A Key Driver of Patient Satisfaction: Interaction of Patients with Personnel Delivering Incontinence Health Technologies

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Abstract
Primary care represents an answer to the growing demand of an ageing population for healthcare services outside the hospital. As a support mechanism of primary care, the distribution of health technologies to chronic patients plays an important role, but it has been investigated from the operational viewpoint only, ignoring the patient's perspective. We explored patient's satisfaction in relation to the distribution processes of incontinence health technologies, investigating its antecedents and isolating the factors driving the satisfaction of patients – which could be leveraged to design better distribution processes for better primary care services. We performed a survey study on 650 patients in primary care services affected by incontinence in Italy, building on the ServQual and Kano models. Partial Least Square Structural Equation Modelling (PLS-SEM) with Multi-Group Analysis (MGA) was adopted to analyse the data. Results show that interaction of patients with the personnel delivering the service is the key driver of patient satisfaction: this is an element more important than the operational features of distribution services (such as punctuality/reliability of the service or its flexibility).

Keywords
patient satisfaction, primary care, health technologies, PLS-SEM, incontinence

Introduction

In a constantly changing world, healthcare services need to evolve to meet the growing demand for services of an ageing population (1). Chronic degenerative diseases are on the rise and can be no longer be treated only in hospitals and secondary care facilities, which are dedicated to acute diseases. Primary care can represent the silver bullet at the disposal of the National Health Services to face long-term and expensive treatments for chronic patients (2,3). However primary care services cannot work without appropriately designed support mechanisms to manage the various treatments and ensure quality of care (4). Among these support mechanisms, the distribution of health technologies[1] to chronic patients is a key factor to achieve the above-mentioned aim (5). Previous literature on primary care and related support mechanisms is significantly scarce, and the existing contributions on this theme focus on the operational side of the processes, explore from a managerial perspective the performance evaluation of primary care activities, and the related cost implications (6). It appears that the main perspective adopted by existing research is centered around the subjects delivering the services, eg, the National Health Service, while the patient's viewpoint appears to be a minor factor in the design and management of distribution processes. In other words, it appears that patients are only a passive player in the service delivery processes, ie, those who receive the service but are not integral part of the service itself. This constitutes a considerable limitation, since it is acknowledged that focusing on the patient and her/his experience enables the design of healthcare systems not only to improve the quality of care, but also facilitates the provision of medical care that is safe, effective, patient-centered, timely, efficient, and equitable (7,8). But what are the factors driving patient

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satisfaction in the distribution of health technologies? To provide an answer to this question, we analysed the distribution processes of incontinence health technologies. With the aim of improving the quality of this type of primary care services, we explored the antecedents of patient satisfaction in relation to incontinence health technologies. The antecedents of patient satisfaction, in fact, could be leveraged to design better distribution processes for better primary care services. To achieve this aim, we performed a survey study on patients affected by incontinence in charge to primary care services and performed a structural equation modelling (SEM) analysis using the partial least square (PLS) method. This approach has been used in recent works on patient's experience: for example (9) investigated the mediating role of sharing decision making about treatment processes in the patient-physician relationship and (10) explored the impact of patients trust in physicians and other behavioral factors on shared decision making – both relying on PLS-SEM as their data analysis approach.

Theoretical Background

Distribution Models of Incontinence Health Technologies

The distribution of health technologies in the primary care setting is related to the concept of "distribution model", which includes the delivery process of a certain health technology and the relationships among the various players involved.

With specific reference to the incontinence health technologies, through the seminal work of (11) – who first identified the features and basic processes of the distribution of health technologies – further developed by (5,12) – who investigated the qualitative and quantitative performance of distribution models for incontinence health technologies – the literature identifies two main models for the distributing health technologies: Home delivery (the local National Healthcare System – NHS – department identifies the supplier that will deliver the devices directly to the patient's home); and the Collection system, which happens through local pharmacies, through the local NHS's facilities or through private shops of medical devices managed by health professionals. According to (11,12) in the Collection system patients can typically receive direct counselling on how to use absorbent devices and on the quantity of devices to be used accordingly to their needs respecting the quantity limits for incontinence levels. The counselling is offered by the professionals delivering the devices. Whereas, in the Home delivery system this possibility is more limited, because the NHS outsources the delivery of the absorbent devices to an appointed supplier, and patients are referred back to the support websites of the NHS or their call centers.

