Sustainability of the Italian Healthcare System and of the presently active hospitals: a methodological proposal for a systematic assessment of humanization of paediatric care and areas

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Abstract

Introduction. In paediatrics, the word "humanization" means to care for the whole patient's family. It is vital to preserve a balanced relationship between family members to help the healing process for the young sufferer. How do we ensure that all the strategies adopted up to now have positively reached their objectives of humanization? How then can we measure hospital users' perception?

The purpose of this research project is to identify the main factors that influence users' opinion about the quality of environment in paediatrics through a qualitative analysis on users' well-being. Monitoring the humanization level achieved by hospitals and testing the effectiveness of spaces devoted to host young people, may be considered essential phases in gathering new useful evidences as well as to identify potential emerging guidelines.

Methods. Operative measurements were supported by the LpCp-tool, an effective tool that includes a questionnaire-based investigation and a processing software. The tool was then adapted to the specific explored field. The investigation was applied in three hospitals in Lombardy Region (Italy).

Results. The most influent factors in users' perception were the space comfort and the standards of security services. Hospital staff generally had a worse opinion than patients/visitors on all items. Under no circumstances must users' involvement relevance be overlooked.

Conclusions. The research highlights the relevance of the environmental well-being and involvement of users' in the decision-making processes, as well as the absolute requirement of a multicultural context.

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Introduction

The humanization of space in healthcare environments may offer a significant strategy to improve mental and physical well-being of patients and workers (1, 2). Several experts scientifically demonstrated that social aspects and design approaches could influence the healing process of patients (3). The implementation of humanization's principles in pediatric care is an ongoing process implying that care should be addressed not only to the child as a patient (4), but even to the whole family (5-7). Despite all norms and qualitative standards achieved, the hospitalization continues to represent a difficult experience for the young users, especially considering the "clean break" from everyday habits and activities (8). Moreover, environmental perception depends on both physical and emotional factors, thus different opinions from staff to visitors could be helpful to define the best design solutions for the most common requirements as space comfort, way finding, positive relationships, safety, and security (9). How could we measure users' perception to improve the quality of healthcare systems? Starting from the previous considerations, this article presents the results of the application of a qualitative tool that took place in some pediatric departments in Italy, in particular in the North of the Country, and some useful evidences from the data-analysis.

Methods

The investigation was pursued through LpCp – tool (Listening to people to Cure people), an effective, reliable, and replicable evaluation tool – already validated on previous case studies in generic healthcare settings - able to support the active hospitals in decision making and to improve their comprehensive sustainability (10). The

tool examines existing healthcare facilities in which design and structural restrictions imposed by the design could affect and limit quality levels, focusing on user's perception and involvement (11). The developed methodology and the adaptation to pediatric functional units aim to outline a multidimensional evaluation tool, which considers the importance of environmental conditions in healthcare processes (12, 13).

Articulation of the Tool

Starting from the LpCp-tool applied to generic healthcare settings (10), the research group improved its contents for paediatric spaces. The new tool consists of three questionnaire models: one for patients/visitors (P/V), one for the medical staff (MS), and one for the hospital's administrative staff (AS); and of a spreadsheet able to process the data, to rank the quality, and to indicate suitable and effective strategies to better supplying solutions for the most critical indicators (10). The questionnaires are composed of an introductory section - including general information about the participant, such as sex, age, nationality, occupational role, etc., and a list of questions, aimed at investigating users' perceptions and experiences in the healing spaces, divided into four parts: well–being, social aspects, safety & security, health promotion (14-16). Specifically, the criteria investigate (9):

1) **well–being**: to evaluate the level of overall well-being, with regard to the paediatric areas. This with the aim to improve the level of attention paid to the well-being within the hospital, considered as a workplace and a service provider. Aspects as materials, colours and light have a positive effect on the psycho-physical well-being, improving staff performance and helping patient's recovery;

2) **social aspects:** to evaluate the social cohesion inside the paediatric area. This with the aim to encourage participation and

collaboration among all hospital's users and to increase the level of attention paid to the hospitals' social policies, especially in paediatric areas (7);

3) **safety & security**: to evaluate the level of safety and security of users. This with the aim to encourage adequate safety and security policies, because the indicator considers both the existing regulations and the hospital's policies about these aspects, especially users' final perception about all of them;

4) **health promotion**: to evaluate the level of health promotion and sustainable lifestyle pursued in the hospital and in particular in the paediatric area. This with the aim to encourage the attention paid to the promotion of *salutogenic* lifestyle and disease prevention in hospital policies.

