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REVIEW

Humanization interventions in general pediatric wards: a systematic review

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Abstract

Humanization of care (HOC) interventions have rarely been evaluated and compared. We systematically reviewed the outcomes of published interventions aimed to improve the HOC for hospitalized children. PubMed and Scopus were used as data sources. Studies published between January 1, 2000, and February 28, 2018, were considered eligible if they reported analysis of results vs. either a control group or baseline, or if they measured patient/family/staff satisfaction. Neonatal age, emergency departments, and subspecialty settings were excluded. Data were extracted using a standardized data extraction form including study design, sample size, intervention, outcome/objective, and evaluation of results or pre- post-intervention satisfaction. Twenty-eight of the 12,012 retrieved articles met the inclusion criteria. Most studies were of moderate to low quality. Only six studies were of high quality. Areas of interest dealt with environment ($n = 4$), provider–patient relationship ($n = 6$), pet therapy ($n = 5$), technology ($n = 5$), family-centered rounds ($n = 2$), psychological support ($n = 3$), and staff training ($n = 3$). The overall trend of the results indicated that interventions were mostly effective and likely to have beneficial effects on several aspects of pediatric hospitalization.

Conclusions: Pending further studies of better research quality, the findings of this review may have policy and practice implications for planning HOC interventions by pediatric healthcare professionals.

Marina Tripodi, Maria Anna Siano and Claudia Mandato contributed equally to this work.

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What is Known:
- *In pediatrics, humanization of care (HOC) provides assistance focused not only on the child as a patient, but on the whole family.*
- *HOC programs have been developed, but information on the overall outcome of local projects aiming to improve in a practical way the hospital taking charge of pediatric patients is still lacking.*

What is New:
- *Local HOC interventions are mostly effective and have beneficial effects on several aspects of hospitalization in general pediatrics wards.*
- *The findings of this review may have practice implications for planning HOC interventions by pediatric healthcare professionals.*

Keywords Humanization of care · Pediatric hospitalization · Humanization models · Pediatric care

Abbreviations

FCC	Family-centered care
FCR	Family-centered rounds
HOC	Humanization of care
PFCC	Patient and family-centered care
SDH	Social determinants of health
SDM	Shared decision-making

Introduction

Humanization of care (HOC) is a term used to refer to several theoretical models that place the patient as a person, in his/her totality, at the center of providers' attention [49]. In pediatrics, the humanization concept is even vaguer due to the dual involvement of both the child and his/her family and by the existence of multiple proposed models. The American Academy of Pediatrics has recently provided the definition of patient- and family-centered care as "an innovative approach to the planning, delivery, and evaluation of health care that is grounded in a mutually beneficial partnership among patients, families, and providers that recognizes the importance of the family in the patient's life" [7]. The models differ substantially according to geo-social factors, and the main programs have been elaborated and developed in the Americas, particularly USA [7] and Brazil [31], and in Europe [16, 43, 49]. In pediatrics, humanization provides assistance focused not only on the child as a patient, but on the whole family.

There is little information on the overall outcome of local projects aiming to improve in a practical way the assistance of adult [8] and pediatric patients in different individual hospitals or other medical settings. In pediatrics, family-centered care (FCC) and shared decision-making (SDM) are the major components of HOC programs. In a recent survey, the analysis of data following interventions shows that, in US health system, FCC/SDM prevalence in year 1 varied from 38.6 to 93.7% [25]. This ample range may depend (in part) on the measurement strategy selected, which means that existing measurement approaches could result in different interpretations of healthcare quality even when the same data are used. As these models were rarely verified experimentally through randomized controlled trials (RCTs), the specific evidence regarding the benefits of FCC was limited and of moderate quality [41]. Recently, Rea et al. published a systematic review that focused exclusively on families' experiences with pediatric family-centered rounds (FCR) in several heterogeneous settings [38].

As clinical opinion alone continues to be dominant, to better design programs intended to improve the whole spectrum of HOC of children hospitalized in general pediatrics wards, our systematic review has three main aims: (1) to identify previously published relevant studies in the above area, (2) to analyze and compare different strategies of interventions and related outcomes, and (3) to give food for thought on how to plan future HOC targeted interventions able to provide a permanent change in the local environment.

Materials and methods

Database search

We searched within the PubMed and Scopus academic medical databases. A general Web search using Google was also performed only in order to get a larger vision and understanding of the issue around the world as we have shown in a previous paper of narrative review nature [49]. The database search strategy was formulated around terms for "child" AND several other text words reported in Table S1**.** Initially, we tried to do a mesh search, but we decided to use only a word search because the MeSH strategy was too limited for the terms of our interest (e.g., humanization 0; family-centered care 0; child friendly 0). Text words were chosen based on the existing literature and were obtained from related bibliographies. The earliest publication date was January 2000, and the search ended in February 2018.

Selection of articles

Systematic search of the PubMed and Scopus databases of literature was performed with no language restrictions but

limited to peer-reviewed, original research articles. Only studies carried out in general pediatrics wards and able to meet our criteria (i.e., experimental studies with either qualitative or quantitative descriptions of interventions and the analysis of results) were included. To be eligible for inclusion, studies had to describe an intervention aiming to improve humanization of pediatric care in a hospital setting, with measurement of changes pre- vs. post-intervention or at least evaluating patient/family/staff satisfaction.

Study details and quality characteristics were independently extracted by three of the authors for all the articles and in a stepwise approach, first by reading the title, then by reviewing the abstract, and finally by revising the full text, where appropriate. Pertinent data were extracted using a standardized data extraction.

