non-medical nature rather than customization with a medical nature. The reason for this might be that patients do not have substantive insight into treatment methods. Table 6 provides an overview of the different types of customization as recognized by patients in the CCP.

Table 1 Customization types recognized by patients in CCP

<b>Customization</b>	
<b>Combining Menu Components</b>	<b>Changing Prototype Dimensions</b>
Medical	Non-medical
<ul style="list-style-type: none"> <li>• Combination of treatment options (chemo, surgery, radiotherapy)</li> <li>• Adjustments to initial treatment plans</li> </ul>	<ul style="list-style-type: none"> <li>• Single-bed room / Multiple-bed room preferences</li> <li>• Preferences for specific professionals</li> <li>• Preferences regarding appointments</li> <li>• Preferences regarding nutrition</li> </ul>

### *Personalization*

According to the empirical results, patients recognized personalization in their care provision. Patients mentioned interactions with professionals such as small talk with a secretary. As stipulated by De Blok et al. (2013) this can be recognized as *pro-forma personalization*. In this research, pro-forma personalization is recognized as guidance from professionals. According to patients the guidance is positive because they feel taken seriously, and professionals are clear and comprehensive. From a care provider's perspective, this guidance is rather routinized and standardized as it is part of their job. Pro-forma personalization was also recognized by patients throughout the CCP and when they have had many different doctors. This indicates that this type of personalization does not require a long time bonding process, as opposed to attentive personalization. When patients have been in the process for some time, and had a specific care provider for a longer period, patients indicated that they build a relationship with the professional. According to De Blok et al. (2013) this is recognized as *attentive personalization*. In this research, the difference between the two types of personalization is established over a certain period and whether patients and professionals have regular contact. Pro-forma personalization is therefore a more standardized and basic way of personalization, whereas attentive personalization aims for relationship building and bonding. This is in line with the findings of De Blok et al. (2013), who found that in the elderly care sector, pro-forma personalization is a way of personalizing services while adapting to an efficient script. The



same research found that attentive personalization is a more adapted approach to the individual needs of clients. In the context of oncological care provision, it is concluded that pro-forma personalization occurs mainly in the beginning of the CCP whereas attentive personalization occurs more and more as a patient has been in the process for some time. This is in line with the findings of De Blok et al. (2013) who found that in the elderly care sector that personalization occurs over the total course of care provision. As personalization occurs throughout the CCP, this stimulates the cyclical nature of modular care provision, because insights are given into changes that are required by patients. This is also in line with the findings of De Blok et al. (2013) who mentioned that continuous personalization makes the process of care package configuration and care package delivery cyclical.

Although patients mentioned positive aspects about personalization, it was often mentioned by some patients that they missed personalized service offerings during the CCP. Therefore, this new category *missing personalization* originated. From a patient's perspective, professionals often only had time and eye for their health condition instead of looking at the person. Patients were missing the personal attention from professionals. More specifically, professionals should have adjusted the guidance and approach accordingly to the characteristics and needs of patients. Patients who raised this issue, and mentioned to be missing personalization often, were also less positive about the care or about the guidance of professionals. It can be concluded that pro-forma or attentive personalization leads to better guidance. When patients are satisfied about the guidance and attention from their care provider, they were more satisfied about the care provision. This is, however, not in line with the conclusion of Surprenant & Solomon (1987), who found that personalization does not necessarily contribute to more positive evaluations of service offerings. Nevertheless, it is in line with the findings of Gwinner et al. (2005) who mentioned that especially attentive personalization increased patient satisfaction. Table 2 provides an overview of the different types of personalization as recognized by patients in the CCP.

*Table 2 Personalization types recognized by patients in CCP*

<b>Personalization</b>		
<b>Pro-forma Personalization</b>	<b>Attentive Personalization</b>	<b>Missing Personalization</b>
<ul style="list-style-type: none"> <li>• Guidance</li> <li>• Contact</li> <li>• Small talk</li> </ul>	<ul style="list-style-type: none"> <li>• Relationship</li> <li>• Adjust approach to person</li> </ul>	<ul style="list-style-type: none"> <li>• Care provision not just about disease</li> <li>• Offer more than medical care</li> </ul>

As already mentioned by De Blok et al. (2013): personalization effectuates customization, this research found the same conclusion. Pro-forma personalization may lead to attentive personalization over time and both types of personalization increase customization over the care process. According to De Blok et al. (2013) this is because professionals can assess patient's needs more deeply which brings to light the opportunities and necessities for customization. Moreover, in this case study it is also found that when a patient-professional relationship has been established, because of personalization, patients dare to ask more which also increases customization.

## **Conclusion**

The current study advances existing research findings by studying how modular clinical pathways lead to customization in the multidisciplinary context of cancer care by examining patients' needs and requirements. In this way we contribute to the call for research on how the implementation of modularity influences the customers' service experience (Brax et al., 2017).

### *Future research directions*

Since a single case study has been conducted, the findings of this study are specific for the clinical pathway colon carcinoma in one particular hospital and not necessarily generalizable to other settings. Therefore, it would be interesting to conduct case studies on colon carcinoma pathways in multiple hospitals. Similarly, one could think of cases studies on pathways for several types of cancer, particularly to investigate if and how customization and personalization vary among these settings. Cancer is a serious disease that involves emotional pressures. This may explain why personalization is important. The question arises, however, whether patients also appreciate personalization when a disease and its treatment are emotionally speaking less complicated. More generally, it is worthwhile to study how customization and personalization in modular care pathways affect patient reported outcomes. Besides, the results show that there is a lack of interfaces between professionals, although not reported on in this paper. This may lead to problems with patient handoffs (Manser et al., 2010). The advice for future research is therefore to carry out a similar research, to find out whether improved patient handoffs may enhance interfaces among professionals.

### *Managerial recommendations*

The results indicate that personal attention is important for oncology patients. This means that personalization should be added to a modular designed service processes (such as a modular clinical pathway) to improve customization (see Figure 1). This way, professionals may know what options a patient might favor, what kind of information patients expect and what further needs of patients are throughout care provision. To improve personalization, it is vital that professionals increase their awareness on characteristics of patients and pay attention to the personal lives of patients, too.

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