For each criterion, Table 1 lists all the indicators.

The percentage of people responding is calculated according to the following formula:

number of positive answers / number of valid answers * 100.

Therefore, each percentage group was awarded a score points, based on the amount of positive answers obtained on the total of valid ones, according to the following thresholds: (1) positive answers $\geq 66\%$, full score; (2) positive answers between 66 % and 33%, half score; (3) positive answers < 33%, no score (10).

Answers with both high and fairly satisfaction were considered positive. The sum of scores obtained concurs to allocate the indicator's final score (from 0 to 5 points). Marks were given by different evaluation criteria, each of them has a specific maximum score, as shown in Table 2.

As several assessment tools are structured, the final hospital evaluation score (from 0 to 100 points) is calculated as the weighed sum of the scores achieved in all four criteria (17). Weighing process is based both on

the customer ratings and on the effect of improvements that were made, looking at a minimum resource cost; the ANP (Analytic Network Process) used is the multi-criteria approach (18). The weight of the different criteria are subdivided into: Well-Being (13%), Social Aspects (38%), Safety & Security (42%), Health Promotion (7%) (9).

Hospitals Selection

The first step was to create an index of healthcare facilities. Referring to the localization of the research group, the activities were applied in Lombardy region, Northern Italy. Starting from a wide list of case studies, a hospital of each Local Health Authority was contacted and requested to join the survey.

According to their availability, the investigation was performed in three general hospitals, characterized by renovations in paediatric wards. Furthermore, all the analyzed healthcare facilities include educational and cultural services, play-rooms and psychological support services for patients and their families (7).

Information Gathering Criteria

The operative phase was articulated in three steps: 1. meeting with hospital managers and medical staff; 2. visits in the hospital settings for an analysis of space configuration, activities carried out, and the availability of the head nurse; 3. interviews with patients/visitors (over 12 years old patients could complete the questionnaires on their own), medical staff, and administrative staff (representatives of the healthcare organization).

Data Elaboration

Starting from the questionnaires, the spreadsheet has been articulated in five sheets: (a) Administrative staff, (b) Medical staff, (c) Patients/Visitors, (d) Rating of total answers, and (e) Comparison between

Table 1 – List of Criteria, Indicators and Definitions of the LpCp-tool for paediatric areas

Criteria	Indicator	Definition
Well-being	Comfort level of the spaces	Comfort: colours, materials, artificial and natural lighting, furniture quality
	Services and recreational activities	Presence of activities/facilities for staff and patients/visitors: sport, leisure, culture, bar/restaurant areas, libraries, WI-FI areas, art, exhibitions, etc.
	Orientation and intelligibility	Adequate and clear wayfinding and paths within the hospital and the paediatric area
	Green area and views	Quality/presence of green areas and outside views
Social aspects	Involvement in the therapeutic process	Level of patient involvement in the therapeutic process
	Involvement of all users in the hospital's design phase	Level of patient involvement in the design process
	Discrimination	Discriminatory behavior: all patients and staff are treated with the same care and professionalism regardless of their race, religion, sexual orientation physical and mental handicap, professional specialization
	Collaboration between hospital staff	Level of collaboration within hospital staff
	Meeting areas	Presence and use of spaces capable of accommodating meetings between staff and patients
	Mediation, translation and interpreting services	Presence and quality of a mediation, translating and interpreting service
	Attention towards different ethnic groups	Structure friendliness towards different cultures (presence of directions in different languages, of spaces that allow people with different cultures to accomplish their own customs, e.g. worship traditions)
	Complementary space to welcome relatives of patients	Presence of spaces to give hospitality to patients' relatives
Safety & Security	Theft	Perceived security with regards to theft
	Personal safety	Perceived personal safety
	Hospital services	Trust in hospital services
	Hospital infections	Perception of hygiene standards
	Vigilance and control	Presence of security control
Health promotion	Prevention campaigns	Presence of health prevention campaigns
	Promotion campaigns	Presence of health promotion campaigns
	Ecological products and materials	Presence and use of natural and ecological products and materials, non-toxic, recyclable, with a short supply chain

