

A COMPARATIVE EVALUATION OF INTERNAL MEDICINE WARDS IN SPAIN

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Abstract

Objective – This analysis investigates the functional and environmental quality of several internal medicine wards in Spain.

Background – Despite the economic recession, the Spanish healthcare system has proven to be resilient. In the near future, Spain will be faced with the demographic challenge of an ever-ageing population. Further efforts should be made to ensure a sustainable and affordable healthcare system. The elderly population is the group that requires the highest rates of healthcare resources, especially in acute-care hospitals, with the maximum hospital attendances and the longest average length of stay. Since there is scientific evidence that links healthcare outcomes with design (evidence-based-design), one way of improving the efficiency of healthcare delivery is by enhancing the quality of existing internal medicine wards as it is usually the place where the elderly inpatients are cared for. Post-Occupancy-Evaluation (POE) tools have been used globally to assess the performance of existing buildings but little has been applied in the Spanish context.

Research question – How well do existing internal medicine wards perform in relation to guidelines and research on functional and environmental quality?

Methods – Both quantitative and qualitative methods have been used in this case study for the triangulation of data. Four internal medicine wards have been evaluated with the following methods: architectural layout analysis, photo analysis and a POE tool designed for the Spanish context (CURARQ-H).

Results – Not surprisingly, the oldest ward scores lower than the most recent buildings. The analysis reveals that the patients' area is the one that gets better grades while the access area scores the lowest marks. Further details on improvement measures are given for each ward area.

Conclusion – Compared to Scandinavia, USA or Canada, healthcare architecture in Spain is being slow to embark on EBD. This evaluation method together with CURARQ-H tool could be an enabler for generating synergies between healthcare staff and architects in Spain and work as an accelerator in the use of EBD at a national level.

Keywords: *Internal-medicine ward | post-occupancy-evaluation tool | evidence-based design | design evaluation | evaluation tool*

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1. Background

1.1 Spain vs. Scandinavia

The following table shows several national indicators for Spain, Denmark, Norway and Sweden.

	Spain	Denmark	Norway	Sweden	Unit
Population (2013-2014)	46.464	5.614	5.137	9.609	Inhabitants, thousands
Life expectancy at birth (2016)	♀ 86,3	82,8	84,2	84,1	Years
	♂ 80,5	79	80,7	80,6	Years
Health expenditure and financing (all functions 2015)	9,1	10,3	10,1	11	% (Share of Gross domestic product)
	3.175,5	5.000,8	6.239,4	5.271,9	US Dollar (Per capita, current prices, current Purchasing Power Parity (PPPs))
Total hospital beds (2016)	138.008	14.871	19.303	23.207	Number
	2,97	2,6	3,69	2,34	Per 1.000 population
Average length of stay (inpatient care, hospital aggregates 2016)	7,3	5,4	6,9	5,8	Days

Table 1, National indicators: comparison between Spain and Scandinavia [1].

The numbers reveal that even though Spain has one of the longest life expectancies at birth, its health spending is the lowest (about half of US dollars per capita compared to Norway) and the average length of stay, the longest. These indicators demonstrate that there are plenty of opportunities to improve in the Spanish healthcare system.

1.2 Spanish healthcare system

Spain has a decentralized national health system or “Sistema Nacional de Salud” (SNS) in Spanish which is funded by taxes. This public system is based on the principles of “universality, free access, equity and fairness of financing” [2]. The SNS is organized independently by the 17 regions of the country with a national institution responsible for the overall coordination and monitoring of its performance.

After the economic crisis in 2008, measures were taken for reducing public expenditure in the SNS. It was not until 2014 that public spending on health started to increase again. Despite the budget reductions suffered over this time, the SNS has proven to be resilient [2]. This resilience could be caused by the strength of primary care and its close coordination with acute-care hospitals, as both care levels belong to the same public system.

Acute-care hospitals accounted for over 25 % of health spending in 2014 [3]. That is why efficiency measures have targeted this expensive sector. The SNS joins the global trend on hospital bed reduction (from 3,68 beds per 1.000 inhabitants in 2000 to 2,97 beds per 1.000 inhabitants in 2016 [4]) and shorter average length of stay. The possibility to free resources in the inpatient area of an acute-care hospital has been made possible thanks to the moving of many diagnostic and therapeutic procedures to the outpatient care (both in the acute-care hospital and in primary-care centers). However, clinical advances have increased the need for intensive beds in acute-care hospitals as more severe and critical illnesses can now be treated [5].

In the near future, Spain will be faced with the demographic challenge of an ever-ageing population. Even though health expenditure is expected to rise, further efforts should be made in order to ensure a sustainable and affordable SNS [3].

1.3 Internal medicine ward

The internal medicine ward in a Spanish acute-care hospital is usually the place where the elderly inpatients are cared for. These patients may suffer from two or more chronic conditions and hence have higher functional limitations [6]. Figure 1 shows the data provided by the survey of hospital morbidity carried out by the Spanish Institute of Statistics in 2016.

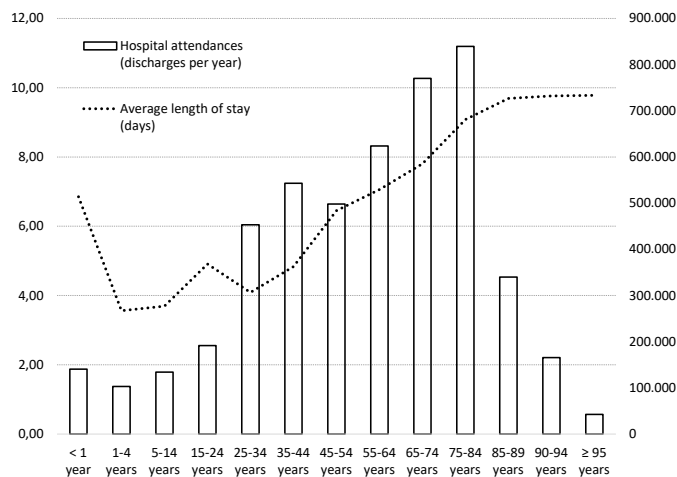


Figure 1. Hospital attendances and average length of stay according to age in Spain in 2016 [7].

The figure illustrates that the highest hospital attendance rates (discharges in 2016) occur in the age range of 55 to 84 years. Furthermore, even though the attendance for patients aged over 85 is lower, their average length of stay reaches its maximum duration (9,78 days). Those facts corroborate that the usage of acute-care hospital resources is not distributed homogeneously among the Spanish population. In fact, it is the elderly population group that requires the highest rates of healthcare resources. Thus, improvement measures in the internal medicine ward (along with other approaches) might increase the quality of the caring process and ensure a cost-efficient usage of healthcare resources.

