QUESTIONES PUBLICITARIAS

Revista Científica Internacional de Comunicación y Publicidad
International Journal of Advertising and Communication

V7N34

Building Hospital Brands through Smart Technologies
La promoción de marcas hospitalarias a través de las tecnologías inteligentes

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Recepción: 22/10/2023, Aceptación: 19/03/2024, Publicación: 23/07/2024

Abstract
Hospitals use corporate communication to strengthen their relationships with stakeholders and build a reputed brand. This paper analyzes how these organizations manage smart technologies to promote their brand. We conducted a literature review about smart hospitals and branding processes; then, we defined 34 indicators to analyze how the 100 best hospitals in the world used smart technologies to promote their brands. We divided these indicators into four groups: a) patients and society; b) media companies; c) public authorities, suppliers, and shareholders; and d) employees. Our results revealed that most hospitals managed smart technologies to communicate with patients (7,09 criteria out of 11 applicable). We concluded that hospitals should reinforce their relationships with all stakeholders, accelerate digital transformation, and implement collective branding processes consistent with human values.
Keywords
Hospitals; corporate communication; brand; reputation; smart technologies

Resumen
Los hospitales recurren a la comunicación corporativa para fortalecer sus relaciones con los públicos y construir una marca reputada. Este artículo analiza cómo estas organizaciones usan las tecnologías inteligentes para promocionar su marca. Para ello, realizamos una revisión bibliográfica sobre los hospitales inteligentes y sus procesos de marca; después, definimos 34 indicadores para analizar cómo los 100 mejores hospitales del mundo gestionaban dichas tecnologías para fortalecer sus marcas. Posteriormente, clasificamos estos indicadores en 4 grupos: a) pacientes y sociedad; b) medios de comunicación; c) autoridades públicas, proveedores y accionistas; y d) empleados. Nuestros resultados revelaron que la mayoría de los hospitales utilizaban las tecnologías inteligentes para comunicase con los pacientes (7,09 criterios de 11 posibles). Concluimos que los hospitales deberían reforzar sus relaciones con todos los públicos, acelerar su transformación digital e implementar procesos de construcción de marca colectiva consistentes con los valores humanos.
Palabras clave
Hospital; comunicacion corporativa; marca; reputación; tecnologías inteligentes

Paper pp. 67-82

como citar este artículo/referencia normalizada
Medina Aguerrebere, Pablo, Medina, Eva, González Pacanowski, Toni (2024) "Building Hospital Brands through Smart Technologies". Questiones Publicitarias, 34, pp. 67_82

DOI: https://doi.org/10.5565/rev/qp.398

Introduction

Hospitals interact with stakeholders such as employees, patients, media companies, public authorities, suppliers, and shareholders. Each of them has different needs in terms of information and social support. On the other hand, these organizations comply with rigid legal frameworks and strict ethical principles that determine their internal and external processes and relationships with stakeholders. In this context, building a reputed brand collectively with stakeholders constitutes a challenge and a priority. Hospitals implement different initiatives such as media relations, corporate events, and internal communication campaigns to do that. However, these initiatives cannot influence stakeholders' perceptions efficiently: hospitals must be more creative. That is why some hospitals use different technological tools (mobile apps, social media platforms) to implement more efficient communication initiatives and, in this way, build a reputed brand.

This paper aims to analyze how hospitals use smart technologies to strengthen their relationships with stakeholders and build a reputed brand. To do that, we conducted a literature review about smart hospitals (artificial intelligence, big data, telehealthcare), the role of doctors and nurses, and the branding processes implemented in these organizations. Then, we analyzed how the 100 best hospitals in the world managed smart technologies to promote their brand. To do that, we resorted to the World's Best Hospitals 2023, an annual report published by Newsweek and Statista. Then, we defined 34 branding indicators that we grouped into four categories according to platforms and targets: a) the hospital's homepage (patients, society); b) the hospital's online newsroom (media companies); c) About us section in the hospital's homepage (public authorities, suppliers, and shareholders); and d) the hospital's department of artificial intelligence (employees). Finally, we presented our results, limitations, research avenues, and three conclusions that will help hospitals worldwide manage smart technologies for branding purposes.

Smart hospitals: branding initiatives

Smart hospitals

With the rapid development of information technology, some hospitals use artificial intelligence, big data, and other technological tools to improve their medical protocols, optimize resources, and become smart companies where technology determines internal and external processes (Shi *et al.*, 2020). Artificial intelligence has drastically altered healthcare organizations (Ramon Fernandez, 2021). Thanks to this technology, hospitals increase their organizational performance in various areas, including medical imaging, diagnosis, and robotic surgery (Kaissis *et al.*, 2020). Furthermore, this technology enables hospitals to transform the patient experience through online appointments, data collection, and tracking (Dhagarra *et al.*, 2020). Finally, artificial intelligence assists doctors and nurses in maximizing their time and resources (Khan, Alotaibi, 2020; Angehrn *et al.*, 2020). Despite these benefits, utilizing artificial intelligence in hospitals has significant concerns. On the one hand, some hackers attempt to invade patients' privacy to steal data and utilize it for criminal purposes (Lin, Hou, 2020). On the other hand, implementing artificial intelligence requires hospitals to adjust their internal protocols, raise their investments in specific areas, and train their employees to use this technology for medical purposes (Zegers *et al.*, 2021).

