

Intellectual capital disclosure and its determinants in healthcare organisations – Evidence from Italy

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Abstract

Purpose – The present study aims to extend the knowledge of intellectual capital disclosure (ICD) disclosure practices in the Italian Healthcare Organisations (HCOs) context. The ultimate goal of the study is to provide fresh insight into the possible explanatory factors that may drive the extent of ICD provided by Italian HCOs via the web.

Design/methodology/approach – The present study applies a manual content analysis on the websites of a sample of 158 HCOs to determine the level of voluntary ICD. A multivariate regression model is estimated to test the association between different variables – size, gender diversity in top governance positions, financial performance and indebtedness – and the level of ICD provided by sampled HCOs through their official websites.

Findings – Content analysis results reveal that – in the absence of mandatory requirements – Italian HCOs tend to use websites to disclose information about IC. Particular attention is devoted to Structural and Relational Capital. The statistical analysis pinpoints that size and indebtedness negatively influence the level of ICD. In contrast, the presence of a female General Manager (GM) positively drives ICD. Also, it is observed that Research and University HCOs and those located in the Italian Northern Regions are particularly prone to discharge accountability on IC through websites.

Originality/value – To the best of the authors' knowledge, this is the first study that examines voluntary ICD practices through websites in the Italian HCOs' context. Also, since prior studies on IC in the healthcare context are mainly descriptive or normative, this is the first study examining the potential determinants of ICD provided by HCOs in terms of size, gender diversity in top governance positions, financial performance and indebtedness.

Keywords Intellectual capital, Intellectual capital disclosure, Healthcare, Hospital, Reporting

Paper type Research paper

1. Introduction

In recent years, Intellectual Capital (IC) – as a combination of intangible resources crucial to value-creation processes (Guthrie *et al.*, 2006; Carlucci and Schiuma, 2012) – has gained progressive prominence in healthcare (Manes-Rossi *et al.*, 2020; Paoloni *et al.*, 2020). Healthcare Organisations (HCOs) are knowledge-intensive systems as they strongly depend

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on their employees' specialised knowledge, skills and abilities (Carlucci and Schiuma, 2012; Pirozzi and Ferulano, 2016). HCOs deal with a highly unpredictable environment determined by the need to ensure high-quality care and volume of services while simultaneously containing costs and satisfying public agendas (Peng *et al.*, 2007; Cavicchi, 2017). In recent years, HCOs have been facing massive changes imposed by significant budget constraints, increasing operating costs, new diseases and treatments emerging and increased competition (Uyar *et al.*, 2021). Following these circumstances, IC – as a combination of intangible resources – has acquired a pivotal role in enhancing the efficiency and effectiveness of the HCOs through innovation and adaptive change (Pirozzi and Ferulano, 2016). IC has become a crucial lever that allows HCOs to achieve strategic objectives, reducing healthcare costs and, in turn, improving their overall performance (Pirozzi and Ferulano, 2016; Gravili *et al.*, 2020).

The relevance gained by the IC in the HCOs context has progressively triggered greater demand for information by citizens and stakeholders about how HCOs effectively manage IC resources to create public value (Pirozzi and Ferulano, 2016; Andrades-Peña *et al.*, 2021). Being Public Sector Organisations (PSOs), HCOs are under massive scrutiny from the public audience to demonstrate accountability for using public resources and performance achieved (Ramírez *et al.*, 2022; Andrades-Peña *et al.*, 2021). Therefore, since IC represents both the input and output of their processes (Vagnoni and Oppi, 2015), according to stakeholder theory, HCOs need to incorporate IC information within their reporting systems to provide stakeholders with a comprehensive understanding of their objectives and performance (Pirozzi and Ferulano, 2016; Manes-Rossi *et al.*, 2020). However – being focused on financial measures – traditional HCOs reporting systems fail to recognise the relevance of IC resources (Veltri *et al.*, 2011). This provides room for exploring alternative tools, such as websites to provide voluntary IC disclosure and meet emerging stakeholders' information needs (Alcaraz-Quiles *et al.*, 2015; Nicolò *et al.*, 2021a).