At the end of revision, findings were compared, and a consensus was achieved on studies selected. In case of controversy, a third author decided.

Studies were rated with the Quality Rating Scheme (1–5, where 1 is the best and 5 is the worst) modified from the Oxford Centre for Evidence-Based Medicine ratings of individual studies [35].

Evaluation of bias was evaluated using Joanna Briggs Institute (JBI) critical appraisal checklist for randomized controlled trials and other type of studies (Tables 7, 8, 9, 10, and 11) [17].

Results

From the 12,012 retrieved studies (3334 in PubMed and 8678 in Scopus), 28 were considered eligible for analysis as part of a comparison of pre- vs. post-intervention ($n = 21$) or verification of user satisfaction ($n = 7$) (Fig. S1). The selected papers are shown in Tables 1, 2, 3, 4, 5, and 6, which summarize the design and results of these studies. According to the *Quality Rating Scheme for studies and other evidence* [35], most of the included studies were of moderate to low quality [most of the selected studies were case–control studies and a minority were case series (type 4)]. Only six of the included studies were of high quality [five were randomized controlled trials (type 1), and one was a well-designed controlled trial without randomization (type2) (Table S2)]. Only for two RCTs, randomization is adequate, but in all RCTs, statistical analysis is appropriate (Tables 7, 8, 9, 10, and 11).

The seven most prevalent areas of interventions were environment, FCR, pet therapy, provider–patient relationship, psychological support, staff training, and technology (Fig. S2). Studies were mostly conducted in the USA [3, 9, 11, 12, 15, 18–22, 27, 32, 34, 44, 48], Canada [2, 23], Iceland [47], Iran [39, 40], Italy [5, 30, 46, 50], Mexico [1], South Africa [24], and Israel [4, 14].

Populations

The included studies were conducted exclusively in general pediatric wards. On the whole, they regarded providers, parents, and children. In particular, four studies involved staff and parent [21, 22, 24, 30] one of which pediatrics residents as well [21]; four studies were conducted among parents and children [4, 9, 14, 46]; six among only parents [11, 12, 15, 19, 47, 48]; eight studies only children [1, 3, 18, 32, 39, 40, 44, 50]; four studies among staff, of which two also involved pediatrics residents [20, 23, 27, 34]; two studies included evaluation by staff, parents, and children [2, 5].

In total, the included studies considered 3345 parents, 2107 staff members, and 2934 children.

Interventions

As shown in Tables 1, 2, 3, 4, 5, and 6, there was a wide range of interventions across the studies included, which can be categorized as follows:

- In four studies (Table 1), HOC intervention regarded the environment: structural features [22] (e.g., light, noise, comfort), colored walls [30], children and family-friendly signage [24], and an interactive screen as kill-time [2]
- Two studies (Table 2) regarded the use of family-centered rounds as a model to conduct the rounds on pediatric wards [9, 32].
- In five studies (Table 3), pet therapy was realized for hospitalized children [3, 5, 18, 44, 46]
- Three studies (Table 4) were aimed at improving the psychological and emotional support for children [1] also helped by clown therapy [14, 50].
- The provider–patient relationship (Table 4) was the issue of six studies including interventions such as continuity of care [12], family-centered care approach [40], dialog between nurses and parents [47], use of colored clothing for nurses [39], badges for providers [11], and displaying staff photographs [4].
- Three studies [27, 34] (Table 5) regarded interventions through staff training, one of which addressed residents [27]
- Technology implementation was the topic of five studies (Table 6), including interventions regarding the use of tablets [15], handheld electronic devices [20], integrated personal health record [48], e-consultation [23], and an inpatient portal [19].

Table 1 Four studies reporting measured interventions of humanization of pediatric care about environment

Ref/country [study design]	Sample size	Intervention	Outcome/objective/evaluation of	Results	Pre–post	Sat
Environment						
Monti [30] 2012 Italy [pre–post-descriptive]	Pre: 200 parents, 25 staff Post: 200 parents, 25 staff	Painting	Effects of a painting intervention on the perception of emotional qualities of the place	Parents: all 4 positive emotional domains*** reported significant better scores post-intervention ($P < 0.001$); all 4 negative domains*** showed lower scores post-intervention Staff: environment significantly more exciting, pleasant, stimulating and less gloomy post-intervention $P < 0.05$);	X+	
Kotzer [22] 2011 USA [pre–post-descriptive]	Pre: 812 staff; 138 parents Post: 890 staff; 67 parents	Improving hospital environment	Impact of an existing and newly built hospital environment on family and staff satisfaction.	Family satisfaction scores➔ B: from 2.84/5 to 4.34/5 vs. A: from 3.97 to 4.89; $P < 0.01$ Staff satisfaction scores➔ statistically significant improvement ($P < 0.05$) in most areas (layout of room, natural light, storage and writing surfaces, and comfort and appeal).	X+	
Leonard 24] 2014 South Africa [satisfaction study]	25 parents 25 staff	Family-friendly signage	Family friendly environment pre/post developing a new signage: 44 signs replacing old ones.	The new signs were considered noticeable, attractive and easily understandable (rapid appraisal questionnaire mean score approximately 4.5/5)		X
Biddiss [2] 2013 Canada [satisfaction study]	EG: 10 staff 6 parents 11 Ctrls	Screen Display (SD)	Effects on healthcare waiting experience related to an interactive SD in a pediatric hospital waiting space.	Positive experience accessible to children, youth and adults of all motor abilities. All participants strongly agreed that Intervention would improve the healthcare waiting experience. (children: 100% would play again, 100% was safe, 100% got along with others, 100% had fun, 0% bored, 0% disinterested 0% felt left out)		X