Healthcare organizations use big data to improve their patients' medical results in the following areas: prevention, diagnosis, treatment, and follow-up care (Wirth *et al.*, 2021). Hospitals and staff gain significantly from big data (Howe, Elenberg, 2020). One of the most essential advantages is survival analysis: large data helps clinicians to compute survival probability (period free from disease or death) and optimize clinical decisions (Bonomi *et al.*, 2020). Furthermore, this technology assists hospitals in meeting a variety of difficulties, including an aging population, precision medicine, and an increase in noncommunicable diseases (Zerka *et al.*, 2020). However, these organizations face three significant challenges regarding big data. First, patient information ownership is essential since it influences hospital medical protocols (Mirchev *et al.*, 2020). Second, these organizations face significant costs when integrating big data with other technological platforms, such as artificial intelligence or mobile technology (Shi *et al.*, 2020). Third, implementing big data requires hospitals to train their personnel in this area and hire professionals in other domains, such as mathematics or engineering (Wu *et al.*, 2020).

Aside from artificial intelligence and big data, hospitals use telehealth care to cure certain diseases and enhance patient outcomes (Ye, 2020). This technology enables these organizations to save costs while improving the quality of life of their patients, particularly those living in remote areas (Mahmoud *et al.*, 2022). Telehealthcare assists hospitals in enhancing procedures such as medical consultations, nursing, teleradiology, psychotherapy, and teleneurology (Nittari *et al.*, 2022). This technology allows doctors to establish new patient relationships based on trust, respect, and data (Bassan, 2020). As a result, many hospitals have increased their investments in telehealth care, and some have even integrated this technology with medical wearable devices to improve their patients' medical outcomes (Mina, 2020). These wearable devices collect real-time patient data (behaviors, symptoms) and are essential to the hospital's health education campaigns (Luo *et al.*, 2020).

Doctors' and patients' practices

Doctors, nurses, and patients play a vital role in developing smart hospitals, so these organizations must work with them, change their mentalities, and encourage them to use this technology in their daily tasks (Hager *et al.*, 2021). Artificial intelligence, big data, and telehealthcare have compelled doctors and nurses to branch out and master new skills, such as information management, mobile health platform use, and health wearable utilization (Agrawal, Prabakaran, 2020). When assessing large amounts of data regarding patients, health practitioners encounter several challenges (Oxholm *et al.*, 2022). As a result, many hospitals are training their doctors and nurses to use big data and artificial intelligence in medicine (Caron *et al.*, 2020). These sessions are notably beneficial in the treatment of four disorders. First, obesity. Health practitioners use artificial intelligence to construct models that examine behavioral risk variables and forecast obesity prevalence (Shahid *et al.*, 2021). Second, depression. Telehealthcare enables hospitals to improve access to healthcare services for these patients, particularly those residing in rural or remote locations (Stoll *et al.*, 2020). Third, rare diseases. Hospitals use big data to study patient behavior and uncover patterns that help prevent rare diseases (Courbier *et al.*, 2019). Fourth, epidemics. Hospitals use artificial intelligence and big data to improve their surveillance and forecasting systems, allowing them to manage epidemics better (Buckee, 2020).

Digital technologies have revolutionized not only healthcare professionals' practices but also patients' behaviors: thanks to artificial intelligence and big data, patients may now execute duties formerly performed by doctors in a more convenient and quality-assured manner (Hager *et al.*, 2021). On the other hand, patients use technology to form health communities where they share knowledge and experiences with other patients and clinicians (Dang *et al.*, 2020). Finally, this technology contributes to implementing precision medicine projects based on artificial intelligence and big data (Raita *et al.*, 2021). Despite these benefits, some patients face challenges when using these technologies, including a lack of health literacy skills (Rubeis, 2022); a tension between autonomy and automation that causes patients to lose control over some medical processes (Burr *et al.*, 2020); and a difficulty using some tools, such as mobile apps or patient portals (Lv, Qiao, 2020). To address this issue, hospitals, government agencies, and patient associations should educate people on using these technologies and preserving their right to quality healthcare (Rickert, 2020).