1.4 Evaluation tools

Given that there is scientific evidence [8] that links healthcare outcomes with design (evidence-based design), one way of improving healthcare delivery is by enhancing the quality of hospital environments.

Despite the fact that design quality is still an imprecise concept [9], there are many tools or instruments targeted to measure the quality of the physical healthcare environment [10]. The Post-Occupancy Evaluation (POE) [11] is the most extended method in use for assessing the performance of buildings. Since the introduction of the POE at the end of the last century, there has been a proliferation of different tools. There is even a model (the Focus Flower [12]) for organizing the different evaluation methods according to their main focus (beauty, durability or utility). More specifically, POE tools have found an important niche in the healthcare sector, where small building improvements might result in financial gains. Thus, pinpointing the design features that might have a return on investment over the lifecycle of the building [13] has become of paramount importance. Subsequently, there is a growing interest in the development of evaluation tools for every different context as there is no “one size fits all” solution [14].

1.5 Research question

The aim of this paper is to investigate the functional and environmental quality of several internal medicine wards in Spain. The research question is:

How well do existing internal medicine wards perform in relation to guidelines and research on functional and environmental quality?

With this research question we address how to include the organizational learning collected mainly by the national guidelines into the evaluation of four individual projects. The aim of guidelines is usually to translate and apply research into design [15]. This study analyzes existing design to test the application stage of the guidelines and other research.

2. Methods

Both quantitative and qualitative methods have been used in this case study for the triangulation of data. Four internal medicine wards have been evaluated with the following methods: architectural layout analysis, photo analysis and a POE tool designed for the Spanish context (CURARQ-H).

2.1 CURARQ-H

CURARQ “Arquitectura para curar” or architecture for cure is a post-occupancy-evaluation tool available online [16], which methodology has been previously published [17].

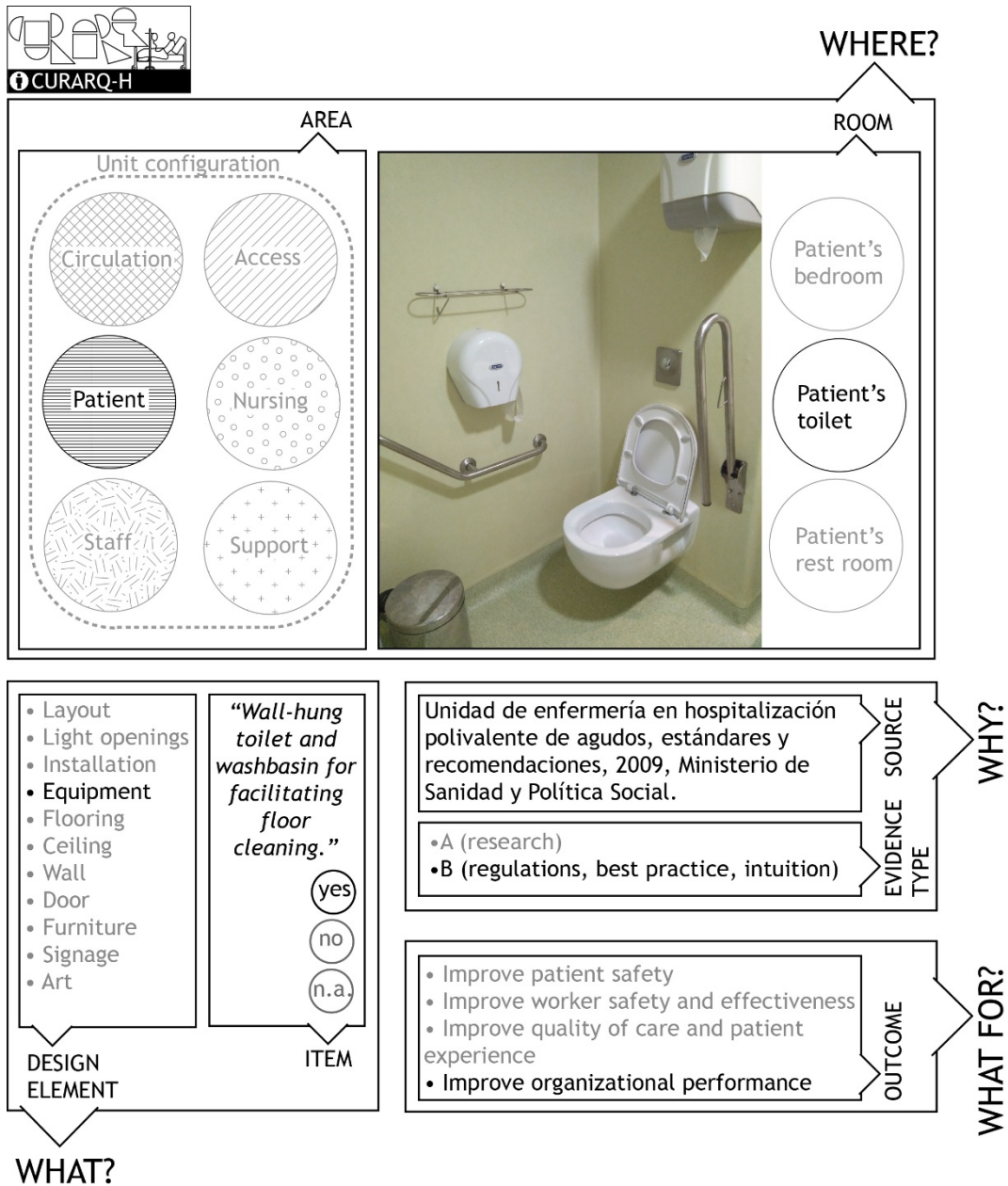


Figure 2. CURARQ-H content structure.

The data collection starts with a tour across all the rooms of the ward. For each room there are several items that can be checked. The total number of items for the whole ward is 213 and they are organized according to four questions: where? why? what for? and what?

Where?

The information is organized according to the room that is being analyzed, which in turns is part of a functional area of the ward. The rooms that can be found in any of these areas are:

- Unit configuration (10 items): an overall category for general features (signage, art) the planning layout of the unit and its relationship with other units of the acute hospital.
- Circulation area (17 items): internal corridor for inpatients and staff.
- Access area (21 items): external lobby and entrance (for visitors or relatives), waiting room, public toilet and interview room.
- Patient and family care area (74 items): patient's bedroom, patient's toilet and patients' rest room.
- Nursing control area (55 items): counter, nurses' office room, medicine preparation room, staff rest room, head nurse's office, staff toilet, treatment room and assisted bathroom.
- Staff area (8 items): doctors' office room and staff changing room.
- Support area (28 items): internal lobby (for staff, inpatients and supplies), regeneration kitchen, dirty utility room, cleaners' room, dirty linen room, linen store, clean supply room and large equipment store.