Patient Satisfaction in Primary Care and in the Distribution of Health Technologies

Patient satisfaction with healthcare services can be influenced by quality of the care delivery (13). From a general perspective, the determinants of care quality include technical and interpersonal components, and these apply to primary care too (14). The success of the technical component is dependent on the management of the interpersonal component (14). Satisfaction with the interpersonal component is based on patient perceptions of providers' sympathy, reliability, responsiveness, communication, and caring (7). The above recall the principal traits of a pillar of the service quality measurement literature, ie, the ServQual model (15), which has been applied to healthcare studies and primary care in several cases (eg 16 – who identified some dimensions of choice of primary care physicians by patients such as reputation and qualifications). With the ServQual Model, the quality of the service and the level of satisfaction of patients are measured through the evaluation of 5 dimensions: tangible elements (appearance of physical facilities, personnel, equipment), reliability (ability to provide services accurately), responsiveness (ability to respond promptly to customer needs), assurance (employees' competence, courtesy and ability to inspire trust), empathy (dedicated and caring attention from the staff). In addition to ServQual, the Kano model has recently gained popularity in the healthcare discipline. Materla et al (17) applied the Kano model to analyse the expectations of patients in terms of treatments and services in a Student Health Services facility. The Kano model evaluates the level of satisfaction of respondents introducing the theory of "attractive quality" to understand how product or service quality are perceived and evaluated. The relationship between the functional performance of quality attributes and degree of satisfaction is expressed by a scale of importance/attractiveness of attributes, which spans from "must-be" to "indifferent". With this model, users express the importance of the elements that characterize the service they receive (eg, through a Likert scale), indicating those factors that are the most important to their satisfaction and that in turn can be leveraged by the service provider to establish sustainable quality improvements (18).

With reference to patients' satisfaction in relation to the delivery models of health technologies within the primary care context, the literature appears to be particularly scant. Cornago and Garattini (11) performed a comparative analysis of the distribution processes and delivery models of incontinence health technologies (pads/diapers) across Europe, but they didn't take into consideration the point of view of the patients and their satisfaction. Similarly (19,20), respectively studied the distribution of domiciliary oxygen therapy and the distribution of stoma appliances across Europe, observing a certain preference towards home care in terms of distribution models, but again they did not deal with patients' satisfaction. Clèries et al (21) investigated the perceptions, attitudes and satisfaction of patients and their family members or caregivers in relation to the distribution models of oxygen therapy delivered at home. Referring back to technical and interpersonal components (mentioned above as pillars of patients' satisfaction in primary care), the topics studied by the authors were: psychological impact, impact on daily life, level of care provided by the distribution

companies and in general problems and satisfaction related to those activities. Results show the importance of taking into account the psychological impact of receiving such a therapy at home and the potential consequent social isolation. In terms of satisfaction, patients pointed out that better coordination between the various providers involved in the distribution processes could be beneficial to them.

Development of the Conceptual Framework

To explore the antecedents of patient satisfaction within the distribution of incontinence health technologies, we developed a conceptual framework, built on the ServQual and Kano models. The technical component regards the reliability and responsiveness of the delivery service included in the distribution model and related process. The ServQual model provides general constructs that we adapted to the context under investigation building on (12), which contains specific constructs on the distribution of incontinence health technologies. In particular, we took the constructs of punctuality of the delivery service (named "punct", a one-item construct measured by indicator "punct"), and flexibility of the delivery service (named "flex"), measured by the indicators related to the flexibility of delivery dates ("delflex") and flexibility of delivery batch size ("batchflex"). Then, we took the interpersonal components of the ServQual model and we named it as our "interact" construct. We measured it through the indicators of counseling ("couns"), privacy ("privacy") and assistance ("assist"), which link back to the empathy and assurance of the ServQual model. In conclusion, the punctuality of the delivery service is indicative of the ServQual's reliability dimension; the respect for privacy, care and discretion of the delivery staff is indicative of its empathy dimension; the availability of staff to provide information and counselling is indicative of its assurance dimension; the availability of staff to respond and assist in case of complaints is indicative of responsiveness, which can also be seen in light of adapting the time-windows and batch sizes. Building on the Kano model, the level of importance/priority was made intrinsic to these variables. The constructs related to satisfaction were combined in an original way by the authors in two constructs to measure the satisfaction with the technical (delivery – named "model satisf") and the interpersonal dimension (interaction – named "interact satisf"). The general satisfaction of the patient ("global satisf") was derived from (22).