Artificial intelligence, big data, and telehealth help to revolutionize hospitals; yet these technologies present significant legal concerns, such as information collection methods, technological faults, and secondary use of medical data (Tseng *et al.*, 2020). The use of medical data by technology companies can risk patients' privacy (Rickert, 2020), which is why hospitals have implemented security procedures to prevent data breaches and thereby protect patients' rights (Fazal *et al.*, 2022). Some of these measures include requiring patients to sign official informed consent forms before their medical information is used (Wirth *et al.*, 2021). Furthermore, some hospitals adopt codes of conduct, including ethical standards that all employees must follow (Zerka *et al.*, 2020). Finally, other hospitals launch educational programs to urge patients to accept personal responsibility (Belani *et al.*, 2021)

Smart hospitals and branding initiatives

Reputation refers to indivisible networks of associations that stakeholders deploy to describe a company (Govers, 2020). In hospitals, this concept describes patients', employees', and other stakeholders' perceptions of the hospital and its brand. Building a reputable brand is a goal for hospitals seeking to develop rich relationships with stakeholders, which include staff, patients, suppliers, media companies, and public authorities (Medina Aguerrebere *et al.*, 2020). The first phase in this process consists of defining the organization's brand identity, mission, and goals; the organization will then conduct corporate communication activities to promote its brand (Singla, Sharma, 2021). These activities must adhere to five guidelines. First, prioritizing useful material that assists stakeholders in improving their quality of life and health literacy abilities (Lithopoulos *et al.*, 2021). Second, showing how the organization is unique and contributes to the common good (Hart, Phau, 2022). Third, strengthening the organizational and stakeholders' cultural linkages (Tong *et al.*, 2021). Fourth, highlighting facts, events, and projects demonstrating the company's authenticity (Jenkins *et al.*, 2020). Fifth, improving the organization's long-term reputation and social connections with stakeholders (Govers, 2020).

Artificial intelligence, big data, social media platforms, and mobile apps have significantly impacted hospitals' branding efforts (Butow, Hoque, 2020). These organizations use social media to share personalized content with each stakeholder (Chou, 2021), to connect doctors with other experts to boost their professional reputation (Farsi, 2021), to launch health education campaigns to reinforce patients' health literacy skills (Chen, Wang, 2021), and to implement online programs to improve employees' sense of belonging to the organization (Sotto *et al.*, 2020). Aside from social media platforms, hospitals use mobile apps to promote their brand in a variety of ways, including integrating these apps into the hospital's medical protocols to make patients' experiences more pleasant (Chamberlain *et al.*, 2021), using mobile apps to reinforce patients' skills in health education (Crossley *et al.*, 2020), managing these apps to establish online communities that provide patients with emotional care (Tsai *et al.*, 2021), and using mobile apps to allow patients monitor their symptoms and reinforce their empowerment (Mackert *et al.*, 2020).

The use of smart technologies helps hospitals revamp their branding initiatives in five different ways. First, hospitals can display data more visually and creatively and impact stakeholders' perceptions more efficiently (Butow, Hoque, 2020). Second, these organizations can use artificial intelligence-based tools to involve stakeholders in different communication initiatives and, in this way, build the hospital brand collectively (Yantian *et al.*, 2022). Third, using smart technologies helps hospitals establish more emotional connections with stakeholders, especially patients and employees (Chou, 2021). Fourth, hospitals can resort to big data to analyze vast amounts of information, reduce the risk of strategic decisions concerning corporate communication, and improve the efficiency of their branding efforts (Agrawal, Prabakaran, 2020). Fifth, thanks to smart technologies like social media and mobile apps, hospitals engage with stakeholders long-term, reinforcing the hospital's brand value (Alonso-Cañadas *et al.*, 2020).

Promoting a hospital brand is challenging on many levels: communication, business, and social issues (Jenkins *et al.*, 2020). As a result, health communication professionals draw on various disciplines, including journalism, corporate communication, psychology, sociology, economics, and public health (Kreps, 2020). Furthermore, they integrate various human qualities, such as empathy or compassion, into the hospital's communication campaigns to make the organization's brand more relevant (Shafiee *et al.*, 2022). When hospitals create meaningful brands, they can influence their stakeholders' opinions and help them form memorable associations with the organization (Rahman *et al.*, 2021). This emotional attachment assists firms in improving their corporate communication strategies (Bian, Haque, 2020) as well as the performance of their brands in terms of loyalty, awareness, and reputation (Driever *et al.*, 2020; Razmus, 2021).

Methodology

Hospitals are radically altering corporate communication strategies to meet stakeholders' new information and emotional support needs. These organizations use artificial intelligence, big data, telemedicine, and mobile applications to achieve this goal. However, incorporating this technology

into the organization's branding activities is challenging. The object of this paper is to analyze how hospitals use their corporate websites, as well as other smart technologies (mobile apps, social media platforms) to communicate with their stakeholders and, in this way, promote their brands.

To further understand how the best hospitals in the world lead this branding process, we turned to the World's Best Hospitals 2023. This ranking covers 2.300 hospitals from 28 nations and is published annually by Newsweek and Statista. To create this ranking, both organizations used four main tools: a) online surveys to 80.000 doctors from 28 different countries, b) online surveys to evaluate patients' perceptions of hospitals, c) hospital performance indicators, and d) PROM questionnaires concerning patients' quality of life. Each criterion was weighted differently: online doctor surveys (54%), online patient surveys (14.5%), hospital performance indicators (29%), and PROM questionnaires (2.5%). These criteria determined each hospital's score and position in the ranking. A Global Board of Medical Experts of healthcare professionals from the United States, Germany, France, Israel, and Switzerland verified these scores (Newsweek, 2023).