Why?

Specifies the source from where the item has been taken. The summary of references used are shown in Figure 3.

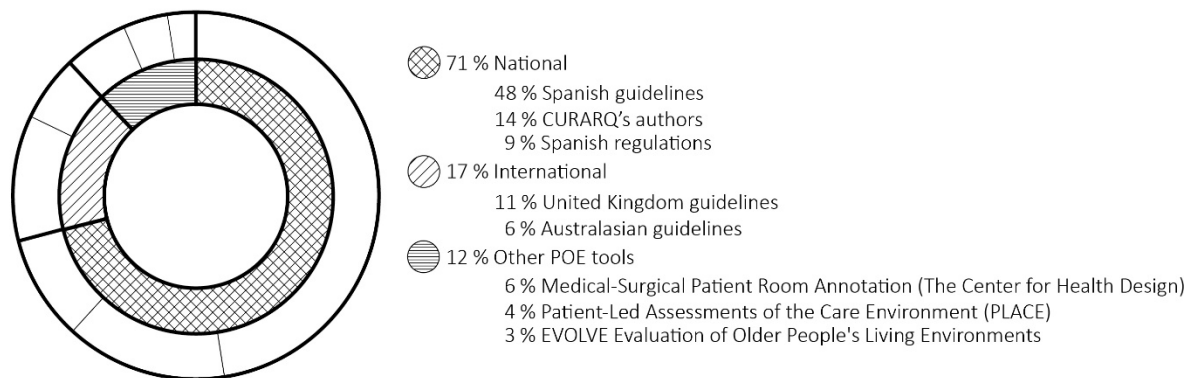


Figure 3. Sources of tool content.

Type of evidence states whether the item considered comes from research (A) or regulations, best practice and intuition (B). According to the type of evidence, each item scores points (10 points for an A item and 1 point for a B item).

What for?

Determines the objective the item aims at. These objectives have been taken from an existing tool [18]:

- Improve patient safety.
- Improve worker safety and effectiveness.
- Improve quality of care and patient experience.
- Improve organizational performance.

What?

Identifies the design element that concerns the item (layout, light openings, installation, equipment, flooring, ceiling, wall, door, furniture, signage or art) and the item description. The answer to any item can be “yes”, “no” or “not applicable”. Each design element has a cost associated according to Table 2.

Cost	Design element
5	layout
4	light openings, installation
3	equipment, flooring
2	ceiling, wall, door
1	furniture, signage or art

Table 2. Cost category for each design element.

2.2 Study cases

Four different hospitals (Table 3), which are geographically close and managed by the same healthcare regional department, have been selected for this comparative evaluation.



Hospital short name	HCUV	HUPF	HD	HUV
Year of building or pavilion opening (year of renovation works)	1960 (1994)	2010	2009	2010
Assigned population	341.972	281.720	166.108	154.017
Installed beds	582	1.050	262	230
Nº registered emergencies	161.488	237.328	58.544	89.467
Nº outpatient appointments (first + successive)	574.215	618.050	207.668	240.761
Ratio successive / first	2,17	2,24	1,66	2,13
Nº hospital admissions (urgent + planned)	24.105	45.109	11.908	12846
Average length of stay (days)	6,39	6,48	5,54	5,09
Evaluation date	January 2018	January 2018	June 2016	February 2018

Table 3. Hospital data [19] for Hospital Clínico Universitario de Valencia (HCUV), Hospital Universitari i Politècnic La Fe (HUPF), Hospital de Dénia (HD) and Hospital Universitario del Vinalopó (HUV).

Figure 4 shows the location of the evaluated ward within each the acute-care hospital floor.