Methodology

Ethical Considerations

Our institution does not require ethical approval for reporting individual cases or case series. However, all procedures performed in this study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Written informed consent was obtained from the patients for their anonymized information to be published in this article.

Survey Design: Population and Sample

As mentioned, we focused on absorbent devices for incontinence, as these devices are relevant to NHSs due to their economic impact and the large number of people who use these products because of chronic diseases (23). For consistency and comparability of the results, we focused on one single type of device: diapers. We investigated the Piedmont Region in Italy, which constitutes a significant application example because more than 4 million people live in that Region (7% of the Italian population and 1% of the European Union population). The territory of Piedmont is divided into 12 Local Health Authorities (LHA). Each LHA guarantees the continuity of care and coordinates territorial activities. Patients suffering from chronic diseases that require the use of absorbent devices for incontinence sum up approximately to 120 000 people in Piedmont. Devices are prescribed by a specialist physician and are delivered by the NHS's local departments through the Collection systems or the Home Delivery system according to the processes above described. The personnel who deliver the devices are different professionals depending on the delivery model: in the Collection Systems pharmacists or nurses of the NHS, while in the Home Delivery system is the driver of the supplier appointed by the NHS who performs the delivery.

Data Collection: Survey Instrument Development

A five-item Likert scale was adopted to indicate the extent to which respondents agree or disagree with each question item where applicable (1 = strongly disagree, 5 = strongly agree) or to indicate their level of satisfaction (1 = completely dissatisfied, 5 = completely satisfied). The first section of the single-survey questionnaire focused on the socio-demographic information and the level of incontinence. The second section regards the distribution model used by the LHA serving the patient and its operating details. The third section regards the expectations of the patient related to a distribution service. The fourth section regards the preferences of the patient related to a distribution service. The final section regards the evaluation of the level of satisfaction of the patient in relation to the experienced distribution service. We translated the questionnaire from Italian to English and checked with a forward/backward process. The full survey questionnaire is available upon request from authors.

Data Collection and Analysis

The questionnaire was administered through the web-application Google Forms by the Piedmont Region Administrators and by the Piedmont Association for Incontinents and Ostomates – APISTOM. Respondents

were people (home-dwellers) using the absorbent device or their caregivers; the latter were asked to respond on behalf of the patient if patients themselves could not provide an answer to the survey questions (21% of the sample was represented by those patients able to directly fill the questionnaire – the remainder was represented by caregivers, who however only filled the questionnaire on behalf of patients). Overall, 858 compiled questionnaires were received in the time window December 2020 – March 2021, with 650 complete and valid responses. 67% of the sample was female, and 76% of the sample was aged over 75 years. The greatest part of respondents presented a medium and high level of incontinence, respectively the 33% and the 34% of the sample. The prevalent distribution model is home delivery (78%). To analyze the data, we adopted a PLS-SEM approach (Hair et al, 2014), using the Smart PLS 3.32 software package. We conducted a multi-group analysis (MGA) with the MICOM (Measurement of Invariance of Composite Models) procedure (24), to consider the influence of factors such as age, gender, level of incontinence and distribution model. We established the following groups: Gender: male (1), female (2); Age: up to 75 years (1), over 75 years (2); Level of incontinence: up to medium (1), high and very high (2); Distribution model: home delivery (1), collection system (2).

Results

General Descriptive Statistics Related to Satisfaction of Patients

From a general perspective, the sample declared to be moderately satisfied with the technical and the interpersonal components of the distribution models: counselling (43% of the sample), assistance (43% of the sample), privacy (40% of the sample) and organization of the delivery processes (48% of the sample) were the items scoring the highest satisfaction levels. The main elements of dissatisfaction were registered in terms of assistance (21.48%) and privacy (20.52%). The most frequently encountered problems were related to the need to contact the local departments of the NHS for assistance and to the punctuality/reliability of deliveries.

Validity and Reliability

A full collinearity test for assessing vertical and lateral collinearity was performed. The values of the Variance Inflation Factors (VIFs) for the various construct are below the critical threshold of 3.3, and this demonstrates the absence of common method bias. The indicators' reliability was then measured. Table 1 indicates that just a few cases the value of the loadings is close to 0.7 and the squared value is below 0.7 but all above 0.4.