Nevertheless, despite its relevance, previous research on Intellectual Capital Disclosure (ICD) in the public sector is still limited (Dumay *et al.*, 2015; Manes-Rossi *et al.*, 2016). Some studies focused on universities (e.g. Low *et al.*, 2015; Manes-Rossi *et al.*, 2018; Nicolò *et al.*, 2020) and local governments (e.g. Schneider and Samkin, 2008; Manes-Rossi *et al.*, 2016; Ramírez *et al.*, 2022). In contrast, the HCOs' domain is still virtually unaddressed by IC academics, as there is a "lack of attention given to the issue of disclosure" (Paoloni *et al.*, 2020, p. 373). Furthermore, the limited research on ICD in the HCOs' domain is mainly descriptive or normative (e.g. Habersam and Piber, 2003; Zigan *et al.*, 2009) as it did not dive deep into the possible factors that could drive disclosure.

Therefore, in the context of the above arguments – based on stakeholder theory's arguments, the present study aims to answer the recent call made by Paoloni *et al.* (2020) for more research investigating ICD practices in the HCOs. It also intends to cover the research gap about the possible explanatory factors of ICD provided by HCOs.

To this end, we applied a manual content analysis on the websites of a sample of 158 HCOs. Following mainstream ICD research (e.g. Guthrie *et al.*, 2004; Ramírez *et al.*, 2022), a disclosure index has been constructed to examine the online voluntary ICD of sampled HCOs. Since most studies on ICD focus on traditional reporting tools such as annual reports, there is currently little knowledge on the amount and nature of IC information disclosed via the Internet (Lee *et al.*, 2007; Manes-Rossi *et al.*, 2018).

The ultimate goal of the study is to provide fresh insight into the possible explanatory factors that may drive the extent of ICD provided by Italian HCOs via the web. Accordingly, this study applies an Ordinary Least Squares (OLS) regression technique to test the association between different variables, including *size*, *gender diversity in top governance positions*, *financial performance* and *indebtedness*, and the level of ICD provided by sampled HCOs through their official websites. The regression model also tests the effect of some control variables related to the presence of Research and University HCOs and their geographical localisation.

The research makes several contributions to the existing body of knowledge on ICD. Firstly, we broaden the scope of ICD research – traditionally focused on the private sector – by investigating ICD practices in the public sector domain. Secondly, while prior research in the public sector mainly focuses on universities and local governments, this study extends previous research by providing novel insight into an unexplored context such as the HCOs. Thirdly, to the best of the authors' knowledge, this is the first empirical study that connects organisational (size), governance (gender diversity in top governance positions) and financial (financial performance and indebtedness) factors with ICD practices of HCOs. Lastly, previous research has largely used annual reports as the primary data source for ICD research. In contrast, this study investigates the websites as tools to disclose IC information voluntarily.

The paper is structured as follows. [Section 2](#) examines the literature on IC, identifying the main contributions of previous ICD studies. [Section 3](#) introduces the development of the hypotheses, while [Section 4](#) illustrates the research methodology applied in the study. [Section 5](#) and [Section 6](#) present and discuss the results of the research. Lastly, [Section 7](#) presents conclusions, the study's main limitations and the future paths for research on ICD in the healthcare context.

2. Literature review

IC can be distinguished in Human, Structural and Relational Capital ([Habersam and Piber, 2003](#); [Manes-Rossi et al., 2020](#); [Ramírez et al., 2022](#)).