A after, *B* before, *Ctrls* control group, *Pre–post* before vs. after intervention or control group vs. experimental group, *Sat* satisfaction, ✓ study with (+)/without (−) positive satisfaction or results before/after intervention with a control group vs. experimental group

***Four positive affective domains (Relaxing, Exciting, Pleasant, Stimulating); four negative domains (Distressing, Gloomy, Unpleasant, Sleepy/Boring)

Table 2 Two studies reporting measured interventions of humanization of pediatric care about family centered rounds

Ref/country [study design]	Sample size	Intervention	Outcome/objective/evaluation of	Results	Pre–post	Sat
Family-centered rounds						
Oshimura [32] 2014 USA [retrospective study]	Pre/post 912 children	Family-centered rounds (FCR)	Time to discharge; Time to study completion MRI/EEG.	Pre, 40% discharged before 3:00 PM. Post, 47% discharged before 3:00 PM ($P = 0.0036$). Time to study completion for MRIs and EEGs, 2.15 h pre-FCR vs. 1.73 h post-FCR ($P = 0.001$).	X+	
Cox [9] 2017 USA [randomized trial]	298 families	Family-Centered Rounds (FCR) Checklist	The performance of 8 FCR checklist elements and family engagement from 673 pre- and post-intervention FCR videos	The intervention significantly increased the number of FCR checklist elements performed ($P < 0.001$). Intervention rounds were significantly more likely to include asking the family (odds ratio [OR] = 2.43, $P < 0.05$) or healthcare team (OR = 4.28, $P = 0.002$) for questions and reading back orders (OR = 12.43, $P < 0.001$)	X+	

Ctrls control group, *CI* confidence interval, *EEG* electroencephalography, *EG* experimental group, *FCR* family-centered rounds, *MRI* magnetic resonance imaging, *OR* odds ratio, *Pre–post* before vs. after intervention or control group vs. experimental group, *Sat* satisfaction, *X* study with (+)/without (−) positive satisfaction or results before/after intervention with a control group vs. experimental group

Outcomes of interventions addressing parents/children/staff

Environment

In the hospital setting, a "Family-friendly" signage was used to improve parental satisfaction by facilitating orientation to and around the hospital and the access to information [24]. Similarly, the effect of Screen Play, an interactive display located in the waiting room, was appreciated for improving the waiting room experience for both parents and children [2]. Pictorial interventions led to a significant increase in measured humanization [30] and were appreciated by children's parents and staff. Similarly, improved lighting, sound, room temperature, color and decoration, entertainment, and privacy safeguards provided a statistically significant increase in comfort for both parents and staff members compared with baseline findings [22]. Overall, attention to these environmental aspects appears a useful and easy to realize tool for implementing a child-friendly hospital setting.

Family-centered rounds

The practice of FCR led to a modest but significant reduction in time of discharge compared to traditional rounds [32]. Checklist implementation was associated with changes in family engagement and more positive perceptions of safety climate, ultimately leading to FCR delivery improvement [9].

Pet therapy

Pet therapy classically promoted the well-being of children by improving social skills and interactions during the hospital stay [5, 46], significantly reducing pain perception [44] and contributing to overcome fears of animals and increase self-efficacy [46].This strategy provided additional support when associated with play [18]. Although animal-assisted activities appear to have a beneficial effect, usefulness in reducing bio-behavioral stress in hospitalized children however could not be well documented [3].

Psychological support

Hospital clowns played a significant role in reducing stress and anxiety levels in children admitted to hospitals as well as their parents [45]. In particular, clown show joined with dog interaction and live music had high effectiveness in reducing the level of anxiety and fear and decreased the need for sedation in children undergoing magnetic resonance imaging [50]. Emotional support interventions, therapeutic games, and medical clown shows involved a significant increase in positive effects and reduction in negative effects in hospitalized children [1, 14].

Provider–patient relationship

When staff members (including trainees) were provided with identification badges (including pictures and level of training), parents could better identify their children's caregivers and

Table 3 Five studies reporting measured interventions of humanization of pediatric care about pet therapy

Ref/country [study design]	Sample size	Intervention	Outcome/objective/evaluation of	Results	Pre–post	Sat
Pet therapy						
Caprilli [5] 2006 Italy [pilot study]	138 children 55 staff 46 parents	Animal-assisted activity	Reactions of Ctrls, Parents and Staff and infection rate pre/post pet introduction.	Meetings with the animals create a sense of children well-being and comfort. Positive event due to patient's participation, parents (100% favorable)/medical staff (92% favorable) satisfaction. The Hospital Committee of Infections did not find an increase in infections transmitted by dogs during intervention	X+	
Kaminski [18] 2002 USA [critical review]	EG: 40 children Ctrls: 30 children	Play and pet therapy	Pet therapy and play enhancing experiences effects on hospitalized children	Both therapies have been enhancing experiences for the child ($P = 0.165$). Heart rates, (significantly higher in the EG 99.27 ± 16.38 vs. CG 88.44 ± 12.68) parent's ratings of the child's mood (B vs. A $P < 0.001$) and display of positive effect were enhanced in EG. Salivary cortisol decreased in both groups (CG 18 ng/dl vs. EG 22 ng/dl, $P > 0.05$)	X+	
Sobo [44] 2006 USA [pilot study]	25 children	Pet- therapy	Pet therapy effectiveness on acute post-operative pain.	Pet therapy significantly reduced perceived pain (physical pain score, pre 3.79 vs. post 1.64, $P = 0.001$; emotional pain score, pre 3.89 vs. post 1.24, $P = 0.000$)	X+	
Stinchi [46] 2012 Italy [satisfaction survey]	1236 children 836 parents	Animal-assisted a ctivity (AAA)	Effectiveness of pet therapy on several aspects of hospitalization.	Positive effects on children (improvement of their phobias to the animals overcoming pre 60% vs. post 20% scared; 85% loves animals; 93% liked playing with them), on parents (89% favorable) and staff (87% favorable, 93% AAA useful for child, 62% AAA 97% improved work in ward)		X
Branson [3] 2017 USA [randomized controlled study]	EG: 24 children Ctrls: 24 children	AAA	Effectiveness of AAA on bio-behavioral stress responses (anxiety, positive and negative affect, and salivary cortisol and C-reactive protein [CRP] levels) in hospitalized children.	Differences between the AAA and control conditions were not significant. Increases in positive affect were larger in the AAA condition. Decreases in negative affect were larger in the AAA condition. In addition, pre- and post-intervention differences between the conditions in salivary cortisol and CRP were not statistically significant. Baseline levels of anxiety, cortisol, and CRP had a significant and large correlation to the corresponding post-intervention measures. Scores on the Pet Attitude Scale were high but were not associated with changes in anxiety, positive affect, negative affect, or stress biomarkers.	X+	