Thanks to this ranking, we identified the top 100 hospitals globally (see Appendix 1). We examined how these organizations interacted with their stakeholders to promote their brands: a) patients and society; b) media companies; c) public authorities, suppliers, and shareholders; and d) employees. We prioritized these publics for a variety of reasons. First, patients are opinion leaders who affect the attitudes of other stakeholders about hospitals (Véliz, 2019). Second, media corporations play an important role in health education initiatives conducted by hospitals and governments (Mheidly, Fares, 2020). Third, public authorities regularly engage with hospitals to improve patients' medical and emotional experiences (Jansen *et al.*, 2021). Fourth, hospital staff are essential to these companies' collective branding processes (Medina Aguerrebere *et al.*, 2020).

From 21st September 2023 to 20th October 2023, we conducted a quantitative study on how the world's top 100 hospitals managed smart technologies (websites, social media platforms, and mobile apps) to boost their brands. Then, based on the literature review, we defined 34 brand indicators and divided them into four major groups according to stakeholders and platforms: a) homepage (patients, society); b) online newsroom (media companies); c) about us (public authorities, suppliers, and shareholders); and d) department of artificial intelligence (employees) - see figure 1 below. Subsequently, we analyzed each hospital's corporate website to understand whether they fulfilled the 34 indicators. Two authors analyzed 50 hospital websites each, and the third author reviewed the results. We analyzed the hospital's websites and their different internal menus to retrieve all elements (mobile apps, AI department website, podcasts). We only looked at official websites and used a binary system. We analyzed the hospital websites in Spanish, English, and French and used *Google Chrome* to translate hospital websites into other languages. We did not resort to hospital websites' internal browsers due to their lack of performance. On average, each author analyzes each hospital's website for 20-25 minutes.

Results

Our quantitative findings demonstrated that all hospitals managed corporate websites to improve stakeholder interactions. Nonetheless, the majority of them failed to meet the 34 criteria assessed. We offered our findings in five major categories: a) homepage, b) online newsroom, c) about us section, d) department of artificial intelligence, and e) global results.

Homepage. All hospitals used a homepage to present their primary offerings (100%), affecting their stakeholders' perceptions. Besides, many hospitals managed social media platforms (92%), smartphone applications (81%), interactive health libraries (78%), and patient portals (71%) to improve the health literacy abilities of their stakeholders. Furthermore, many hospitals used various technological methods to increase patients' access to the hospital, including virtual tours (72%) and video consultations with doctors (71%). However, only a few hospitals recommended other online services, such as interactive maps (58%), podcasts about healthcare topics (51%), symptom checkers (21%), and chatbots (14%). Hospitals, on the other hand, met an average of 7,09 of the 11 applicable criteria. Finally, only five hospitals met all eleven criteria: *Mayo Clinic - Rochester* (United States), *Mayo Clinic - Jacksonville* (United States), *Mayo Clinic -*

1. Homepage: *patients and society*	2. Online newsroom: *media companies*	3. About us: *public authorities, suppliers, shareholders*	4. Department of artificial intelligence: *employees*
1. Hospital homepage 2. Patient portal 3. Mobile apps 4. Symptoms checker 5. Video consultations with doctors 6. Chatbot 7. Interactive maps 8. Virtual tours 9. Interactive health library 10. Podcasts 11. Social media platforms	1. Newsroom 2. Digital press archives 3. Interactive infographics 4. B-roll videos 5. Podcasts 6. Interactive corporate reports 7. Online translation services 8. Online interviews with doctors 9. Online press conferences 10. News alerts 11. Mobile apps or platforms for journalists	1. About us section 2. Videos 3. Interactive infographics 4. Interactive corporate documents 5. Suppliers platform 6. Shareholders platform	1. Department of artificial intelligence 2. Integrating AI into medical protocols 3. Training employees 4. Research projects 5. Collaborations with universities or research centers 6. Collaborations with external technological companies

Figure 1. Brand indicators. Source: authors' elaboration

Phoenix (United States),[1] *The Mount Sinai Hospital* (United States) and *UCSF Medical Center* (United States).

Online newsroom. All hospitals had set up an online newsroom (100%) where they offered a variety of services, including digital press archives (99%), interactive corporate reports (75%), and B-roll videos (52%). However, only a small number of organizations met the following criteria: news alerts for journalists (27%), interactive infographics (23%), podcasts for journalists (13%), online translation services (11%), online interviews with doctors (11%), online press conferences (6%), and mobile apps or platforms for journalists (4%). In contrast, hospitals met an average of 4,21 of the 11 applicable criteria. *Mayo Clinic* in Rochester, Jacksonville, and Phoenix – USA- (10 criteria), *Cleveland Clinic* – USA- (9 criteria), and the *Mount Sinai Hospital* – USA- (8 criteria) were the best in this category.