Human Capital refers to all qualities and capabilities of human resources, such as knowledge, skills and experience owned and used by individuals ([Guthrie et al., 2006](#); [Nicolò et al., 2021a, b](#)). In HCOs, it includes information on the composition of the health workforce and its professional experience and expertise, as well as information on training, promotion, evaluation, health and safety of the health personnel and the enthusiasm, personal sensitivity and passion of the medical staff ([Veltri et al., 2011](#); [Mazzotta, 2018](#); [Gravili et al., 2020](#)). Structural Capital refers to institutionalised experience and knowledge, such as databases, information systems, work procedures and routines, governance principles, ethical codes and management philosophies ([Guthrie et al., 2006](#); [Nicolò et al., 2021a](#)). In HCOs, it includes information on the organisational structure of the HCO, the health technologies, the communication tools and all the Information Technology solutions used for healthcare services. Also, it includes information on HCOs' Research and Development, such as scientific research projects focused on clinical effectiveness, service delivery and the development of patents and other research products ([Veltri et al., 2011](#); [Mazzotta, 2018](#)). Lastly, Relational Capital refers to the sum of collaborations, partnerships and other relationships established with external entities that allow an organisation to create value ([Manes-Rossi et al., 2018, 2020](#)). In HCOs, it includes information on the amount and type of the relationships between HCOs and their several stakeholders such as patients, other HCOs, pharmaceutical industries, local governments, regions and other public or private voluntary organisations, universities and research institutions and citizens ([Mazzotta, 2018](#)).

While the theme of IC has been widely explored in the private sector, the research in the public sector is still exiguous ([Dumay et al., 2015](#); [Manes-Rossi et al., 2016](#)). From an empirical perspective, studies on IC in PSOs have mainly focused on local governments (e.g. [Schneider and Samkin, 2008](#); [Cohen and Vlismas, 2013](#); [Manes-Rossi et al., 2016](#); [Ramírez et al., 2022](#)) and universities (e.g. [Low et al., 2015](#); [Manes-Rossi et al., 2018](#); [Ramírez et al., 2022](#); [Nicolò et al., 2020](#)). However, literature on IC in HCOs remains virtually unaddressed ([Paoloni et al., 2020](#)). Specifically, part of the literature has focused on identifying, describing and measuring IC in HCOs (e.g. [Habersam and Piber, 2003](#); [Zigan et al., 2009](#)). Another strand of research focused on the relationship between IC and performance measurement as an approach to driving improvements in HCOs ([Peng et al., 2007](#); [Carlucci and Schiuma, 2012](#); [Vagnoni and Oppi, 2015](#); [Pirozzi and Ferulano, 2016](#); [Manes-Rossi et al., 2020](#); [Gravili et al., 2020](#)).

Only a limited strand of research focuses on ICD practices in HCOs. In particular, [Lee et al. \(2007\)](#) examined the nature and extent of IC information disclosed by Australian hospitals via the Internet. While they observed a low level of ICD, they noted that the quantity of online ICD varied according to the type of hospitals, geographical location, type of services offered and location where services are provided. Also, [Mazzotta \(2018\)](#) analysed the extent and type of ICD disclosed by an Italian University Hospital through its Social and Intellectual Capital Report (SICR) from 2009 to 2011. Their study highlighted that the SC was the most disclosed IC category and that the ICD was prevalently conveyed in a narrative form. Furthermore, [Dameri and Ferrando \(2020\)](#) conducted an action research study to dive deep into the Integrated Reporting (IR) adoption in an Italian HCO to improve the disclosure of the role played by IC in the organisational business model and value creation process.

Therefore, according to [Paoloni et al. \(2020\)](#), the literature review evidenced that ICD practices in the healthcare context remain under-investigated. As a consequence, “this field of research can represent a new interesting line of inquiry” ([Paoloni et al., 2020, p. 373](#)), to advance scientific knowledge.

Hence, to fill this research gap, the present research aims to explore ICD practises in the healthcare context. Moreover, this study broadens the traditional scope of previous studies on ICD by investigating the possible determinants of online ICD in Italian HCOs.

3. Theoretical background and hypotheses development

The present research focuses on the stakeholder theory to explain ICD practices in HCOs.