Ctrls controls , *CG* control group, *CRP* C reactive protein, *EG* experimental group, *Pre–post* before vs. after intervention or control group vs. experimental group, *Sat* satisfaction, *X* study with (+)/without (−) positive satisfaction or results before/after intervention with a control group vs. experimental group

Table 4 Nine studies reporting measured interventions of humanization of pediatric care about psychological support (*n* 3) and provider–patient relationship (*n* 6)

Ref/country [study design]	Sample size	Intervention	Outcome/objective/ evaluation of	Results	Pre–post	Sat
Psychological support						
Viggiano [50] 2015 Italy [randomized controlled study]	40 children (15 for clown show, 12 for dog interaction, 13 for musicians) Ctrls, 65 children	Clown show, animal-assisted intervention, and live music	Impact of psychological interventions on reducing anxiety, fear levels and the need for sedation in children undergoing magnetic resonance imaging	In the EG, the activities had a beneficial effect on the patients' emotional status with a decreasing of both anxiety and fear level ($P < 0.01$ and $P < 0.001$, respectively). The effect of activity experience on need for sedation was statistically significant ($P < 0.025$). The need for sedation was less in those children who engaged in one of the activities compared to the control group. Furthermore, the main effect of age was found ($P < 0.001$): a decreasing of need for sedation was observed to a greater extent in older children compared with younger ones.		X+
Batún-Cutz [1]2016 Mexico [case–control study]	47children (20 emotional intervent; 27 play intervention)	Emotional intelligence (IE) and game (G)	Interventions and aimed to reduce negative affect and maintain or increase positive affect	93% of the patients who received IE increased or maintained their positive affect, 55% of the patients who received G increased or maintained their positive affect. Considering both treatments, 77% of the patients presented therapeutic improvement. Game intervention decreases negative affect ($P < 0.001$), while the emotional intelligence intervention decreases negative affect ($P < 0.001$) and increases positive affect ($P = 0.014$). Both interventions improve the emotional state of hospitalized children.	X+	
Goldberg [14] 2014 Israel [randomized controlled study]	EG, 45 children and their parents Ctrls, 45 children and their parents	Clown show, video tape	To evaluate whether medical clowns can diminish pain and anxiety perceived by children undergoing allergy skin prick tests.	A significant reduction in State-Trait Anxiety Inventory was found in the clowns group, in both parents and children, when compared with Ctrl ($P = 0.004$, and $P = 0.002$, respectively). Both anxiety score (videotapes recorded during the procedure, m-YPAS) and pain score (FLACC) were reduced in the clowns group compared with Ctrls. In the clowns group, m-YPAS positively correlated with both Visual Analog Score for pain and FLACC ($P = 0.000$ and 0.002, respectively). m-YPAS was positively correlated with FLACC in the regular group ($P = 0.000$).		X+
Provider–patient relationship						
Flippo [12] 2015 USA [pre-post-intervention study]	15 parents	Post-discharge phone calls	Efficacy of post-discharge phone calls on 30-day preventable readmissions	Pre: 4 readmissions, pre intervention readmission rate = 26% Post: 1 readmission, post-intervention readmission rate = 6% Sample size was not large enough to show valid statistical significance ($P = 0.53$)	X+	
Rostami [40] 2012 Iran [quasi esperimental study]	EG, 35 children Ctrls, 35 children	Family-centered care	Effects of family-centered care on satisfaction of parents of children hospitalized in 2012	EG: mean score of satisfaction among parents pre/post-intervention: 20/90 vs. 83.2/90. Fourfold increase of satisfaction Significant difference satisfaction scores Ctrls vs. EG ($P < 0.001$ paired sample *t* test)	X+	
Svavarsdottir [47] 2012 Iceland [case-control study]	EG, 41 parents Ctrls, 35 parents	Short- term therapeutic conversation	Effectiveness of a short-term therapeutic families-nurses conversation intervention	Significant difference EG vs. Ctrls in perceived cognitive support ($P = 0.011$ ANOVA); emotional communication ($P = 0.04$ ANOVA); collaboration and problem solving ($P = 0.049$), verbal communication ($P = 0.024$ ANOVA). No significant benefit for families of children with chronic illnesses vs. Ctrls.	X±	
Roohafza [39] 2011, Iran [clinical trial]	EG, 47 children Ctrls, 45 children	Colored clothing for nurses	Effects of white vs. colored nurses clothing on anxiety levels	Higher global anxiety levels in Ctrls vs. EG (entry 10.04 ± 4.71 discharge 14.14 ± 4.13 vs. entry 11.24 ± 5.51 discharge 12.35 ± 5.64; $P \leq 0.05$ paired *t* test)	X+	
Dudas [11]	EG, 49 parents	PHACES tool			X+	