Table 2 - Q*uestionnaires and scores adopted by LpCp-tool assessment*

Criteria	Indicators	Max Score	Questionnaires		
			P/V	MS	AS
Well-being	Comfort level of the spaces	+2.0	•	•	
	Services and recreational activities	+1.2	•	•	
	Orientation and intelligibility	+1.0	•	•	
	Green area and views	+0.8	•	•	
Social aspects	Involvement in the therapeutic process	+0.7	•		
	Involvement of the users in the hospital's design phase	+0.2		•	
	Discrimination	+0.3	•	•	
	Collaboration between hospital staff	+0.9		•	
	Meeting areas (presence)	+0.6			•
	Meeting areas (use)	+0.6		•	
	Mediation, translation and interpreting services (presence)	+1.2			•
	Mediation, translation and interpreting services (quality)	+1.2		•	
	Attention towards different ethnic groups	+0.7			•
	Complementary space to welcome relatives of patients*	+0.4			•
Safety & Security	Theft	+1.5	•	•	
	Personal safety	+1.0	•	•	
	Hospital services	+1.5	•		
	Hospital infections	+1.5		•	
	Vigilance and control	+1.0	•	•	
Health promotion	Prevention campaigns	+2.5			•
	Promotion campaigns	+2.5			•
	Ecological products and materials	+2.5			•

Note. In case of yes/no answer, the maximum score will be assigned to the "yes" and 0 points to the "no".
Abbreviations: P/V - patients/visitors; MS - medical staff; AS - hospital/administrative staff.

patients/staff answers. By inserting answers in the spreadsheet, the humanization score has been appointed to the hospital and critical areas have been identified.

Results and Discussion

To be effective, the tool must generally be distributed to a significant percentage of hospital users (at least 10% of medical staff and 10% average daily patients) (10). Nevertheless, uniformity of answers detected in bigger sample (CASE A) made it possible a reduction of the minimum percentage (from 10% to 5%).

Results by Hospitals
The first hospital (H1 referred below) is a large hospital, built in 1939. Its pediatric ward was renovated in 2014 and has a capacity of 36 beds, almost everyone in private rooms (not including intensive care unit - ICU). Questionnaires were distributed to 10% of patients/visitors (171/1,700) and members of the staff (5/50). An overall score of 96.6/100 has been achieved in this case study. The partial ratings of the four areas were the following: a) Well-being 5.00/5.00; b) Social aspects 4.60/5.00; c) Safety and security 5.00/5.00; d) Health promotion 5.00/5.00.

The second hospital (H2 referred below) is one of the most important hospital in the North-East of the region. It is located in a recently built facility, which became operative at the end of 2012. It has 1,200 beds. The survey was conducted in the Pediatric Surgery Unit, which has a capacity of 17 beds; this partial selection was due to the temporary unavailability of the Director of General Pediatrics. Questionnaires were distributed to more than 5% of patients/visitors (58/1,047) and to 10% of staff members (6/50). An overall score of 99.1/100 has been achieved here. The partial ratings of the four areas were the following: a) well-being 5.00/5.00; b) social aspects

4.90/5.00; c) safety and security 5.00/5.00; d) health promotion 5.00/5.00.

The last hospital (hereinafter referred to as H3) is the major hospital in the northeast part of the region. It is located in a recently completed building (inaugurated around 10 years ago). Its Pediatric Unit has a capacity of 25 beds (11 single rooms and 7 double rooms). Questionnaires were distributed to 10% of patients/visitors (171/1,700) and staff members (5/50). An overall score of 73.5/100 has been achieved in this facility. The partial ratings of the four areas were the following: a) well-being 4.10/5.00; b) social aspects 4.00/5.00; c) safety and security 3.00/5.00; d) health promotion 5.00/5.00.

Concerning well-being criteria, the section "wayfinding" was perceived as a critical issue. Presumably, this is related to the fact that the re-design of buildings usually creates disorientation in user's mind (considering the fact that they are pediatric patients, and they recognize the hospital as a place different from other types of environments). Furthermore, the entire wayfinding system rarely meets the most common expectations of users.