About us section. Even though all hospitals proposed this section (100%) and published interactive corporate documents (73%), the majority of these organizations failed to meet the following branding criteria: videos (41%), interactive infographics (9%), suppliers platform (2%), and shareholders platform (0%). Hospitals followed 2,25 criteria on average. Finally, the best hospitals in this category were *UCLA Health - Ronald Reagan Medical Center* (USA), *UCLA Health - Santa Monica Medical Center* (USA)[2] , and *Sheba Medical Center* (Israel).

Department of Artificial Intelligence. Thirty-three hospitals, according to our findings, had established a department of artificial intelligence that integrated this technology into the organization's medical protocols, trained employees in this area, and conducted scientific research on the impact of artificial intelligence in healthcare (see figure 2 below). Twenty-five hospitals did not have this department, but they did collaborate on research projects in this field with external institutions (universities, research centers, and technology companies). Thirty hospitals did not have this department, although they did research in this field without partnering with outside organizations. Finally, 12 hospitals did not mention "artificial intelligence" on their corporate website.

Global results. Our findings revealed that hospitals met an average of 15,80 of the 34 criteria. As shown in figure 3 below, *Mayo Clinic - Rochester* (United States), *Mayo Clinic - Jacksonville* (United States), and *Mayo Clinic - Phoenix* (United States) were the best hospitals.

1. Mayo Clinic - Rochester (United States), Mayo Clinic - Jacksonville (United States) and Mayo Clinic - Phoenix (United States) used the same website.
2. Ronald Reagan Medical Center (United States) and UCLA Health - Santa Monica Medical Center (United States) used the same website.

	Hospital	Department of artificial intelligence	Universities, research centers	Technology companies
1	Mayo Clinic - Rochester (United States), Mayo Clinic - Jacksonville (United States), Mayo Clinic - Phoenix (United States) *	Department of Artificial Intelligence and Informatics		Nvidia
2	Cleveland Clinic (United States)	Department of Digital Technologies and Artificial Intelligence		IBM, PathAI.
3	Massachusetts General Hospital (United States)	Surgical Artificial Intelligence and Innovation Laboratory	MIT, University of Toronto (Canada).	CRICO Risk Management Foundation
4	Toronto General - University Health Network (Canada)	Techna Institute	University of Toronto, McGill University, The Princess Margaret Cancer Foundation, Agnico Eagle, Garron.	
5	Charité - Universitätsmedizin Berlin (Germany)	Charité Lab for Artificial Intelligence in Medicine	Center for Stroke Research Berlin, Berlin Institute of Health, ETH Zurich (Switzerland), Technological University Dublin (Ireland), University of Tartu (Estonia).	
6	Singapore General Hospital (Singapore)	Artificial Intelligence Lab	Nanyang Technological University, National University of Singapore.	SingHealth HSRC, Institute of High Performance Computing.
7	Sheba Medical Center (Israel)	ARC Center for Digital Innovation	TriVentures	G42 Healthcare, AISAP, Caresyntax.
8	Universitätsklinikum Heidelberg (Germany)	Research Group Artificial Intelligence and Cognitive Robotics	German Cancer Research Center, National Center for Tumor Diseases.	Karl Storz GmbH & Co KG, Phellow Seven GmbH, Karlsruher Institute of Technology.
9	Centre Hospitalier Universitaire Vaudois (Switzerland)	Biomedical Data Science Center	University of Lausanne, EPFL, UniSante.	Swiss Institute of Bioinformatics
10	Brigham And Women's Hospital (United States)	Center for Clinical Data Science		GE Healthcare, Nvidia, Fujifilm Sonosite, Nuance Communications.
11	Sunnybrook Health Sciences Centre (Canada)	Augmented Precision Medicine Lab	University of Toronto, TD Bank Group.	Canada Foundation for Innovation
12	The Mount Sinai Hospital (United States)	Department of Artificial Intelligence and Human Health	National Institute of Neurological Disorders and Stroke, National Institute on Aging, Tau Consortium.	
13	LMU Klinikum (Germany)	Artificial Intelligence Department		Avelios, Atos, Veeam, Munich Center for Machine Learning.
14	Medizinische Hochschule Hannover (Germany)	Leibniz AI Lab	Humboldt University Berlin, University of Technology Sydney (Australia), Edith Cowan University (Australia), Indian Institute of Technology (India), Pennsylvania State University (USA), Stanford University (USA).	Peter L. Reichertz Institute for Medical Informatics
15	Cedars-Sinai Medical Center (United States)	Division of Artificial Intelligence in Medicine	National Institutes of Health	
16	St Thomas' Hospital (United Kingdom)	Centre for Innovation, Transformation and Improvement		KHP Ventures, KiTEC, AI Centre, Clinical Scientific Computing (CSC), Clinical engineering, KHP Biobank.
17	UCSF Medical Center (United States)	Artificial Intelligence Center		Kheiron Medical Technologies, Nvidia.