Table 4 (continued)

Ref/country [study design]	Sample size	Intervention	Outcome/objective/evaluation of	Results	Pre–post	Sat
2010 USA [prospective mixed method study]	Ctrls, 51 parents	(information sheet with photo and training level of medical providers)	Effectiveness of PHACES tool on parent's ability to identify child's providers and on tolerating trainees in the staff	82% were able to name at least one provider, more likely to correctly match the face with the name of the trainee (67% vs. 14%; $P < 0.01$ multiple logistic regression) and doctors (80% vs. 24%; $P < 0.01$ multiple logistic regression), to report medical students involvement acceptance and an improved understanding of their roles		
Bretler [4] 2016 Israel [prospective, comparative study]	Pre/post 100 (children/parents)	Staff photographs	Displaying staff photographs in prominent locations helps children and their parents to recognize staff	Phase 1: no photographs were displayed. Phase 2: staff photographs were placed in prominent locations throughout the pediatric ward. The children named a significantly larger number of staff members in phase 2 than phase 1, while the parents' score was unchanged. Overall parental satisfaction was significantly higher in phase 2 (3.7 vs. 3.1, $P < 0.001$)	X	+

Ctrls control group, *EG* experimental group, *Pre–post* before vs. after intervention or control group vs. experimental group, *Sat* satisfaction, *X* study with (+)/without (−) positive satisfaction or results before/after intervention with a control group vs. experimental group

showed a more significant acceptance of the presence of doctors-in-training than a control group [11]. When children better-recognized hospital staff in respect of a control group, this indirectly improved parental satisfaction, although the number of staff members identified by parents remained unchanged. Displaying staff photographs was a simple way to increase parental satisfaction during the child's hospitalization [4].

A brief 15-min meeting between nurses and parents during a child's hospitalization ("short-term therapeutic conversation") significantly improved some aspects of family support: perceived cognitive support, emotional communication, collaboration and problem-solving, and verbal communication. A significant benefit was observed only for families of children affected by acute illnesses and not for those with chronic diseases [47]. The use of a family-centered approach led to a fourfold increase in parental satisfaction regarding their children's care during hospitalization [40]. The introduction of a post-discharge phone call to the family (conducted according to the family-centered approach) resulted in a marked although not statistically significant reduction in the rate of re-admissions after discharge [12]. Compared to white uniforms, colored nurse uniforms appeared to effectively reduce child anxiety and promote relationships with the young patients [39].

Staff training

The use of a "video curriculum" to train doctors in investigating the social determinants of health (SDH, related to the social conditions at birth, during growth, and depending on work and age) during medical history collection led to a twofold increase in doctors' perceptions of their SDH screening ability. This positive result, however, was not mirrored by a parallel increase in parental satisfaction [21]. Another study was focused on physicians' perceptions of their own training level, after a training program on patient- and family-centered care curriculum. An evaluation of the program's effectiveness revealed that there was no significant difference between intervention and control groups. However, female doctors of the experimental group were found to be significantly more patient-centered and scored significantly higher on the sharing domain in respect of male colleagues [27]. The use of workshops and tutorials (Observed Structured Teaching Exercise, OSTE) appeared to be useful for improving medical education programs during FCR, leading to the correction of errors in clinical reasoning (new patient diagnosis) and coordination [34].

Technology

In a survey on the use of handheld electronic devices (HEDs), 75% of pediatricians declared to use it, but only

Table 5 Three studies reporting measured interventions of humanization of pediatric care about staff training

Ref/study design	Sample size	Intervention	Outcome/objective/evaluation of	Results	Pre–post	Sat
Staff training						
Klein [21] 2014 USA [nonrandomized controlled study]	Pre: 141 parents, 47 staff Post: EG, 72 parents, 24 staff Ctrls, 79 parents, 23 staff	Video curriculum on resident Social Determinant of Health (SDH) screening competence	Impact of a video curriculum on resident SDH screening competence, parental perceptions, resident referrals to a medical legal partnership (MLP) and formula distribution to food-insecure families.	EG self-assessed significantly higher vs. Ctrls ($P \leq 0.05$). Parents' rating of trust and respect did not differ between groups. Screening for each SDH significantly higher in EG with domestic violence (OR 2.16, 95% CI 1.01–4.63) and depression (OR 2.63, 95% CI 1.15–5.99), MLP referral rates increased ($P = 0.06$), and formula distribution ($P = 0.02$) reached statistical significance in the EG.		X+
Mann [27] 2013 USA [quasi experimental non randomized approach with a pre test–post test design]	EG, 24 staff Ctrls, 18 staff	Patient and Family Centered Care (PFCC) Curriculum	PFCC curriculum impact on residents' self-perceptions of PCC behavior.	Both groups completed the Patient Practitioner Orientation Scale (PPOS). No difference in total/subscale PPOS scores. The 17 female interns in EG were more patient centered than the 6 male interns ($P = 0.005$), scoring significantly higher in the sharing domain ($P = 0.001$).		X–
Ottolini [34] 2011 USA [pre–post-intervention study]	14 staff	Observed Structured Teaching Exercises	A program to address the need of hospitalists to efficiently teach during Family Centered Rounds	Pre- and post-Observed Structured Teaching Exercises scored statistically different ($P < 0.0001$). Particular improvements noted in the correction of incorrect clinical reasoning (new patient diagnosis) (56% pre, 86% post) and orientation (65% pre, 95% post).		X+