Social aspects were perceived as the weakest criterion, containing the largest amount of critical issues in need of improvement, especially for medical staff. More specifically, Figure 1, which compares all the answers, shows that one of the worst result has been achieved by the section "hospital staff involvement"; in any case, it, has not got a satisfactory score.

This fact was probably linked to the deep structural changes that medical and hospital staff dealt with in the recent years, such as hospital relocation, skills outplacement, and new rules. Similarly, another not entirely satisfactory result was reached by the section "collaboration between hospital staff", which means that management communication strategies need to be improved as well as workers involvement policies. The section "quality of mediation & translating services"
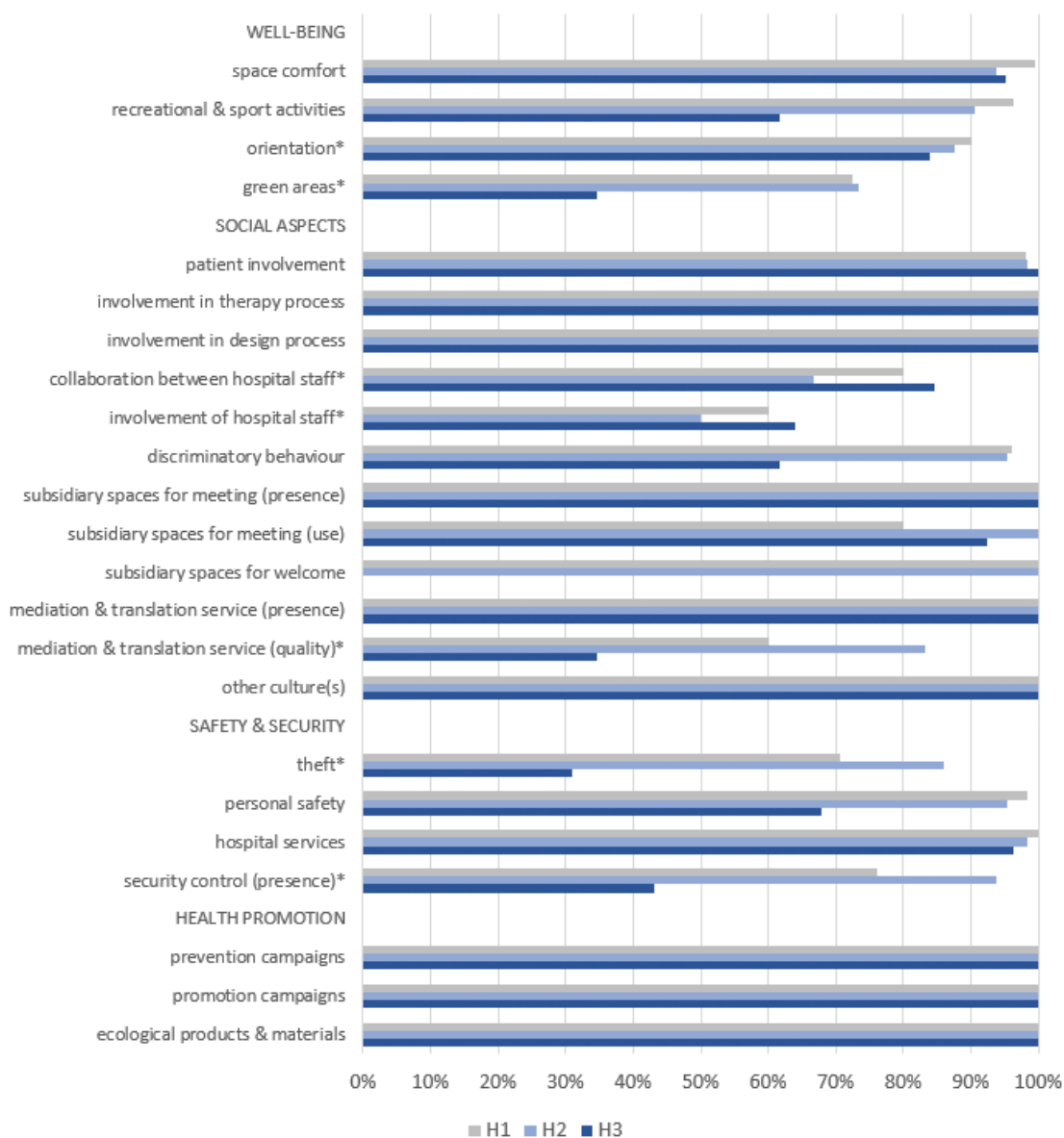
Figure 1 – Comparison of the answers for each hospital: scores and percentage of responses (* main critical areas or in need of improvements)