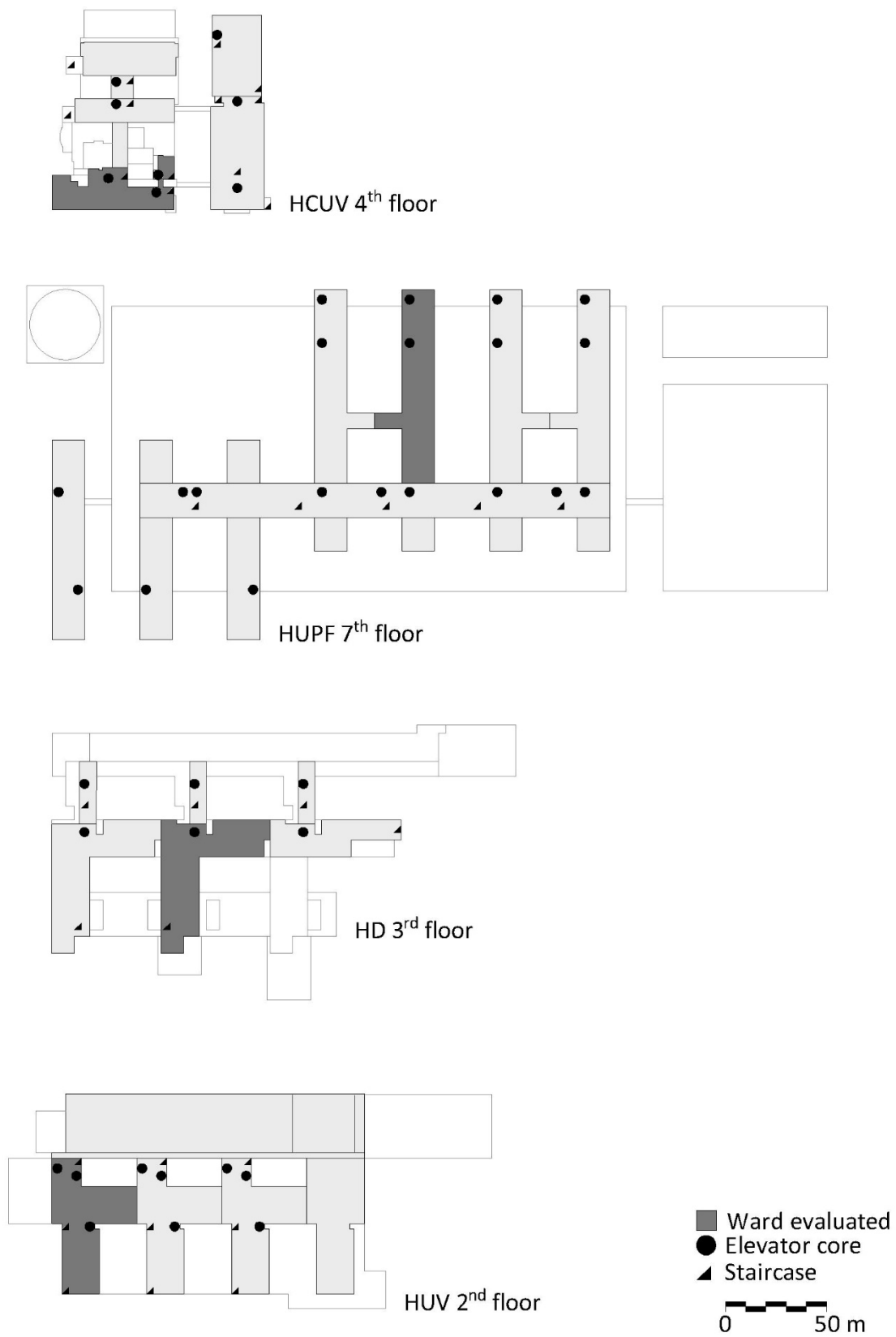


Figure 4. Ward evaluated location.

Hospital Clínico Universitario de Valencia (HCUV)

The ward evaluated in HCUV is located on the fourth floor of pavilion B. On this floor there are another three inpatient wards and outpatient care at pavilion D. Directly above and below the internal medicine ward there is another inpatient ward with the same configuration.

There are three elevator cores that serve the unit. The main elevator core has a mixture of public and private flows and is served by four bed elevators and two passenger elevators. There is another bed elevator in the middle of the ward that opens directly onto the corridor (without lobby) and a passenger elevator for the treatment area of the unit.

The ward has an F shape and the corridor has patient bedrooms on both sides. In the central part of the ward the corridor has patient bedrooms on one side and the staff area and the circulation core on the other side. The staff support area is centralized and there is only one nursing station. There is a variety of patient bedrooms: two triple rooms, fourteen double rooms and three individual rooms (two of them without shower in the toilet room).

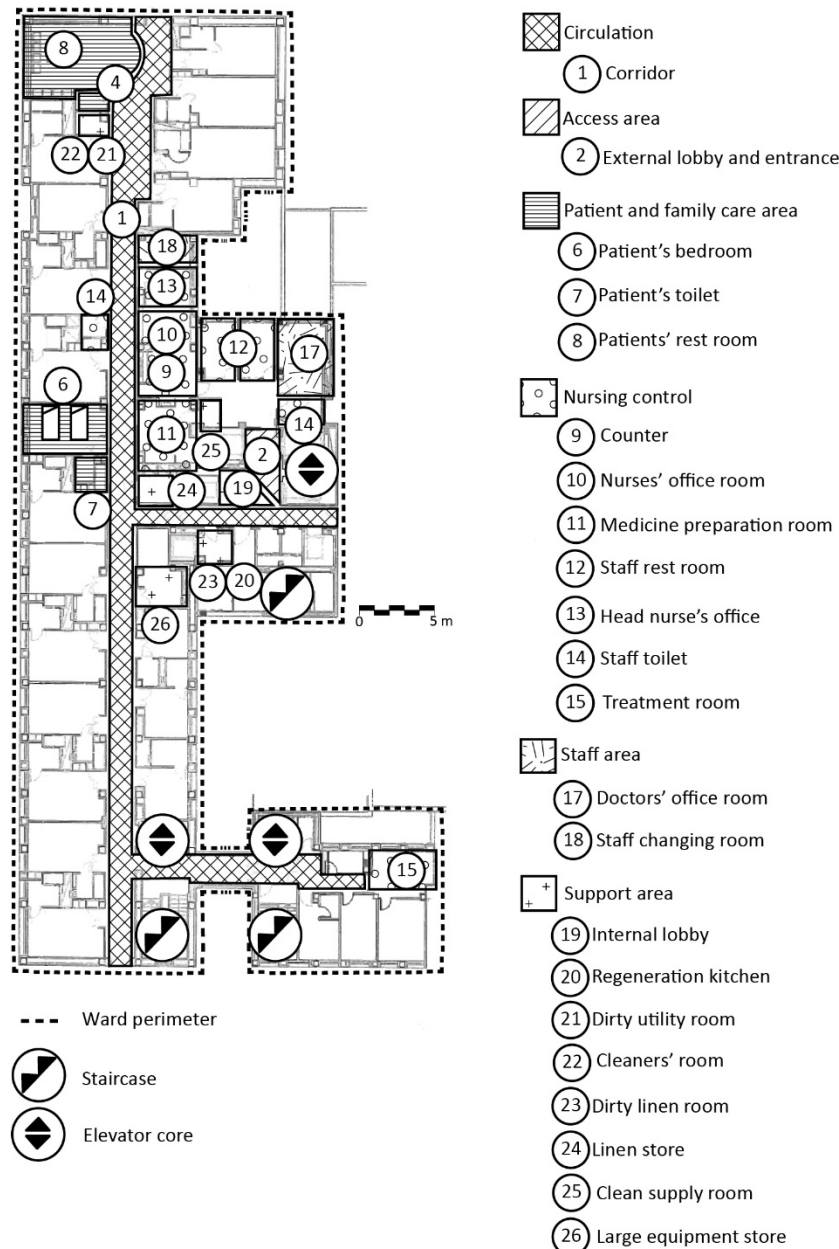


Figure 5. Hospital Clínico Universitario de Valencia (HCUV) layout and rooms evaluated.

Hospital Universitari i Politècnic La Fe (HUPF)

The internal medicine ward in HUPF is located on the seventh floor of tower E. On this floor there are another three wings for inpatient care and two wings for outpatient care. Directly below the internal medicine ward there is another inpatient ward with the same configuration. The seventh floor is the last one of the whole acute hospital.

There are four elevator cores that serve the unit. One core for public access (with two passenger elevators for visitors) and three cores for private access. Two of the three cores for private access consist of two and three bed elevators (for staff and inpatients) and the third core is served by two service elevators (for staff and supplies).

The ward has an F shape. The corridor has one part with patient bedrooms on both sides and another part with patient bedrooms on one side and staff support area on the other side. The staff support area is centralized and there is only one nursing station. There are 35 individual patient bedrooms and 20 of them have an anteroom for the isolation of infectious patients.