	Hospital	Department of artificial intelligence	Universities, research centers	Technology companies
18	UMC Utrecht (The Netherlands)	AI Lab	Utrecht University	
19	North York General Hospital (Canada)	Artificial Intelligence for Health Outcomes	University of Toronto	
20	Erasmus MC (The Netherlands)	AI Innovation Centre for Medical Imaging	Erasmus University Rotterdam, Delft University of Technology.	Philips Healthcare, General Electric Healthcare, Qure.ai.
21	Tel-Aviv Sourasky Medical Center (Israel)	I-Medata AI Center	Israel Innovation Authority, Tel Aviv University, Weizmann Institute of Science.	Google, MDClone, Zebra Medical Vision, Biobeat, Medtronic, Amazon Web Services.
22	Radboud UMC (The Netherlands)	Radboud AI for Health	Radboud University	Innovation Center for Artificial Intelligence, NLAI Coalition.
23	Leids Universitair Medisch Centrum (The Netherlands)	Clinical Artificial Intelligence and Research Lab	Leiden University	Philips, Thirona.
24	Universitätsklinikum Freiburg (Switzerland)	Institute for Digitalization in Medicine	University of Fribourg	
25	Hôpitaux Universitaires de Genève (Switzerland)	Department of EHealth and Telemedicine	University of Applied Sciences and Arts Western Switzerland, HES-SO Valais, University of Geneva, HUG private foundation, National University of Singapore(Singapore), Senghor University (Egypt), World Francophone Digital University, World Health Organization (WHO).	International Medical Informatics Association, IBM.
26	Hôpital Paris Saint-Joseph (France)	BioMedical Engineering Lab	Université Paris Saclay, Institut Polytechnique de Paris, Ecole Centrale Supélec.	GE Healthcare
27	Universitätsklinikum Essen (Germany)	Institute for AI in Medicine	University of Duisburg Essen, Cancer Research Center Cologne Essen.	Zentrale Informationstechnik
28	Istituto Clinico Humanitas (Italy)	Cancer Centre and AI Centre	University of Bologna, the University of Padua.	Datawizard
29	Seoul National University - Bundang Hospital (South Korea)	Center for Artificial Intelligence in Healthcare	Seoul National University	GE Healthcare
30	Universitätsklinikum Erlangen (Germany)	AI-based Real-time Medical Diagnostics and Therapy	Friedrich-Alexander-Universität	
31	Centre hospitalier de l'Université de Montréal (Canada)	Department of Innovation, Artificial Intelligence and Healthcare		

* All of them used the same website and collaborated with the same AI department.

Figure 2. Artificial intelligence departments

Discussion

Creating a memorable brand is a challenge for hospitals all over the world. These firms use various technology tools to attain this goal, such as artificial intelligence and mobile apps. However, it is still vital to communicate with stakeholders respectfully and to meet their medical, emotional, and information requirements. Patients are one of the most crucial stakeholders. As a result, many hospitals teach them health literacy skills (Altun, 2021) and assist them in becoming active participants in medical decision-making processes (Shafiee *et al.*, 2022). To do this, these organizations assess their patients' needs (Mackert *et al.*, 2020) and develop personalized cor-

Hospital	Number of criteria (out of 34)
Mayo Clinic - Rochester (United States)*	29
Mayo Clinic - Jacksonville (United States)*	
Mayo Clinic - Phoenix (United States)*	
Cleveland Clinic (United States)	27
The Mount Sinai Hospital (United States)	
Medizinische Hochschule Hannover (Germany)	25
Hôpitaux Universitaires de Genève (Switzerland)	
Singapore General Hospital (Singapore)	24
Universitätsklinikum Heidelberg (Germany)	
Brigham And Women's Hospital (United States)	
UCSF Medical Center (United States)	
Erasmus MC (The Netherlands)	

*All hospitals used the same website.

Figure 3. Best hospitals: global ranking

porate communication campaigns (Medina Aguerrebere *et al.*, 2020). Our findings demonstrated that the majority of hospitals followed this logic: most of them used their homepages to propose health education services to patients, such as social media platforms (92%), mobile apps (81%), or patient portals (71%). However, only 21% proposed a symptom checker to allow patients to control their health and symptoms.

Hospitals interact with media companies to promote health education, support patients' empowerment, and strengthen the hospital brand (Kreps, 2020). Both organizations must collaborate to define clear messages (Jenkins *et al.*, 2020) and influence stakeholders' perceptions about healthcare-related issues (Oxman *et al.*, 2022). Nevertheless, our results about online newsrooms revealed that hospitals can still improve in this area. Indeed, only 6% of hospitals proposed to media companies the option to organize online press conferences; and only 4% of hospitals had developed mobile apps for journalists. These results proved that most hospitals need to professionalize their online newsrooms and provide media companies with better services that facilitate journalists' tasks.