was ranked just after. If communication could be considered a key component both in care and in healing process, other than in the relationship among staff members and patients, multicultural competences must be "a set of knowledge, attitudes, behaviors, and consistent practices" (12). It is challenging to readapt consolidated attitudes, taking into account the individual multi-factories, especially considering the extraordinary migratory phenomena affecting the Italian Country, nowadays. Too often healthcare professionals solely rely on voluntary groups for cultural and linguistic mediation. Starting from the activation of broad-spectrum health literacy processes, probably it will

improve the current scenario. Consequently, a negative perception of workers' safety emerged: these are kind of misconceptions that can only be overcame within a shift of thought combined with real attempts towards cultural integration in everyday life.

Comparative Results among Hospitals

From the data analysis, as Figure 2 synthetized, the section "space comfort" results every time as the most influential factor in comprehensive assessment: positive reviews (very satisfied + fairly satisfied > 50%) corresponds to overall hospital ratings ranging from good to excellent values. A huge presence of private rooms provides positive reviews. The lowest score was reached by H2, the highest one by H1 (93.8% vs 99.4% of positive answers). At the same time, the most problematic sections were "wayfinding" (max. score for H1, min. score for H3: 90.1% vs 84.0%) and "green areas" (max. score for H2, min. score for H3: 73.4% vs 34.6%). The emphasis should be addressed to the relevance of psychosocial factors in healing processes, like design, privacy and diversified use of spaces in hospital (19). It is undoubtedly necessary to create more meaningful connections between built and natural environments, balancing the perception of the ordinary and extraordinary (16). Another common aspect to all the three hospitals was the request for more attention and protection against theft and better standards of Security Services. Once more, the worse position has been assumed by H3, with respectively 30.9% and 43.2% of negative answers; conversely, the best rating has been reached by H2, with respectively 85.9% and 93.8% of positive answers. Comparing the answers to the same questions provided by the distinct groups, there are wide differences between the points of view of patient/visitors and those of the staff. In fact, health workers generally had a worse opinion than patients/visitors on all items. More precisely, medical staff always complained about the notable absence of
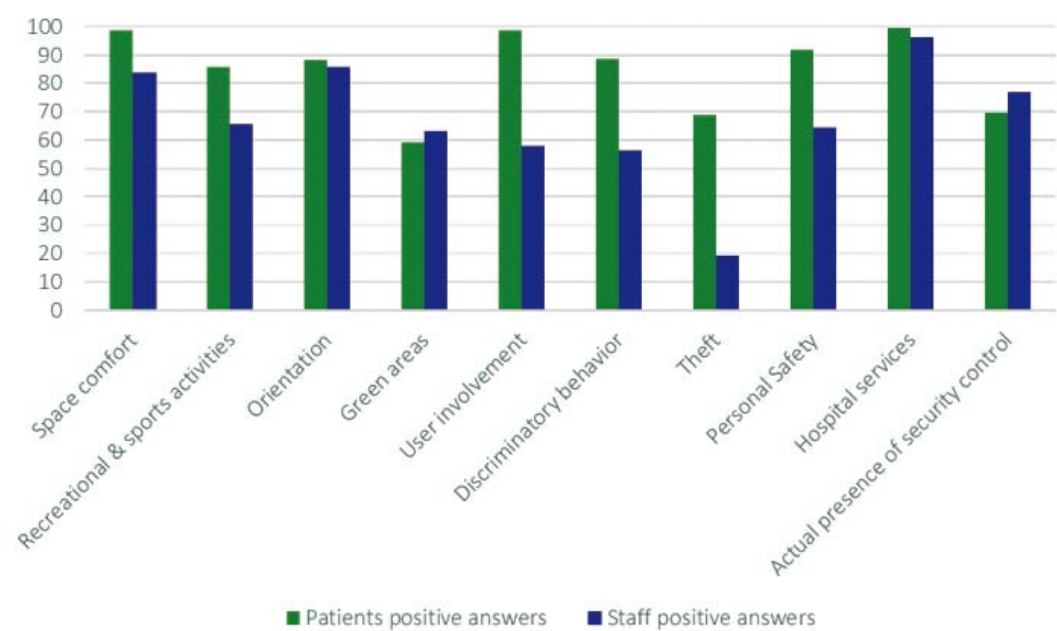