Organisations’ long-term survival and success depend on the degree to which they gain the support and approval of their stakeholders ([Gray et al., 1995](#); [Guthrie et al., 2006](#)). Voluntary disclosure is the primary tool organisations may employ to manage the relationships with their stakeholders and gain their endorsement ([Gray et al., 1995](#); [Guthrie et al., 2006](#)). Through voluntary disclosure, organisations can discharge accountability by convincing stakeholders that they are incorporating their claims and expectations within their activities ([Gray et al., 1995](#); [Guthrie et al., 2006](#); [Nicolò et al., 2020](#)). Considering their pivotal role in determining value creation processes and driving performance, IC has become a crucial element of the dialogue between organisations and stakeholders ([Guthrie et al., 2006](#); [Nicolò et al., 2020, 2021a, b](#)).

The need for accountability and ICD is particularly significant in the healthcare context where stakeholders represent the main audience of ICD. HCOs are knowledge-intensive service organisations characterised by multiple missions of non-financial nature, including the delivery of healthcare services – an indispensable aspect of individual and social welfare ([Habersam and Piber, 2003](#)) – and the provision of education and research in the case of Research and University HCOs ([Peng et al., 2007](#); [Cavicchi, 2017](#)). They are expected to satisfy multiple stakeholders’ expectations regarding access, quality and cost of health services while simultaneously facing increasing resource constraints and rising expenditures ([Peng et al., 2007](#); [Vagnoni and Oppi, 2015](#); [Cavicchi, 2017](#)). Moreover, given that HCOs are essentially PSOs – mainly funded with central and regional governments’ funds – they receive much scrutiny from stakeholders and society at large for transparency and accountability about performances achieved and the use of public resources ([Vagnoni and Oppi, 2015](#); [Pirozzi and Ferulano, 2016](#); [Andrades-Peña et al., 2020, 2021](#)). Such pressures have increased following the growing costs, not least due to the COVID-19 pandemic. For these reasons, in the healthcare context, it is crucial to address correctly and balance the expectations and informational needs of HCOs’ multiple stakeholders ([Aribi et al., 2018](#); [Andrades-Peña et al., 2021](#)). The most common method to discharge accountability to stakeholders is through traditional accounting tools such as

annual reports (Schneider and Samkin, 2008). However, the inadequacy of these tools to capture the value of the intangible resources and their contribution within HCOs led to the diffusion of voluntary ICD practices (Veltri *et al.*, 2011; Nicolò *et al.*, 2020, 2021a) as a powerful tool for dialogue with stakeholders and gain their approval (Gray *et al.*, 1995). In particular, following the development of Information and Communication Technologies (ICT) and e-government policies, official websites have become a primary means for PSOs such as HCOs to discharge accountability and transparency to their stakeholder forums (Alcaraz-Quiles *et al.*, 2015; Manes-Rossi *et al.*, 2018; Tavares and da Cruz, 2020). Websites allow PSOs to provide a vast extent of financial and non-financial information, including IC, in an easier, more accessible and timelier manner than traditional accounting tools (Alcaraz-Quiles *et al.*, 2015; Manes-Rossi *et al.*, 2018; Tavares and da Cruz, 2020). Moreover, they allow for reaching a wider extent of public constituents cheaper and faster than other communication tools (Manes-Rossi *et al.*, 2018; Andrades-Peña *et al.*, 2020, 2021).

Therefore, we contend that stakeholder theory may represent a reasonable theoretical basis to explain ICD voluntary practices through the websites of Italian HCOs. Also, based on these theoretical arguments and drawing on previous literature on ICD and voluntary online disclosure in the public sector context, four hypotheses are developed and discussed below as possible determinants of ICD.

3.1 Size

From a stakeholder theory perspective, larger PSOs are more exposed to public constituents' scrutiny and must cope with higher demand for services from the community (Andrades-Peña *et al.*, 2020). Accordingly, they need to satisfy the information needs of a large and diversified forum of stakeholders – including patients, other public HCOs, industry (i.e. pharmaceutical industries), local and regional governments, universities and research institutions, citizens and media about both financial and non-financial issues, such as IC (Manes-Rossi *et al.*, 2018; Nicolò *et al.*, 2020; Ramírez *et al.*, 2022).