Ctrls control group, *EG* experimental group, *OR* odds ratio, *Pre–post* before vs. after intervention or control group vs. experimental group, *Sat* satisfaction, *X* study with (+)/without (−) positive satisfaction or results before/after intervention with a control group vs. experimental group *SDH* social determinants of health

Table 6 Five studies reporting measured interventions of humanization of pediatric care about technology

Ref/country [study design]	Sample size	Intervention	Outcome/objective/evaluation of	Results	Pre–post	Sat
Technology						
Gottlieb [15] 2014 USA [randomized trial]	EG, 285 parents Ctrls, 253 parents	Social screening via tablet computer versus a face-to-face interview	Impact on social needs reporting via computer-based questionnaire vs. face-to-face interviews	Rates of reporting on the more sensitive issues significantly higher in EG vs. CG (household violence $P = 0.03$, substance abuse $P = 0.05$); disclosure marginally higher in EG for financial insecurity ($P = 0.10$) and neighborhood and school safety ($P = 0.09$) Higher endorsement in the EG (70%) vs. CG (30%).	X+	
Tom [48] 2012 USA [cross-sectional study]	256 parents (65% users vs. 35% non-users)	Integrated Personal Health Record	Use of Integrated Personal Health Record among parents of children with chronic disease.	65% Integrated Personal Health Record users vs. 35% nonusers Top Integrated Personal Health Record uses: viewing immunization records, medical records, messaging, scheduling appointments. Top reasons not using Integrated Personal Health Record "too busy," "forgot password," "my child does not have health care needs."	X−	
Kern [20] 2015 USA [anonymous electronic cross-sectional survey]	140 staff	Handheld Electronic Devices (HED)	HED use by pediatric hospitalist, benefits/barriers in FCR on trainee education and family interactions with the staff.	92% use a smartphone; 56% a tablet. 76% use an HED in daily work activities, 24% never used them at work. 81% practice FCR ➔ 34% use it during FCR. Common HED uses: medical reference, personal use, pharmacology database. Barriers: connectivity, concerns of infection control.		X
Kelly [19] 2017 USA [cross-sectional study]	296 parents	MyChart Bedside: inpatient portal application on a tablet computer	A portal application on a tablet computer that provides information about a child's hospital stay	Parent survey respondents ($N = 90$) were satisfied with the portal (90%), reporting that it was easy to use (98%), improved care (94%), and gave them access to information that helped them monitor, understand, make decisions, and care for their child. Portal use improved health care team communication (60%).		X
Lai [23] 2018 Canada [prospective observational cohort study]	367 primary care practitioners 23 pediatric specialists	BASE™ (Building Access to Specialists through eConsultation)	eConsult in pediatric setting to improve healthcare system process and high provider acceptance	For 515/1064 (48.4%) referrals, primary care practitioners received advice for a new or additional course of action; 391/1064(36.7%) referrals resulted in an averted face-to-face specialist visit. In 9 specialties with complete data, the median wait-time was significantly less ($P < 0.001$) for an eConsult (1 day, 95% CI 0.9–1.2) compared with a face-to-face referral (132 days??; 95% CI 127–136). The majority (> 93.3%) of primary care practitioners rated eConsult as very good/excellent value for both patients and themselves. All specialist survey-respondents indicated eConsult should be a continued service.		X

Ctrls control group, *CI* confidence interval, *EG* experimental group, *FCR* family-centered rounds, *OR* odds ratio, *Pre–post* before vs. after intervention or control group vs. experimental group, *Sat* satisfaction, *X* study with (+)/without (−) positive satisfaction or results before/after intervention with a control group vs. experimental group

Table 7 JBI critical appraisal checklist for randomized controlled trials

Criteria	RCTs				
	Gottlieb [15] 2014, USA	Cox [9] 2017, USA	Branson [3] 2017, USA	Viggiano [50] 2015, Italy	Goldberg [14] 2014, Israel
1. Was the assignment to treatment groups truly random?	✓	✓	?	?	?
2. Were participants blinded to treatment allocation?	X	✓	✓	?	?
3. Was allocation to treatment groups concealed from the allocator?	X	X	✓	?	?
4. Were the outcomes of people who withdrew described and included in the analysis?	X	X	X	X	X
5. Were those assessing the outcomes blind to the treatment allocation?	X	✓	✓	?	?
6. Were control and treatment groups comparable at entry?	✓	✓	✓	✓	✓
7. Were groups treated identically other than for the named interventions?	✓	✓	✓	✓	✓
8. Were outcomes measured in the same way for all groups?	✓	✓	✓	✓	✓
9. Were outcomes measured in a reliable way?	✓	✓	✓	✓	✓
10. Was appropriate statistical analysis used?	✓	✓	✓	✓	✓
Overall appraisal (I = include, E = exclude, and SI = seek further information)	I	I	I	I	I

JBI Joanna Briggs Institute, *NA* not applicable to community-based randomized trials, *?* unclear, *X* no, ✓ yes

one third during FCR. Most of the physicians interviewed in the study supported the use of HEDs as an educational tool for doctors-in-training [20]. Compared to the traditional anamnestic interview, the use of tablets represented a more effective tool for anamnestic data collection while in the emergency department, especially for investigating SDH (e.g., when assessing sensitive topics, such as child safety and household member substance use) [15]. Champlain BASE™ (Building Access to Specialists through eConsultation) was a Web-based Asynchronous for an electronic communication service that allows primary-care-practitioners (PCPs) to submit "elective" clinical questions to a specialist. Similarly, eConsult improved PCP access and timeliness to elective pediatric specialist advice and influenced their care decisions, while reporting end-user satisfaction [23].