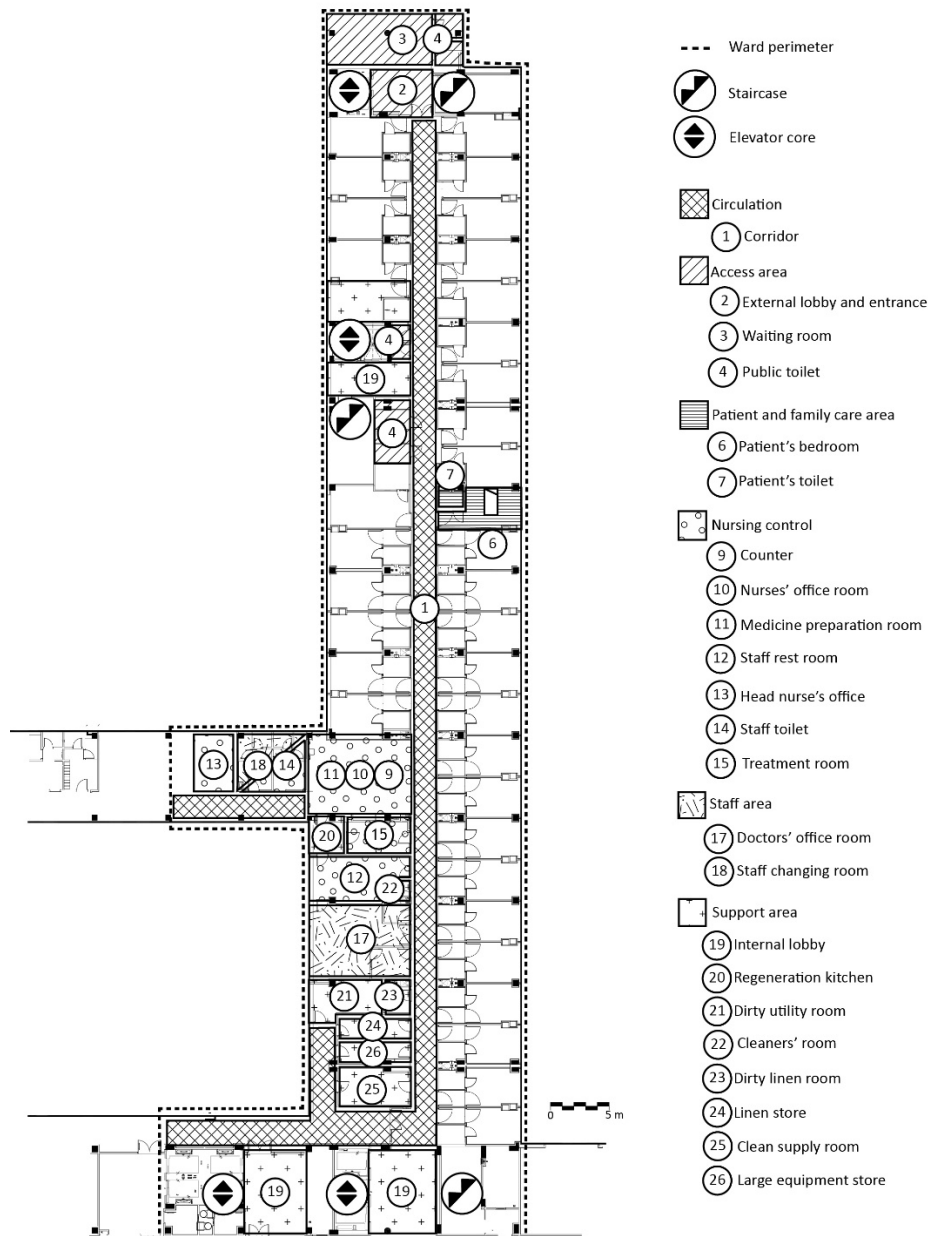


Figure 6. Hospital Universitari i Politècnic La Fe (HUPF) layout and rooms evaluated.

Hospital de Dénia (HD)

The internal medicine ward in HD is located on the third floor of the B hospitalization wing. On this floor there is another internal medicine ward and the psychiatric ward. Directly below the internal medicine ward there is another inpatient ward on the second floor. The third floor is the last one of the whole acute hospital.

There are two elevator cores that serve the unit. One for public access (two passenger elevators for visitors) and another one for private access. The private core is served by a service elevator (for staff and supplies) and a pair of bed elevators (for staff and inpatients).

The ward has an L shape with a double-loaded corridor (with patient bedrooms on both sides). The staff support area is centralized and there is only one nursing station. There are a total of 37 patient bedrooms. All patient bedrooms are used individually even though they have double capacity to cope during peak seasons.