The validity and reliability of the developed model were evaluated measuring the internal consistency reliability (by

means of the Composite Reliability – CR), the Convergent validity (by means of the Average Variance Extracted – AVE), and the Discriminant validity (by means of the Fornell Larcker criterion analysis and Heterotrait-Monotrait ratio of correlations – HTMT) (25). Table 2 indicates good validity and reliability levels of the measurement model, ie, CR > 0.70 and AVE > 0.5. The Fornell-Larcker criterion analysis shows that the square roots of AVE are higher than any correlation between the constructs. The HTMT ratios span from a minimum value 0.022 to a maximum value equal to 0.712, with no value above the critical threshold of 0.85 (25).

PLS Path Model

We obtained the path coefficient values for each relationship and the p-values (bootstrapping procedure with 5000 random replications) (see Table 3).

The construct "interact satisf" has the strongest effect on the global satisfaction of the patient, since the associated path coefficient is 0.633 (Figure 1). "Model satisf" has a weak (negative) effect on the global satisfaction, represented by a path coefficient equal to −0.093. The "model satisf"

Table 1. Outer Model Validation.

Measurement indicator	Outer Model Loadings	Indicator Reliability	Variance Inflation Factor (VIF)	Cross-loadings
ASSIST	0.668	0.446224	1.366	✓
BATCHFLEX	0.894	0.799236	1.302	✓
COUNS	0.884	0.781456	1.355	✓
DELFLEX	0.823	0.677329	1.302	✓
PATSAT	1	1	1.000	✓
PRIVACY	0.781	0.609961	1.299	✓
PUNCT	1	1	1.000	✓
SATASSIST	0.883	0.779689	1.813	✓
SATCOUNS	0.773	0.597529	1.558	✓
SATFREQ	0.765	0.585225	1.012	✓
SATMODEL	0.722	0.521284	1.012	✓
SATPRIVACY	0.853	0.727609	1.683	✓

Table 2. Validation of the Inner Model.

Construct	Composite Reliability	AVE	Fornell- Larcker criterion
Flex	0.849	0.738	✓
Global satisf	1.000	1.000	✓
Interact	0.795	0.572	✓
Interact satisf	0.876	0.702	✓
Model satisf	0.712	0.553	✓
Punct	1.000	1.000	✓

construct seems to be impacted by the flexibility of the delivery model (path coefficient = 0.202) rather than the punctuality and reliability of the delivery model (path coefficient = 0.002). The "interact satisf" construct is moderately affected by the "interact" construct (path coefficient = 0.288) and the highest loading comes from the "counseling" item.

Looking at the path significance, the relationship "punct → model satisf" cannot be considered as statistically significant, along with the relationship "model satisf → global satisf". As concerns the quality of the structural model, the VIF values obtained range from 1.000 to 1.813, and consequently do not suggest any collinearity issue, as they are below the threshold value of 5. The strength of the relationship between couples of variables was tested through Cohen's f^2. A value equal to 0.686 for the relationship "interact satisf → global satisf" indicates substantial effects, followed by a weak-medium effect of "interact" on "interact satisf" (0.090) and a weak effect of flex on "model satisf" (0.039), while the remaining relationships are weak or null. We used the standardized root mean square residuals (SRMR) and root mean square residual covariance (RMStheta) to assess the overall fit of the model in terms of estimation error and misspecification of the model (25). The value of SRMR equal to 0.073 is below the critical value of 0.08, and the value of RMStheta equal to 0.248 is over the threshold of 0.12. The explanatory power of the model was assessed through the measurement of the variance explained of an endogenous variable (R^2). For endogenous variables "model satisf" and "interact satisf" the R^2 vaules were respectively equal to 0.041 and 0.083, while the endogenous variable "global satisf" shows an R^2 value equal to 0.418, which indicates good explanatory power. The predictive relevance of the model was measured through the value of Stone-Geisser's Q^2 for each endogenous variable. The values of Q^2 are all positive and higher than 0 (global satisf = 0.101; interact satisf = 0.055; model satisf = 0.017).

We then conducted the MGA with MICOM. Configural invariance was established, along with compositional invariance (verified through a non-parametric test with 5000 permutations) for all groups, leading to infer the existence of partial invariance. This was sufficient for running the MGA: we started from the group "Gender" and results confirmed the reliability, the convergent validity and discriminant validity of the model. The MGA between "Male" and "Female" did not let any significant differences between the path coefficients emerge. The MGA study was replicated for the group "Age" and no significant differences emerged. No significant differences emerged also for the group "Level of incontinence", and for the group

Table 3. Path Coefficients and Significance.