Figure 2 - Comparison between staff and patient's answers.

involvement in decision making processes and the lack of safety and security, especially against thefts.

Design Directions for the Implementation of Spaces for Paediatrics

All of these observations lead to a series of evidences which might be relevant to consider better design solutions (2, 20, 21). The first one is about the strong impact of space comfort in supporting the healing process: children have unique needs based on age, and their perception of reality is affected by emotions. For this reason, pediatric spaces must be able to meet their individual requirements, including the opportunity to have their family around, that can provide a smoother hospital experience, reducing anxiety levels.

A safe and healing environment, marked by private rooms, wide windows, green and reassuring views, can certainly improve patients' psycho-physical conditions and stimulate a better immune response too. Complexity, variety, intensity, and all the hallmarks of a certain place, play a fundamental role in preserving mental balance. Nevertheless, the comprehensibility of the building elements, with reference to both patterns and space configuration, contributes to reducing the feeling of ambiguity, disorganization and disorientation. It could be useful adopting appropriate strategies as "positive distractions" (22-24), or those elements that can temporarily divert patient attention from his/her condition, such as interaction with nature, arts, games, and appropriate design items for distinct psychophysical development levels of guests (25).

Conclusions

Humanization is an essential and primary factor, especially in delicate healthcare settings, like pediatric wards, yet it is not taken into consideration by the main evaluation tools of healthcare facilities. Speaking about humanization in pediatric care means thinking about a system focused not only on the child as a patient, but on the entire family involvement. Healthcare providers, associations, and managers are in a multidimensional process with patients and caregivers, in which each user is responsible of mutual interaction. LpCp-tool has been able to identify strengths and weaknesses of the investigated hospitals, reinforcing the link between built environment and emotions/reactions, once again. Positive feedback has come to light in those institutions which had made huge renovations, such as lots of them in the region (26, 27).

Hence, the paper demonstrates that the questionnaire tool can provide useful information to identify the main criticisms of comfort and humanization levels and the need of enhancement strategies. Currently the application of the tool, and its validation, in other (inter)national contexts is in progress, to guarantee a large-scale application.

Finally, the current research outlook is that the adopted survey could be able to promote an assessment tool helpful to increase the top health management awareness of the crucial role that humanization, communication, and active involvement played in the transformation process of the Italian National Healthcare System.

Riassunto

Sostenibilità del Sistema Sanitario Italiano e degli ospedali esistenti: una proposta metodologica per una valutazione sistematica dell'umanizzazione delle aree pediatriche

Introduzione. Nelle aree pediatriche, il termine "umanizzazione" significa prendersi cura di tutta la

famiglia del paziente. È fondamentale preservare un rapporto equilibrato tra i membri della famiglia per aiutare il processo di guarigione dei bambini malati. Come garantire che tutte le strategie finora adottate abbiano positivamente raggiunto i propri obiettivi di umanizzazione? Come misurare allora la percezione degli utenti ospedalieri?

Lo scopo di questo progetto di ricerca è identificare i principali fattori che influenzano la percezione da parte degli utenti della qualità dell'ambiente nelle pediatrie attraverso un'analisi qualitativa sul benessere degli utenti stessi. L'analisi del livello di umanizzazione raggiunto dagli ospedali e la verifica dell'efficacia degli spazi dedicati all'accoglienza dei più piccoli, possono essere considerate fasi essenziali per raccogliere nuove evidenze utili nonché per identificare potenziali strategie emergenti.