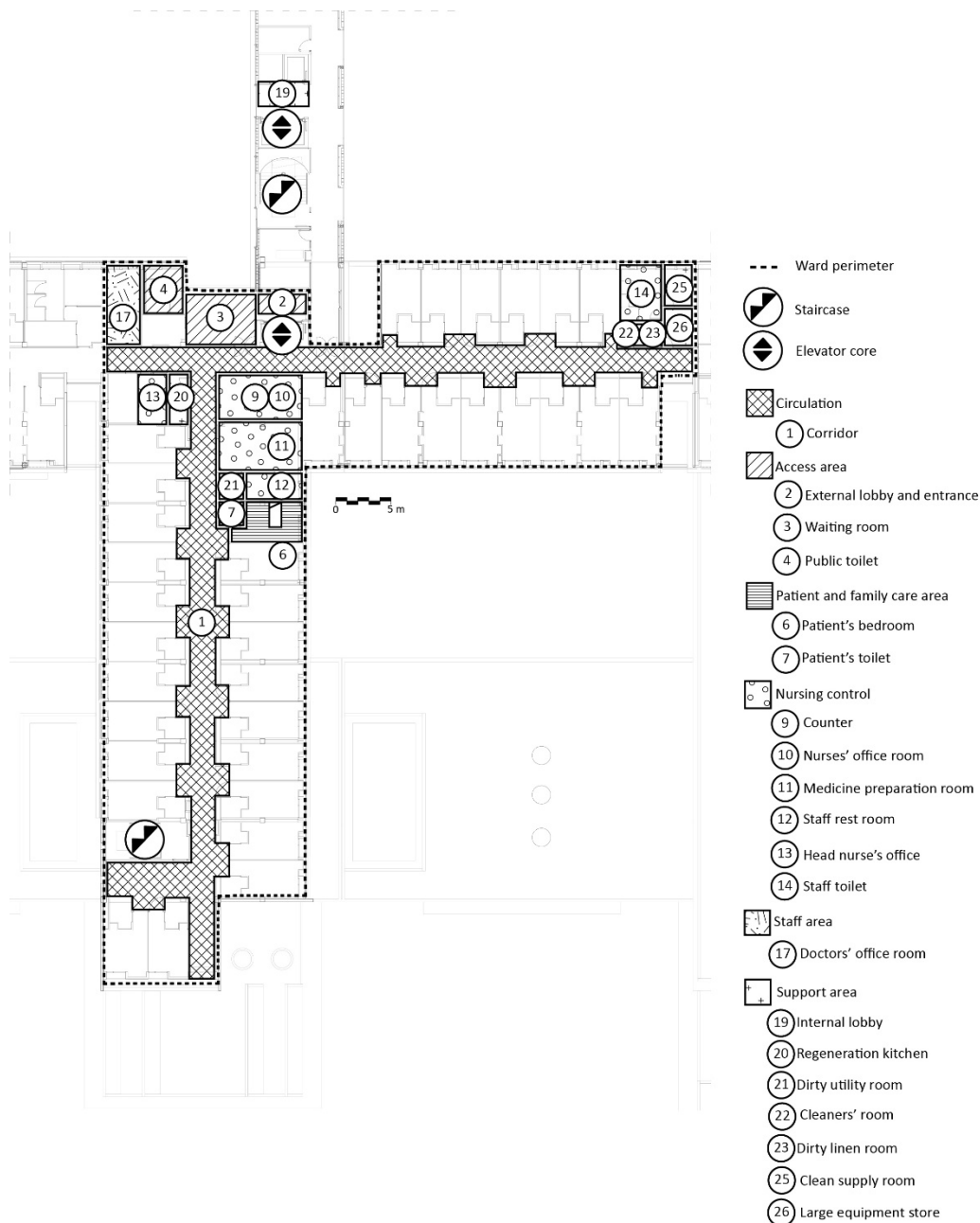


Figure 7. Hospital de Dénia (HD) layout and rooms evaluated.

Hospital Universitario del Vinalopó (HUV)

The internal medicine ward in HUV is located on the second floor of the blue hospitalization wing. On this floor there are more inpatient wards (adult, obstetric, pediatric and neonatal), the operating theaters and the labor unit. Directly below the internal medicine ward is the outpatient area on the first floor. Above, on the third and last floor there is another ward with the same structure.

There are three elevator cores that serve the unit. One for public access (two passenger elevators for visitors) and another one for private access. The private core is served by a pair of service elevators (for staff and supplies) and another pair of bed elevators (for staff and inpatients).

The ward has a Y shape with a double-loaded corridor. The staff support area is centralized and there is only one nursing station. There are a total of 30 patient bedrooms. All patient bedrooms are used individually even though they have double capacity to cope during peak seasons.

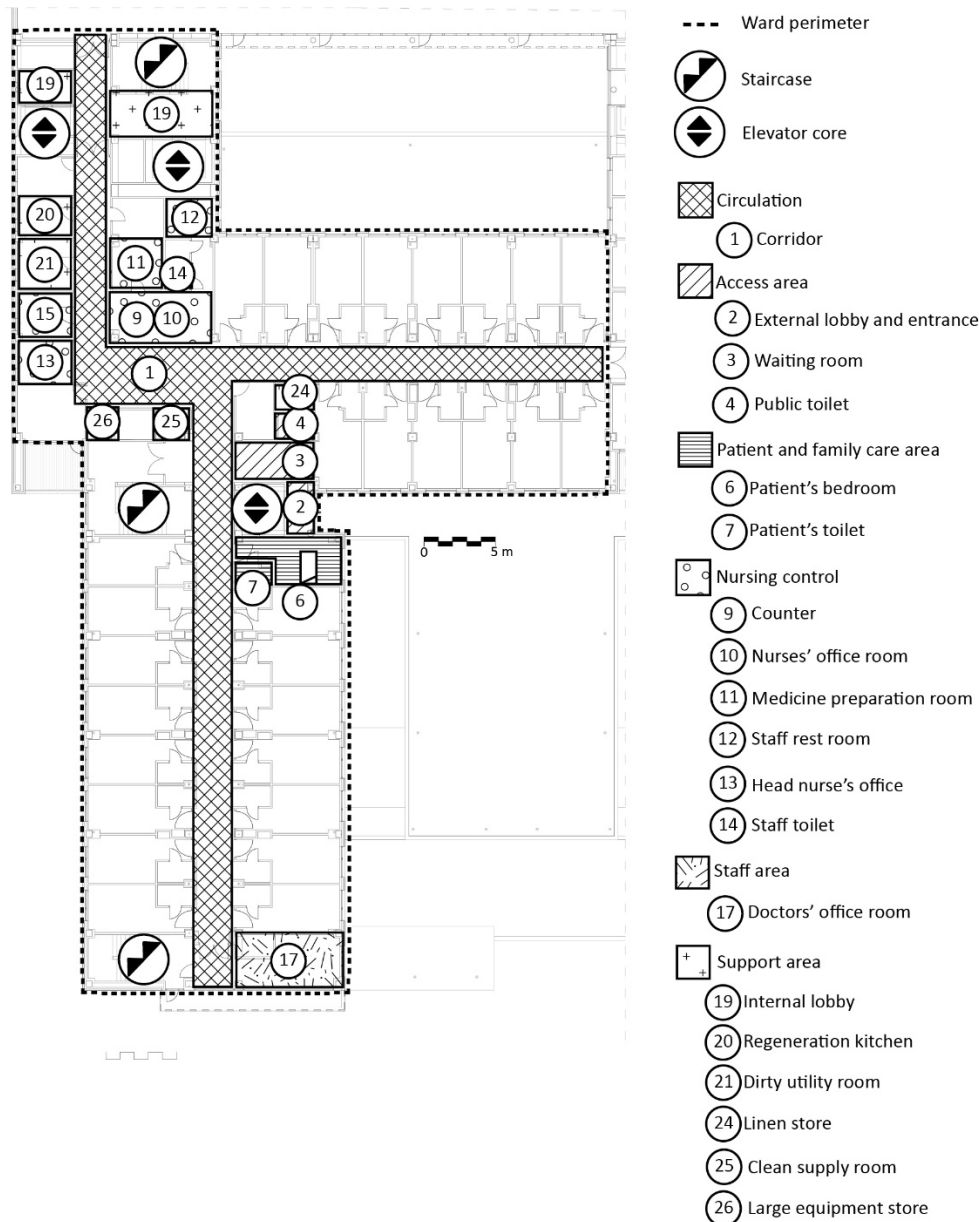


Figure 8. Hospital Universitario del Vinalopó (HUV) layout and rooms evaluated.