	Path Coefficient	T Statistics	P Values
Flex ≥ model satisf	0.202	5.328	.000
Interact ≥ interact satisf	0.288	8.986	.000
Interact satisf ≥ global satisf	0.633	18.221	.000
Model satisf ≥ global satisf	−0.093	2.663	.008
Punct ≥ model satisf	0.002	0.036	.971
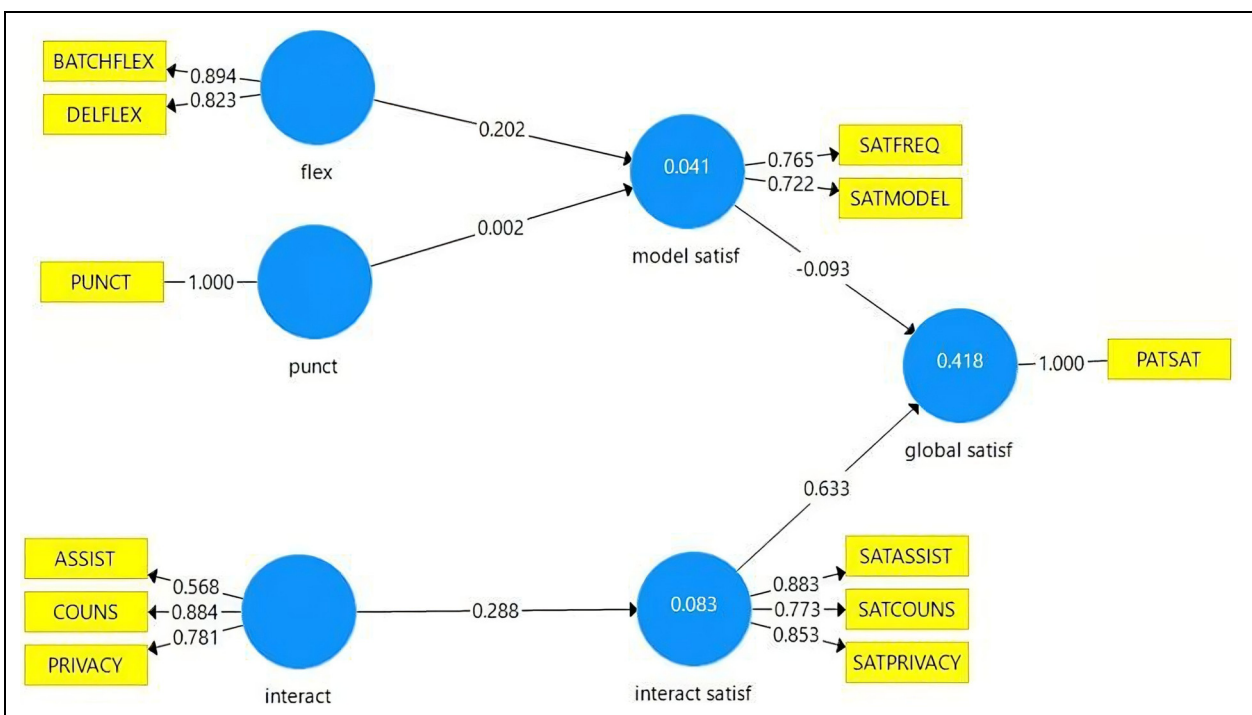
Figure 1. PLS-SEM path model and results.

"Distribution model" – which represents very interesting evidence (ie, same antecedents still valid for different groups of respondents).

Discussion

Looking at the factors driving the satisfaction of patients, it appears that the construct named "interact satisf" has the largest effect in determining the global satisfaction. This insight is also confirmed by (8), who stress the importance of involving patients and fostering interaction to build satisfaction in patients. The contribution of "model satisf" can be considered as negligible, given a weak path coefficient. As mentioned, this represents interesting evidence, because it shows that according to the perceptions of the patients, the features related to the interaction of patients with the personnel delivering the distribution service (such as the presence of counseling and assistance services along with adequate respect of the privacy) are the most important elements driving the level of patient satisfaction – and not how the distribution model works or is technically arranged. Counseling is seen in the literature as a key element to improve health systems, leveraging the connection with patients (26). Those features related to the operational mechanisms of the delivery models, such as the punctuality and reliability of the service or the flexibility in changing the delivery dates or the delivery batch size, are not seen as much important. It appears that the "way" to build patient satisfaction in the delivery of absorbent devices for incontinence is to design a distribution model able to offer interaction of patients with the service provider(s), regardless of the distribution model adopted and of the operational features associated to them. It seems that the counseling service is especially valued as essential by patients and that they have high expectations in terms of availability of this feature, given their specific fragile and sensitive conditions (see item loading's values). In this sense, such frail patients are in need of counselling to make the best use of diapers in order to maintain a good level of quality of life and enjoy what they do (or can do in relation to their age). In doing this, instead of just visiting a webpage or reading "standard" answers to frequently asked questions (with the risk of getting lost and feel frustrated), being able to speak to someone about the use of products, obtain counselling and express thoughts and concerns, appears to be something very important. This recalls and underlines the fact that patient health is something that goes beyond the remit of healthcare and management and is also a fundamental social aspect related to happiness of people.