Metodi. Le misurazioni operative sono state supportate dallo strumento LpCp, uno strumento efficace che include la somministrazione di un questionario con un software di elaborazione. Lo strumento è stato quindi adattato al campo specifico esplorato. L'indagine è stata effettuata in tre ospedali in Regione Lombardia (Italia).

Risultati. I fattori più influenti percepiti dagli utenti sono stati il comfort dello spazio e gli standard dei servizi di sicurezza. Il personale ospedaliero generalmente ha espresso un'opinione più negativa rispetto ai pazienti/visitatori su tutti i criteri. In nessun caso deve essere trascurato il coinvolgimento degli utenti.

Conclusioni. La ricerca mette in evidenza la rilevanza del benessere ambientale e il coinvolgimento degli utenti nei processi decisionali, nonché l'assoluta esigenza di un contesto multiculturale.

References

1. Nickl-Weller C, Nickl H. Healing architecture. 1st ed. Berlin: Braun; 2013.
2. Brambilla A, Rebecchi A, Capolongo S. Evidence Based Hospital Design. A literature review of the recent publications about the EBD impact of built environment on hospital occupants' and organizational outcomes. Ann Ig. 2019 Mar-Apr; **31**(2): 165-180. https://doi.org/10.7416/ai.2019.2269.
3. Ulrich R. Effects of health facility interior design on wellness: Theory and recent scientific research. J Health Care Inter Des. 1991; **3**: 97-109.
4. Tripodi M, Siano MA, Mandato C, et al. Humanization interventions in general pediatric wards: a systematic review. Eur J Pediatr. 2019 May; **178**(5): 607-22. https://doi.org/10.1007/s00431-019-03370-3. Epub 2019 Apr 4.
5. Del Nord R, Marino D, Peretti G. Humanization of care spaces: A research developed for the Italian Ministry of Health. Technè. 2015; **9**: 224-9. https://doi.org/10.13128/Techne-16127.
6. Gola M, Francalanza P, Galloni G, Pagella B, Capolongo S. Architectures for paediatric palliative cure: how to improve quality of life and environmental well-being. Ann Ist Super Sanita. 2016; **52**(1): 48-55. https://doi.org/10.4415/ANN_16_01_10.
7. Protano C, Valeriani F, Macedonio A, et al. Family-based social determinants and child health: Cross-sectional study. Pediatr Int. 2017 Feb; **59**(2): 201-8. https://doi.org/10.1111/ped.13097. Epub 2016 Oct 30.
8. Butragueño Laiseca L, González Martínez F, Oikonomopoulou N, et al. Survey of adolescent perception of hospital admission: The importance of hospital humanization. Rev Chil Pediatr. 2016 Sep-Oct; **87**(5): 373-9. Spanish. https://doi.org/10.1016/j.rchipe.2016.04.003. Epub 2016 May 12.
9. Bottero MC, Buffoli M, Capolongo S, et al. A multidisciplinary sustainability evaluation system for operative and in-design hospitals. In: Capolongo S, Bottero MC, Buffoli M, Lettieri E, Eds. Improving Sustainability During Hospital Design and Operation: A Multidisciplinary Evaluation Tool. Cham: Springer; 2015: 31-114. https://doi.org/10.1007/978-3-319-14036-0_4.
10. Buffoli M, Bellini E, Bellagarda A, Di Noia M, Nickolova M, Capolongo S. Listening to people to cure people: The LpCp – tool, an instrument to evaluate hospital humanization. Ann Ig. 2014 Sep-Oct; **26**(5): 447-55. https://doi.org/10.7416/ai.2014.2004.
11. Bosia D, Marino D, Peretti G. Health facilities humanisation: Design guidelines supported by statistical evidence. Ann Ist Super Sanita. 2016; **52**(1): 33-39. https://doi.org/10.4415/ANN-16-01-08.
12. Brambilla A, Morganti A, Lindahl G, Riva A, Capolongo S. Complex Projects Assessment. The Impact of Built Environment on Healthcare Staff Wellbeing. In: Gervasi O, Murgante B, Mkisra S et al, Eds. Computational Science and Its Applications – ICCSA 2020. ICCSA 2020. Lecture Notes in Computer Science, vol 12253. Cham: Springer; 2020. https://doi.org/10.1007/978-3-030-58814-4_24.