3. Results

Figure 9 represents the results obtained by each ward with the tool CURARQ-H.

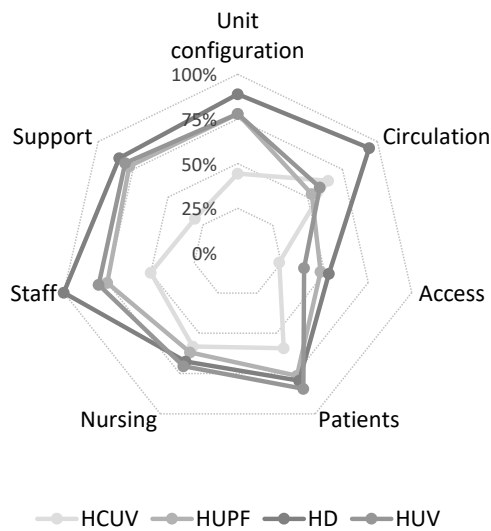


Figure 9. CURARQ-H results for the wards evaluated.

The results show that HD scores the highest percentage in almost all areas. HUV comes next, with the circulation and access area slightly lower. The HUPF has similar results to HUV but lower marks for staff and nursing areas. HCUV receives the lowest grades in almost all areas.

Comparing now between areas, the patients' area is the one that gets the best grades while the access area scores the lowest marks. Next, we analyze the results of each area in more detail and illustrate the best design strategies in the photographed rooms.

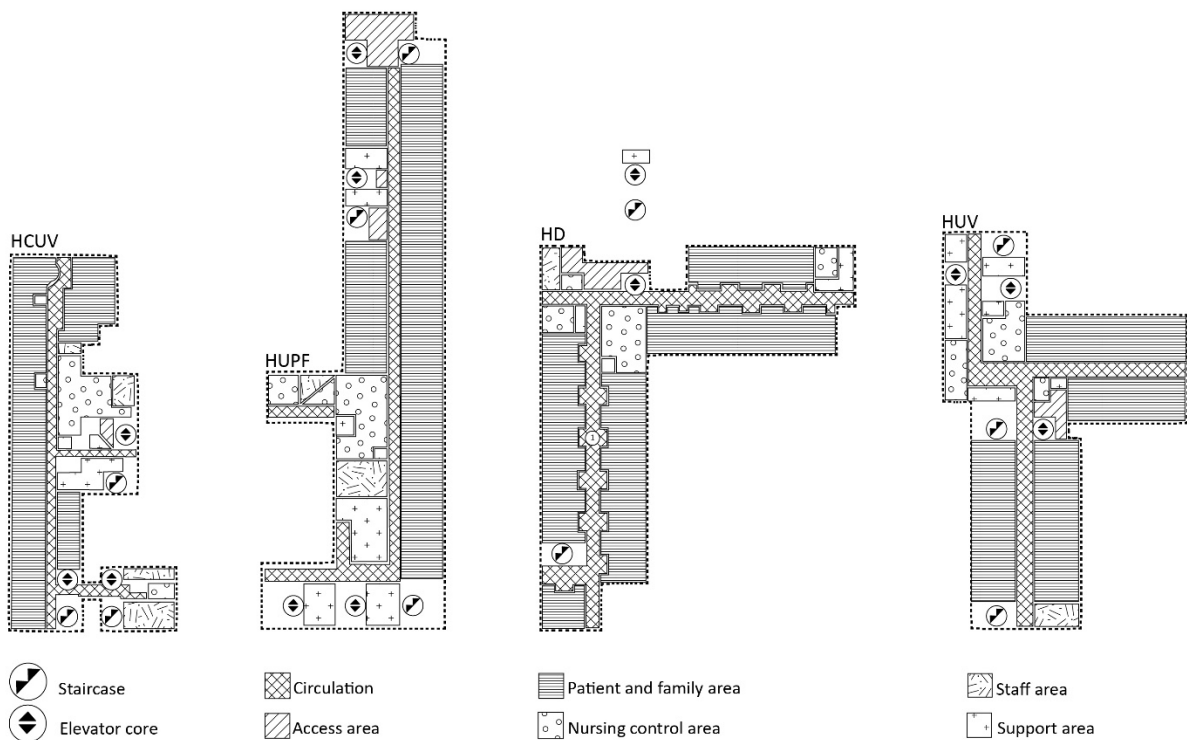


Figure 10. Functional diagrams of ward areas.

3.1 Unit configuration

The unit configuration of HCUV is weaker than the others because there are not different access points for external and internal flows. In this acute-care hospital, the hospitalization wards have different layout arrangements which makes it more difficult for staff to get used to. There is not any form of art in the ward and the maintenance status of some signage systems is poor.

3.2 Circulation

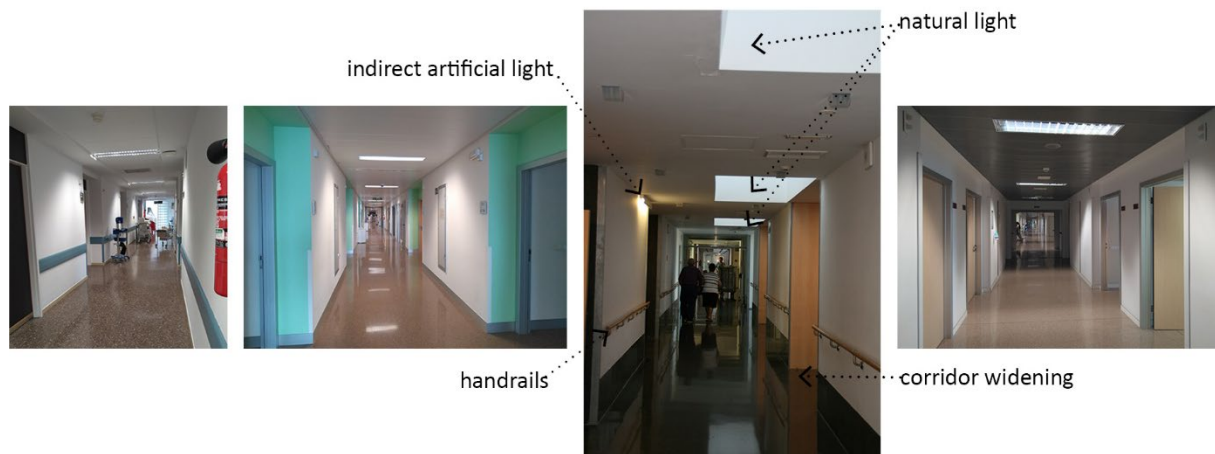


Figure 11. Corridor at HUCV, HUPF, HD and HUV.