Interestingly, no significant divergence emerges from the MGA, as no statistically significant differences were detected among the path coefficients. Regardless of the age, gender, level of incontinence and distribution model, it appears that for such fragile patients the operational features and the nature of the distribution models are not as important as the possibility to have a close connection and interaction with the service provider in the process of distributing health technologies. While (27) stress the fact that the operational side is the backbone of the distribution processes of health technologies, our work adds to existing knowledge stressing that the "front-end" of distribution services should be the features that drive the possibility for patients to interact with personnel.

Looking at the single items driving the satisfaction level of patients, then, it seems that the satisfaction related to the operational features of the distribution processes are driven by the flexibility in re-arranging delivery dates and delivery batches. This is something similar to what happens in the provision of e-commerce services: in fact, (28) indicate that the possibility to re-arrange deliveries is a key preferred feature of consumers buying online. Instead, factors such as punctuality and reliability of delivery services tend to be taken as granted – as explained by (29) in their study about consumers' preferences and service quality in online retailing. In the case of our research, these factors seem less important for fragile patients who instead privilege options for accommodating their necessities when need be. As for the satisfaction related to the interaction features, it appears that counseling is the most important item driving satisfaction. Our evidence seems to confirm the findings of previous works, such as (30) – who explain that considering and addressing the needs of frail patients is a pressing health priority: patients need to be listened and advised to improve their quality of life. This is probably because the possibility to seek out professional advice in case of doubts or problems is seen as important in the eyes of frail patients needing clinical support. Likewise, the relatively smaller loading of the item related to the assistance probably means that this is a factor taken as part of the general terms of the distribution service and that, consequently, could be procured somehow – as confirmed by the loading of the related item ("satassist") in the "interact satisf" construct.

Conclusions

Our work extends the existing knowledge on quality of care in primary care, targeting an area that had received limited attention but that has been recognized as a response to the changes in the demand for healthcare services of an ageing population suffering from chronic diseases.

With respect to the performed analysis on the distribution of incontinence health technologies, it emerged that a key driver of patient satisfaction is represented by the interaction of patients with the personnel delivering the devices – while the organization of the delivery model itself did not seem to be an antecedent of satisfaction of patients. Consequently, it seems that in relation to the investigated category of health technologies the interpersonal component (specifically in terms of counseling – first and foremost – and assistance services along with adequate respect of the privacy) drives patients' satisfaction more than the technical component (ie, distribution system – Collection system vs Home

Delivery system – and related operational features such as flexibility and reliability).

In this way, our work informs healthcare professionals about those elements that should guide the design of distribution models for absorbent devices for incontinence to achieve the objective of improving quality of care. Attention should be devoted to elements such as counseling, which can be seen as a key element of human-to-human interaction. Consequently, appropriate interfaces and activities should be in put in place for ensuring seamless communication and counseling to patients. Our work informs policy makers: it points out that policy should foster the diffusion of patient-centric models able to empower communication and interaction with users, rather than stressing the operational side and the technical features of distribution processes.

Limitations

The sample population analysed comes from a specific Italian region (ie Piedmont). Different geographical contexts might lead to diverse "nuances" in the results. We examined a specific health technology, ie, absorbent devices for incontinence (diapers), and some features might affect the distribution models and related practices. Future research can offset the mentioned limitations, by extending the study to other regions/countries and to other health technologies/devices. Additional avenues for future research, seen as promising by the literature, could be represented by the investigation of the impacts on the level of patient satisfaction of solutions that can improve the level of interaction with patients and their direct and real-time involvement in the care process, such as information/communication technologies – as recommended by (31) – or initiatives such as telemedicine and interactive web-applications – as pointed out by (32).

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Note

1. A health technology is the application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives.

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