Parents of children with chronic diseases were persuaded to use an electronic Personal Health Record device (PHRs), which could have helped them to evaluate laboratory tests, recall visit reports or treatment plans, and communicate the current health condition of their child. The system also helped to plan therapy or send messages to physicians. However, there was no statistically significant difference in addressing the healthcare needs of the child when comparing the parents who used this technology and those who did not [48]. Parents instead were satisfied with an in-patient portal. Portals might engage parents in hospital care, facilitate parent recognition of medication errors, and improve perceptions of safety and quality [19].

Discussion

To our knowledge, this is the first systematic review to specifically examine the effectiveness of a large spectrum of interventions dealing with different aspects of the HOC in general pediatrics hospital wards. Previous reviews specifically considered the effects of individual components of HOC, namely the FCC/FCR in pediatric [38, 41] and/or neonatal age and/or in some specific subspecialty settings [10], probably losing sight of the customary type of hospitalized child and of the broad facets of the interventions that doctors usually plan there.

Differently from Rea's systematic review, we detected parents' satisfaction or outcome improvements in most studies, either with or without comparators [38]. In fact, according to the Quality Rating Scheme for Studies and Other Evidence [35], studies with pre- vs. post-intervention data or intervention vs. a control group ($n = 21$) showed significant efficacy in most cases ($n = 19$). Studies with verification of user satisfaction ($n = 7$) showed positive opinion in all cases. None of the interventions showed evidence of harm or safety concerns.

Regarding the quality of the studies, only five were RCTs [3, 9, 14, 15, 50] and they too show that interventions are reliable and improve the quality of care in multiple areas. One well-designed controlled trial without randomization [27] however did not show significant difference between the intervention and control groups. The majority were case–control studies or retrospective cohort studies [1, 4, 5, 11, 12, 18, 21–23, 30, 32, 34, 39, 40, 44, 47]. Fewer interventions were cross-sectional studies [2, 19, 20, 24, 46, 48]. Opinions

Table 8 JBI critical appraisal checklist for non-randomized experimental studies

Criteria	Studies																
	Klein [21] 2014, USA	Mann [27] 2013, USA	Rostami [40] 2012, Iran	Flippo [12] 2015, USA	Ottolini [34] 2011, USA	Roohafa [39] 2011, Iran	Sobo [44] 2006, USA	Kotzer [22] 2011, USA	Monti [30] 2012, Italy	Oshimua [32] 2014, USA	Bretler [4] 2016, Israel	Dudas [11] 2010, USA	Caprilli [5] 2006, Italy	Kaminski [18] 2002, USA	Leonard [24] 2014, South Africa	Biddis [2] 2014, Canada	Stinchi [46] 2012, Italy
1. Is it clear in the study what is the "cause" and what is the "effect" (i.e., there is no confusion about which variable comes first)?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2. Were the participants included in any comparisons similar?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. Was there a control group?	✓	✓	✓	X	X	✓	X	X	X	X	X	✓	✓	✓	X	✓	X
5. Were there multiple measurements of the outcome both pre- and post-intervention/-exposure?	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	X	✓	X	✓	X	✓
6. Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analyzed?	NA	NA	✓	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Were the outcomes of participants included in any comparisons measured in the same way?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8. Were outcomes measured in a reliable way?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9 Was appropriate statistical analysis used?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X
Overall appraisal (I = include, E = exclude, and SI = seek further information)	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I

JBI Joanna Briggs Institute, *NA* not applicable to community-based randomized trials, *?* unclear, *X* no, ✓ yes

Table 9 JBI critical appraisal checklist for analytical cross-sectional studies

Criteria	Studies		
	Tom [48] 2012, USA	Kelly [19] 2017, USA	Kern [20] 2015, USA
1. Were the criteria for inclusion in the sample clearly defined?	✓	✓	✓
2. Were the study subjects and the setting described in detail?	✓	✓	✓
3. Was the exposure measured in a valid and reliable way?	✓	✓	✓
4. Were objective, standard criteria used for measurement of the condition?	✓	✓	✓
5. Were confounding factors identified?	?	?	?
6. Were strategies to deal with confounding factors stated?	NA	NA	NA
7. Were the outcomes measured in a valid and reliable way?	✓	✓	✓
8. Was appropriate statistical analysis used?	✓	✓	✓
Overall appraisal (I = include, E = exclude, and SI = seek further information)	I	I	I

JBI Joanna Briggs Institute, *NA* not applicable to community-based randomized trials, *?* unclear, ✓ yes

of respected authorities and case reports were not included among selected studies. The selected studies could be assembled into seven categories, with some unavoidable overlaps.

All studies concerning the provider–patient relationship [4, 11, 12, 39, 40, 47] confirm that this is a key factor in determining the quality of care, in agreement with a recent narrative synthesis [13] which identified five common core components of interventions in the PFCC setting. These included the patient and family education, provider–family information sharing, social-emotional support, shared decision-making, and adapting care to match the family background.

Since the concept of FCC was first introduced, it has subsequently evolved under the various hospital settings all over the world, including in developing countries [33]. Dialog with the family and patients and families involvement in diagnosis and treatment plans [40] are in all cases important aspects in the development of HOC and may be useful for reducing the time to discharge [32] and improving the emotional impact of hospitalization experiences including instrumental examinations [50].