HD gets the highest percentage as its internal corridor has natural light, not direct artificial light from the ceiling, handrails and there is even a widening of the corridor at each inpatient bedroom. This space facilitates the manoeuvrability of the bed, gives privacy to relatives and a soft transition between the room and the corridor.

3.3 Access area

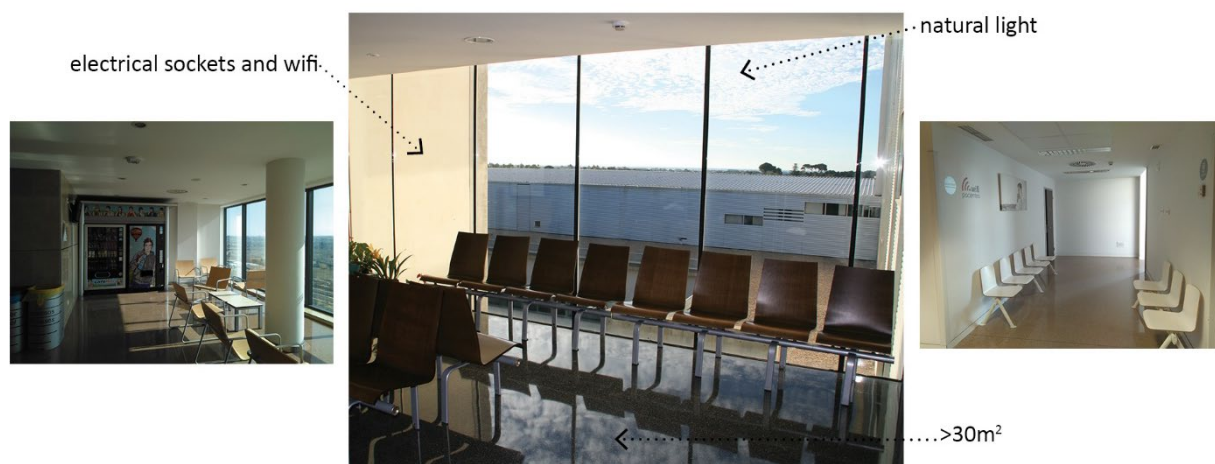


Figure 12. Waiting room for relatives and visitors at HUPF, HD and HUV.

The access area at HCUV does not have a waiting room for relatives and visitors, the other three hospitals do have one but the qualities of the room could be better. None of the hospitals has a dedicated interview room and the staff use other office rooms for private conversations.

3.4 Patient and family area



Figure 13. Patient's bedroom at HUPF, HD and HUV.

The HCUV is the only one that has an inpatient rest room, in the other hospitals, patients share the waiting room in the access area. However, the overall quality of that room, the patient's bedroom and the patient's toilet room at HCUV is quite low compared to the newer hospitals. HUV is the one that scores the highest grades. Its inpatient bedrooms comply with all but four items: the size of the room and the bed should be bigger, the switches should be located at a higher level, there is not a secure locker for valuable items and the door does not have a quiet closing system.

3.5 Nursing control area



Figure 14. Medication room at HCUV, HUPF, HD and HUV.

It is the area with more similarities among the four wards analyzed. In all hospitals the counter and the nurses' office room are shared in the same space. In HUPF and HD even the medicine preparation room is combined with the nurses' office room and the counter while the HCUV and HUV have the medicine preparation room in an independent location.

3.6 Staff area



Figure 15. Doctors' office room at HUPF and HD.

The doctors' office room in all four hospitals complies with almost all the tool items. Regarding the staff changing room, only the HUPF has a specific room. HD and HUV have a centralized system and no changing room in the ward. Originally, the HCUV had a centralized staff changing room for the whole hospital but in response to staff demands there is now a small changing room that does not meet the tool's requirements.

3.7 Support area



Figure 16. Dirty utility room at HCUV, HD and HUV.

HCUV gets the lowest grades as there is not enough room for support activities. The lack of space means that different functions are shared in the same room without adding extra space.

4. Discussion

Not surprisingly, the HCUV receives the lowest grades in almost all areas, which could be due to its age (about 15 years older than any other hospital). In all four wards, the patient area gets the highest grades. This could be because the patient's bedroom and the patient's toilet are the most researched rooms nowadays. On the contrary, the access area scores lower than any other area. Space for relatives is scarce and the functional and emotional demands of family members are usually overlooked. Family presence and engagement in the care of dependent patients could be promoted by design and hence improve the patient's hospital experience and the efficiency of healthcare staff.

Regarding the usability of CURARQ-H tool, the support area is the most difficult area to evaluate because the tool's rooms schedule does not always match reality. The lack of space is usually proportional to the clutter found in support rooms that share different functions. Moreover, the staff area room's schedule is limited to two rooms (doctors' office room and staff changing room) and so few items (8) can be evaluated.

5. Conclusions

This study investigates the functional and environmental quality of four internal medicine wards in Spanish acute-care hospitals. Using a POE- tool designed for the Spanish context (CURARQ-H), layout analysis and photos analysis the results depict the improvement measures that could be carried out in any of the evaluated wards.

The main limitations of the study are:

- Even though the tool item generation was undergone from a review of relevant literature [20] and provided that CURARQ-H is available online [16] further studies should assess its content validation and test reliability.
- Alternative evaluation methods (questionnaire, interviews and/or observation) could have been used for strengthening the results.
- It would be interesting to increase the site scope and replicate the study in multiple facilities.

The implications for practice:

- Given that there is an urgent need for delivering more efficient healthcare resources in Spain, internal medicine wards in acute-care hospitals should be updated to cope with the new demands of an ageing population.
- Compared to Scandinavia, USA or Canada, healthcare architecture in Spain is being slow to embark on evidence-based design. There is no specific training for healthcare architects and little collaboration between healthcare staff and design teams. CURARQ-H tool could be an enabler for generating synergies between healthcare staff and architects in Spain.
- The tool's structure for organizing the information could be replicated in an international context. But only at a national level could the tool be used for updating the guidelines on healthcare facilities as it is customized to the economic context of Spanish society. The tool's usage could be a way to test current guidelines and provide feedback to facilitate the review processes for the improvement of national documents.

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