As regards HCOs, a larger size entails hospital facilities of higher dimensions and more patients to treat. In the light of stakeholder theory, this generates more responsibilities and external pressures to provide information about the quality and efficiency of their services. So, being knowledge-intensive organisations (Peng *et al.*, 2007; Manes-Rossi *et al.*, 2020), ICD should play a primary role in larger HCOs' communication process as a means to demonstrate to stakeholders how public funds have been invested in IC resources to enhance the public value. In addition, based on stakeholder theory, larger public HCOs are expected to have more qualified staff and technological and financial resources to invest in innovative communication tools – such as web channels – to disclose IC information (Manes-Rossi *et al.*, 2018, 2020; Ramírez *et al.*, 2022). This makes them in a better position to satisfy stakeholders' information needs.

Empirically, to the best of the authors' knowledge, no study has investigated the association between HCOs' size and ICD. However, Andrades-Peña *et al.* (2021) observed that larger Spanish HCOs tend to provide more sustainability disclosure through websites. Also, size was found to be a positive driver of ICD in other PSOs' contexts, such as universities (Brusca *et al.*, 2019; Nicolò *et al.*, 2020). Moreover, several studies observed that size positively affects the level of online disclosure provided by local governments (e.g. Serrano-Cinca *et al.*, 2009; Cuadrado-Ballesteros *et al.*, 2014).

Based on these arguments, the following hypothesis is suggested:

H1. There is a positive association between Italian public HCOs' size and the level of online ICD.

3.2 Gender diversity in top governance positions

The appointment of women to governance and top management positions is part of a proactive strategy to increase accountability and transparency among stakeholders (Rao and Tilt, 2016; Manita *et al.*, 2018). Compared with their men counterparts, female directors and managers are likely to be more helpful, sympathetic and concerned with the welfare of stakeholders and have more participative management approaches (Tejedo-Romero *et al.*, 2017; Manita *et al.*, 2018). They show more sensitivity than males to community services and provide governance and management teams with different skills, viewpoints, capabilities and relationships that enhance the internal decision-making processes (Rao and Tilt, 2016; Tejedo-Romero *et al.*, 2017). Female directors and managers also typically have a non-financial background, including expertise in soft components such as intangible assets (Tejedo-Romero *et al.*, 2017; Nicolò *et al.*, 2021b). For these reasons, their appointment in top governance and management roles is likely to increase the organisations' ability to meet stakeholders' information needs about IC (Tejedo-Romero *et al.*, 2017; Nicolò *et al.*, 2021b). According to the stakeholder theory, gender diversity in governance and managerial roles is fundamental in public HCOs (Aribi *et al.*, 2018). HCOs must face a broad forum of internal and external stakeholders, including patients, governments, citizens, universities and society (Aribi *et al.*, 2018; Pizzi *et al.*, 2021; Uyar *et al.*, 2021). So, increasing gender diversity in public HCOs' governance would be desirable to enhance their ability to fulfil stakeholders' accountability needs.

Empirically, to the best of the authors' knowledge, no study has investigated the association between HCOs' governance or top management gender diversity and ICD. However, different studies observed a positive association between board gender diversity and ICD in the private sector context (e.g. Tejedo-Romero *et al.*, 2017; Nicolò *et al.*, 2021b). In the public sector domain, Ramírez *et al.* (2022) found that municipalities governed by women convey higher online ICD levels. Also, different studies noted that municipalities governed by women exhibit significantly higher levels of online transparency (e.g. Araujo and Tejedo-Romero, 2018; Tavares and da Cruz, 2020).

Therefore, based on these arguments, the following hypothesis is proposed:

- H2. There is a positive association between the presence of women in the Italian public HCOs' top governance positions and the level of online ICD.

3.3 Financial performance and indebtedness

Public sector accounting literature contends that financial factors such as profitability and indebtedness may influence PSOs' transparency and accountability (e.g. Gandia and Archidona, 2008; Guillamon *et al.*, 2016; Ramírez *et al.*, 2022). However, the arguments supporting this association are mixed.