Hospitals implement corporate communication initiatives to influence stakeholders, including public health authorities, supplies, and shareholders (Lithopoulos *et al.*, 2021). Hospitals especially collaborate with public health authorities since they are crucial in health education campaigns (Bilbatua *et al.*, 2020) and doctor-patient relationships (Barredo *et al.*, 2021). Our quantitative results related to the About Us Section demonstrated that most hospitals considered public authorities as a key target and proposed different contents to them, such as corporate documents (73%); however, only 2% of hospitals had implemented a platform for suppliers, and none of them proposed a platform for shareholders. In other words, most hospitals did not integrate suppliers and shareholders into the organization's collective branding processes, representing a reputational risk for these institutions.

Patients view doctors and nurses as a human brand with a unique brand personality (Shafiee *et al.*, 2022). To promote their brand, these employees need to reinforce their skills in artificial intelligence and integrate this technology into their daily practices (Mori *et al.*, 2020). Thanks to that, doctors and nurses can establish new patient relationships (Khan, Alotaibi, 2020). According to our results, 88% of hospitals developed projects about artificial intelligence. However, only 33% of these organizations had implemented an in-house department to lead these projects in a coordinated manner. On the other hand, many hospitals collaborated with universities, research centers, and technology companies to develop projects about artificial intelligence, representing an opportunity from a medical and corporate communication perspective since these collaborations could allow hospitals to implement co-branding initiatives and branded content activities.

The last ones are significant since branded content focuses on educational and entertainment content, allowing brands to reinforce their emotional relations with stakeholders (Rodriguez-Rabadan, 2021).

This paper aimed to understand how the best hospitals in the world managed smart technologies to promote their brands. Our quantitative results will help these organizations implement more efficient branding activities. However, we must highlight three limitations that affect this paper. First, we did not contact each hospital's communication department, which prevented us from understanding the role of smart technologies in the branding strategies implemented by these companies. Second, we did not find any papers analyzing the effect of smart technologies on stakeholders' perceptions of the hospital brand, which is why we could not evaluate this area in a more detailed way. Third, we did not consider the legal framework existing in each country, which highly determines each hospital's communication initiatives. For the following years, we recommend that researchers in this area prioritize topics such as the impact of social media platforms on doctors' scientific credibility, the role of artificial intelligence on hospitals' reputation, and the influence of mobile apps on doctors-patients' relationships.

Conclusion

Building a meaningful brand constitutes a true challenge for hospitals. These companies face many barriers that make it difficult to achieve this goal: stakeholders' new demands regarding information and social support, rigid legal frameworks, and strict ethical principles. Besides, in these organizations, most employees directly interact with patients, which represents a risk since, on the one hand, patients are public opinion leaders who influence other stakeholders' perceptions about the organization; and on the other hand, some employees are not trained in corporate communication, which means that they cannot efficiently represent the hospital brand. In other words, hospitals are constantly exposed to reputational risks. Some hospitals resort to social media platforms, mobile apps, artificial intelligence, and other smart technologies to face these risks efficiently and establish better stakeholder relationships. This paper aimed to analyze how the best hospitals in the world managed these technologies to strengthen their brand. To conclude this article, we wanted to highlight three last ideas.

First, most hospitals used smart technologies to communicate with patients (7,09 criteria respected of the 11 applicable) rather than media companies (4,21/11) or public authorities (2,25/6). Even if patients remain the most critical stakeholders, hospitals must improve their relationships with media companies, public authorities, suppliers, shareholders, and employees; otherwise, they will never be able to implement efficient collective branding processes. Second, most hospitals need to professionalize their artificial intelligence initiatives and implement a department that leads a technological revolution: research, treatments for patients, internal processes in the hospital, communication platforms, and branding strategies. Nevertheless, our results revealed that only 33 hospitals had implemented this department, which means that most hospitals can improve in this area. Third, hospitals need to understand that artificial intelligence, telemedicine, social media, and mobile apps are just technological tools whose primary function consists of helping doctors, nurses, and patients improve their relationships; in other words, human values such as compassion, respect, ethics, and professionalism should always prevail over these technological tools.