The reviewed studies confirm that training improves PFCC orientation [27] and the approach to relationship with patients in some difficult issues, such as that of SDH [15, 21].

Within the framework of humanization, environmental issues raise an obvious particular interest, including the welcome/reception, orientation, and architectural features. The studies reviewed here agree that, when possible, there should be attention on defining the environment with design and architectural solutions focusing not only on the strict functionality and efficiency of the healthcare system but also on the comfort of patients, visitors, and healthcare staff [2, 22, 24, 30, 39]. Also initiatives as the use of pet therapy and medical

Table 10 JBI critical appraisal checklist for case control studies

Criteria	Studies	
	Svavarsdottir [47] 2012, Iceland	Batún-Cutz [1] 2016, Mexico
1. Were the groups comparable other than the presence of disease in cases or the absence of disease in controls?	NA	NA
2. Were cases and controls matched appropriately?	✓	✓
3. Were the same criteria used for identification of cases and controls?	✓	✓
4. Was exposure measured in a standard, valid and reliable way?	✓	✓
5. Was exposure measured in the same way for cases and controls?	✓	✓
6. Were confounding factors identified?	?	?
7. Were strategies to deal with confounding factors stated?	NA	NA
8. Were outcomes assessed in a standard, valid and reliable way for cases and controls?	✓	✓
9. Was the exposure period of interest long enough to be meaningful?	✓	✓
10. Was appropriate statistical analysis used?	✓	✓
Overall appraisal (I = include, E = exclude, and SI = seek further information)	I	I

JBI Joanna Briggs Institute, *NA* not applicable to community-based randomized trials, *?* unclear, ✓ yes

Table 11 JBI critical appraisal checklist for cohort studies

Criteria	Study Lai [23] 2018, Canada
1. Were the two groups similar and recruited from the same population?	X
2. Were the exposures measured similarly to assign people to both exposed and unexposed groups?	X
3. Was the exposure measured in a valid and reliable way?	✓
4. Were confounding factors identified?	?
5. Were strategies to deal with confounding factors stated?	NA
6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	✓
7. Were the outcomes measured in a valid and reliable way?	✓
8. Was the follow-up time reported and sufficient to be long enough for outcomes to occur?	X
9. Was follow-up complete, and if not, were the reasons to loss to follow-up described and explored?	NA
10. Were strategies to address incomplete follow-up utilized?	NA
11. Was appropriate statistical analysis used?	✓
Overall appraisal (I = include, E = exclude, and SI = seek further information)	I

JBI Joanna Briggs Institute, *NA* not applicable to community-based randomized trials, *?* unclear, *X* no, ✓ yes

clown shows can improve the hospital stay [5, 14, 18, 44, 46, 50].

Also, to be a support for the hospital environment discussed above [2, 24], studies show that technology can provide direct aid in the management of pediatric patients and their families. The use of HEDs [15] and electronic PHRs [48] may be a useful tool to help parents manage their children. This warrants further exploration to promote ongoing communication and sharing of information between patients, parents, primary care providers, and subspecialists [36]. In this regard, "telemedicine" should be considered more broadly, not only as a replacement for in-person visits but also for other uses, such as optimizing the value of in-person visits through pre-visit telemedicine communication and post-visit telemedicine follow-up [37]. Another important aspect of HOC is psychological support to reduce the negative impact of children's hospitalization [1].

Study limitations

This study should be considered in light of several limitations as variability in the type of interventions and outcome measures, which made the studies difficult to compare and prevented meta-analyses. Additionally, there is likely much publication bias against research with negative results. To be as comprehensive as possible, we did not exclude any study solely on the basis of low research quality. The majority of the 28 studies, however, reported interventions with statistically significant results. The narrative results of some excluded studies might have deserved attention as hypothesis-generating [37] with concepts such as keeping children busy and less anxious by distracting them from thoughts about their disease, suffering, and distance from home [6, 42]. Extending the search beyond major databases, perhaps also into the gray literature, and reducing language restrictions would have likely increased the effectiveness of this review. Finally, pain management in children achieved through various pharmacological [26, 28] and non-pharmacological [29] approaches is a critical and widely studied issue in the humanization of pediatric care. However, this specific topic was outside the scope of this review and would require a dedicated study.

Conclusions

HOC is central to the holistic management of pediatric hospital care, but it is evident that the field requires further robust research. Most of the projects were local initiatives implemented in individual institutions/hospitals and were not based on or merged in specific humanization models/programs. Most of these studies were of moderate to low quality and had some risk of bias. Interventions moreover were frequently limited to the time of the research, probably benefiting the enrolled subjects only. Even so, as most results demonstrate overall a positive balance between beneficial and harmful effects, they will likely help in the meanwhile to orientate policymakers seeking to close the gap between current and optimal levels of pediatric care humanization.

Authors' Contributions Marina Tripodi, Maria Anna Siano, and Claudia Mandato: Drs. Tripodi, Siano, and Mandato participated in the development of the systematic review and equally contributed to the writing of the manuscript.

Anna Giulia Elena De Anseris, Paolo Quitadamo, and Salvatore Guercio Nuzio: Drs. De Anseris, Quitadamo, and Guercio Nuzio worked at specific sections of the literature search.

Pietro Vajro: Prof Vajro conceived and monitored the study quality as the senior author.

Paolo Siani and Pietro Vajro: Dr. Siani and Prof. Vajro supervised the design and execution of the study, performed the final data analyses, and contributed to the writing of the manuscript.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Compliance with ethical statements

Conflict of interest The authors declare that they have no conflict of interest.

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