From a stakeholder theory's standpoint, it is argued that managers of more indebted PSOs tend to provide more online voluntary disclosure as a way to facilitate monitoring by creditors, reduce external stakeholders' pressures and demonstrate their ability to fulfil their obligations (Zimmerman, 1977; Gandia and Archidona, 2008; Guillamon *et al.*, 2016). On the other hand, some scholars contend that higher debt levels may prevent PSOs from disclosing information to conceal the inefficiencies in managing financial resources to stakeholders and society (Guillamon *et al.*, 2016). From the opposite perspective, a reduced level of debt also means more autonomy and less dependence on external subsidies (Ramírez *et al.*, 2022). This creates more incentive for PSOs' managers to disclose information that signals their ability to reduce public debt (Serrano-Cinca *et al.*, 2009; Ramírez *et al.*, 2022).

Similarly, from a stakeholder theory's perspective, higher financial performance – in terms of profitability – is expected to be positively associated with greater voluntary disclosure to highlight good management quality and create a positive image of the PSO to

stakeholders (Gandia and Archidona, 2008; Serrano-Cinca *et al.*, 2009). From this standpoint, more profitable PSOs tend to receive more social and political pressures than others to disclose non-financial information that demonstrates to stakeholders how they generate higher financial performance through investments in IC resources (Andrades-Peña *et al.*, 2019; Nicolò *et al.*, 2021c). In particular, in the case of HCOs, investments in innovative health technologies or specific training programmes for clinicians are expected to generate positive returns over the years. Accordingly, such positive results may motivate HCOs' managers to increase IC disclosure to meet stakeholders' expectations and obtain public approval.

Therefore, public HCOs are essential economic organisations of any country and are responsible for most national public debt and expenditures (Matos *et al.*, 2021). Although profit is not their primary goal, financial sustainability is essential to ensure their users' continuity and quality of healthcare services (Matos *et al.*, 2021). Therefore, financial performance and indebtedness may represent potential drivers of public HCOs' online ICD.

Empirically, to the best of the authors' knowledge, no study has investigated the association between HCOs' financial performance and ICD. However, Ramírez *et al.* (2022) found that lower financial autonomy in Spanish municipalities is associated with more online ICDs. On the contrary, Tavares and da Cruz (2020) found that greater financial autonomy was associated with higher online transparency levels in municipalities.

On the other hand, different studies detected a positive relationship between debt level and online municipalities' transparency (e.g. Alcaraz-Quiles *et al.*, 2015; Araujo and Tejedo-Romero, 2018). Nevertheless, Guillamon *et al.* (2016) observed a negative association between indebtedness and online disclosure.

Therefore, based on these mixed arguments, the following hypotheses are proposed:

H3a. HCOs' financial performance affects the level of online ICD.

H3b. HCOs' indebtedness affects the level of online ICD.

3.4 Other variables

In line with previous studies in the healthcare context (Lee *et al.*, 2007; Pizzi *et al.*, 2021; Arena *et al.*, 2021), the effect of some control variables that are likely to influence the level of ICD provided by Italian public HCOs has been tested to enhance the hypotheses testing's accuracy and minimise biases.

Firstly, we controlled for the presence of National Research or University HCOs (Lee *et al.*, 2007; Pizzi *et al.*, 2021; Arena *et al.*, 2021). Such types of HCOs invest heavily in education, training and development of human resources (Lee *et al.*, 2007). Also, they play a primary role in driving innovation and knowledge creation in the healthcare sector (Vagnoni and Oppi, 2015). Accordingly, in Research and University HCOs, a high degree of intangibility permeates their activities, processes and resources (Lee *et al.*, 2007; Vagnoni and Oppi, 2015). This makes such types of HCOs more prone to provide information through websites to unveil the "hidden value" of the IC resources (Carlucci and Schiuma, 2012; Nicolò *et al.*, 2021a) that drive their value creation processes.