13. Capolongo S, Buffoli M, di Noia M, Gola M, Rostagno M. Current scenario analysis. In: Capolongo S, Bottero MC, Buffoli M, Lettieri E, Eds. In Improving Sustainability During Hospital Design and Operation: A Multidisciplinary Evaluation Tool. Cham: Springer; 2015: 11-22. https://doi.org/10.1007/978-3-319-14036-0_2.

14. Mandato C, Siano MA, De Anseris AGE, et al. Humanization of care in pediatric wards: Differences between perceptions of users and staff according to department type. Ital J Pediatr. 2020 May; **46**(1): 65. https://doi.org/10.1186/s13052-020-00824-5.

156. Colman N, Dalpiaz A, Hebbar KB. Simulation Enhances Safety Evaluation in the Design of New Healthcare Facilities. Curr Treat Options Pediatr. 2020 Sept; 6: 214-25. https://doi.org/10.1007/s40746-020-00202-7.

16. Tripodi M, Siano AS, Mandato C, et al. Humanization of pediatric care in the world: Focus and review of existing models and measurement tools. Ital J Pediatr. 2017 Aug 30; **43**(1): 76. https://doi.org/10.1186/s13052-017-0394-4.

17. Gola M, Botta M, D'Aniello AL, Capolongo S. Influence of Nature at the Time of the Pandemic: An Experience-Based Survey at the Time of SARS-CoV-2 to Demonstrate How Even a Short Break in Nature Can Reduce Stress for Healthcare Staff. HERD. 2021 Apr; **14**(2): 49-65. https://doi.org/10.1177/1937586721991113. Epub 2021 Feb 18.

18. Saaty TL. The analytic hierarchy process: planning, priority setting, resource allocation. New York City: McGraw-Hill; 1980.

19. Brambilla A, Capolongo S. Healthy and sustainable hospital evaluation-A review of POE tools for hospital assessment in an evidence-based design framework. Buildings 2019; **9**(4): 76. https://doi.org/10.3390/buildings9040076.

20. Buffoli M, Bellini E, Dell'Ovo M, et al. Humanisation and soft quality in emergency rooms. Ann Ist Super Sanita 2016; **52**(1): 40-7. https://doi.org/10.4415/ANN_16_01_09.

21. Setola N, Naldi E, Cocina GG, Eide LB, Iannuzzi L, Daly D. The Impact of the Physical Environment on Intrapartum Maternity Care: Identification of Eight Crucial Building Spaces. HERD. 2019 Oct; **12**(4): 67-98. https://doi.org/10.1177/1937586719826058. Epub 2019 Feb 15.

22. Del Nord R. Lo stress ambientale nel progetto dell'ospedale pediatrico: Orientamenti progettuali e suggestioni architettoniche. Milan: Motta Architettura; 2006.

23. Pati D, Nanda U. Influence of positive distractions on children in two clinic waiting areas. HERD. 2011 Spring; **4**(3): 124-40. https://doi.org/10.1177/193758671100400310.

24. Pearson M, Gaines K, Pati D, Colwell M, Motheral L, Adams NG. The Physiological Impact of Window Murals on Pediatric Patients. HERD. 2019 Apr; **12**(2): 116-29. https://doi.org/10.1177/1937586718800483. Epub 2018 Oct 12.

25. Salonen H, Lappalainen S, Lahtinen M, Knibbs L, Morawska L. Positive impacts of environmental characteristics on health and wellbeing in health-care facilities: A review. Vol. 2. 10th International Conference on Healthy Buildings. Brisbane, Australia, 8-12 July 2012. Red Hook, NY, USA: Curran Associates Inc; 2013: 1449-54.

26. Capolongo S. Social aspects and well-being for improving healing processes' effectiveness. Ann Ist Super Sanita. 2016; **52**(1): 11-4. https://doi.org/ 10.4415/ANN_16_01_05.

27. Brambilla A, Buffoli M, Capolongo S. Measuring hospital qualities. A preliminary investigation on Health Impact Assessment possibilities for evaluating complex buildings. Acta Biomed. 2019 Sep 13; **90**(9S): 54-63. https://doi.org/10.23750/abm.v90i9-S.8713.

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