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Appendix 1. List of hospitals analyzed

1. Mayo Clinic - Rochester (United States)
2. Cleveland Clinic (United States)
3. Massachusetts General Hospital (United States)
4. The Johns Hopkins Hospital (United States)
5. Toronto General - University Health Network (Canada)
6. Karolinska Universitetssjukhuset (Sweden)
7. Charité - Universitätsmedizin Berlin (Germany)
8. AP-HP - Hôpital Universitaire Pitié Salpêtrière (France)
9. Singapore General Hospital (Singapore)
10. UCLA Health - Ronald Reagan Medical Center (United States)
11. Sheba Medical Center (Israel)
12. Universitätsspital Zürich (Switzerland)
13. Universitätsklinikum Heidelberg (Germany)
14. Centre Hospitalier Universitaire Vaudois (Switzerland)
15. Universitätsspital Basel (Switzerland)
16. Stanford Health Care - Stanford Hospital (United States)
17. The University of Tokyo Hospital (Japan)
18. Brigham And Women's Hospital (United States)
19. AP-HP - Hôpital Européen Georges Pompidou (France)
20. Klinikum rechts der Isar der Technischen Universität München (Germany)
21. Northwestern Memorial Hospital (United States)
22. Sunnybrook Health Sciences Centre (Canada)
23. The Mount Sinai Hospital (United States)
24. Aarhus Universitetshospital (Denmark)
25. New York-Presbyterian Hospital-Columbia and Cornell (United States)
26. Mount Sinai Hospital (Canada)
27. Rigshospitalet - København (Denmark)
28. St. Luke's International Hospital (Japan)
29. Asan Medical Center (South Korea)
30. Allgemeines Krankenhaus der Stadt Wien - Medizinischer Universitätscampus (Austria)
31. LMU Klinikum (Germany)
32. Medizinische Hochschule Hannover (Germany)
33. University of Michigan Hospitals - Michigan Medicine (United States)
34. Hospital Israelita Albert Einstein (Brazil)
35. Cedars-Sinai Medical Center (United States)
36. Amsterdam UMC (The Netherlands)
37. Oslo Universitetssykehus (Norway)
38. Policlinico Universitario A. Gemelli (Italy)
39. Helsinki University Hospital (Finland)
40. Samsung Medical Center (South Korea)
41. CHU Lille - Hôpital Claude-Huriez (France)
42. St Thomas' Hospital (United Kingdom)
43. Universitätsklinikum Hamburg-Eppendorf (Germany)
44. UCSF Medical Center (United States)
45. Duke University Hospital (United States)
46. UMC Utrecht (The Netherlands)
47. Kameda Medical Center (Japan)
48. UZ Leuven (Belgium)
49. Seoul National University Hospital (South Korea)
50. Hospital of the University of Pennsylvania - Penn Presbyterian (United States)
51. NYU Langone Hospitals (United States)
52. Mayo Clinic - Jacksonville (United States)
53. Hospital Universitario La Paz (Spain)
54. Rush University Medical Center (United States)
55. North York General Hospital (Canada)
56. Turku University Hospital (Finland)
57. University College Hospital (United Kingdom)
58. Landeskrankenhaus Universitätskliniken Innsbruck (Austria)
59. CHU Bordeaux - Groupe hospitalier Pellegrin (France)
60. Grande Ospedale Metropolitano Niguarda (Italy)
61. Erasmus MC (The Netherlands)
62. Hospital Clínic de Barcelona (Spain)
63. Tampere University Hospital (Finland)
64. Ospedale San Raffaele - Gruppo San Donato (Italy)
65. Policlinico Sant'Orsola-Malpighi (Italy)
66. Royal Prince Alfred Hospital (Australia)
67. Severance Hospital - Yonsei University (South Korea)
68. Kyushu University Hospital (Japan)
69. Tel-Aviv Sourasky Medical Center (Israel)
70. Uniklinik Köln (Germany)
71. Radboud UMC (The Netherlands)
72. Hospital Universitario 12 de Octubre (Spain)
73. Center Hospital of the National Center for Global Health and Medicine (Japan)
74. Leids Universitair Medisch Centrum (The Netherlands)
75. Klinik Hirslanden Zürich (Switzerland)
76. Universitätsklinikum Freiburg (Switzerland)
77. Hôpitaux Universitaires de Genève (Switzerland)
78. Mayo Clinic - Phoenix (United States)
79. Landeskrankenhaus - Universitätsklinikum Graz (Austria)
80. Addenbrooke's (United Kingdom)
81. Houston Methodist Hospital (United States)
82. UCLA Health - Santa Monica Medical Center (United States)
83. Hospital Universitari Vall d'Hebron (Spain)
84. Sahlgrenska Universitetssjukhuset (Sweden)
85. Akademiska Sjukhuset (Sweden)
86. Hôpital Paris Saint-Joseph (France)
87. Universitätsklinikum Essen (Germany)
88. Universitätsklinikum Tübingen (Germany)
89. Istituto Clinico Humanitas (Italy)
90. Hospital General Universitario Gregorio Marañón (Spain)
91. The Catholic University Of Korea - Seoul St. Mary's Hospital (South Korea)
92. Odense Universitetshospital (Denmark)
93. Seoul National University - Bundang Hospital (South Korea)
94. Universitätsklinikum Erlangen (Germany)
95. Beth Israel Deaconess Medical Center (United States)
96. National University Hospital (Singapore)
97. Clinica Universidad de Navarra (Spain)
98. The Alfred (Australia)
99. Centre hospitalier de l'Université de Montréal (Canada)
100. Universitätsklinikum Carl Gustav Carus Dresden (Germany)