Secondly, we controlled for Italian public HCOs' geographical localisation. Each Italian region may autonomously organise its healthcare system in different operating and managerial ways through different kinds of HCOs (Anessi-Pessina and Cantù, 2017). Also, each region provides financial resources to its HCOs on an adjusted *per-capita* basis and appoints its top governance directors (Anessi-Pessina and Cantù, 2017; Manes-Rossi *et al.*, 2020; Pizzi *et al.*, 2021). Moreover, some disparities exist among the Italian regions, ranging from socio-cultural to economic factors (Toth, 2014; Cicchetti and Gasbarrini, 2016; MeF, 2021). These inequalities may lead to different stakeholders' information needs and related Italian public HCOs' disclosure behaviours (Pizzi *et al.*, 2021).

4. Research methodology

4.1 Research context and sampling process

This section provides details of the empirical analysis of ICD on the websites of Italian public HCOs.

Italy was considered an appropriate research context for investigating ICD practices as, in recent years, the Italian National Health System (INHS) has undergone a profound change prompted by the NPM wave (Carlucci and Schiuma, 2012; Anessi-Pessina and Cantù, 2017). Several national reforms have imposed the revision of the INHS based on introducing managerialism, regionalisation, decentralisation and value-for-money principles (Anessi-Pessina and Cantù, 2017). The primary objective was to overturn the bureaucratic INHS model by promoting a systematic and progressive improvement in the quality and efficiency of HCOs services attuned to a health costs rationalisation (Carlucci and Schiuma, 2012; Anessi-Pessina and Cantù, 2017).

The INHS was organised into a three-tier model: the central government at the top; 20 regional administrations (including 2 autonomous provinces); and HCOs, including Local Health Authorities (LHAs), Hospital Enterprises (HEs), University Hospitals (UHs), University Hospitals integrated to INHS (UHIs), National Hospitals for Scientific Research (NHSRs) and National Hospitals for Scientific Research's Foundations (NHSRFs) at the bottom (Cicchetti and Gasbarrini, 2016; Anessi-Pessina and Cantù, 2017; Manes-Rossi *et al.*, 2020). The central government, supported by the Italian Health Minister, sets the fundamental goals and principles of the INHS, determines “essential levels of care” that HCOs should provide to citizens, allocates national funds to the Regions and transfers funds from the wealthier Regions to the poorer ones (Toth, 2014; Manes-Rossi *et al.*, 2020). Regions are responsible for defining the health services system for citizens on their territory. To this end, they provide funding to the regional LHAs on an adjusted *per-capita* basis (Anessi-Pessina and Cantù, 2017). LHAs deliver health services at a local level, including primary, secondary and specialist care, directly or through HEs or other accredited HCOs.

Therefore, the INHS transformation process – still ongoing – has created a quasi-market context where patients are free to select public or private entities to receive services (Manes-Rossi *et al.*, 2020). These circumstances made the correct management and development of IC resources fundamental for Italian public HCOs to cost-effectively provide primary and long-term care to patients. At the same time, a process of e-government was undergone by all Italian PSOs, conferring websites an essential role in the dialogue between PSOs and citizens (Manes-Rossi *et al.*, 2018). For these reasons, Italy was selected as a relevant case to study HCOs voluntary ICD practices through websites.

Given these arguments, the sampling process started by consulting the open data provided by the INHS, the main provider of organisational information for all Italian Public HCOs. Our analysis is based on the public HCOs who operated in the Italian context in 2020. The year 2020 was selected as a reference for gathering financial and governance data as it is the most recent year that allowed us to capture the highest number of observations as – at the time of the analysis (September 2021) – many HCOs had not published their financial statements yet. Moreover, the INHS database contains information on HEs, UHIs, NHSRs and NHSRFs up to the year 2020. The choice to set a common year was motivated by the need to avoid duplication of information caused by the possibility of the regional governments revising their internal organisation (Pizzi *et al.*, 2021).

As a result, a sample of all Italian public HCOs (200), including 99 LHAs, 53 HEs, 17 UHs, 9 UHIs, 18 NHSRs and 4 NHSRFs, was initially selected. The following phase consisted of collecting data necessary to test the hypotheses and erasing from the initial sample HCOs for which such data were unavailable. So, from the initial sample of 200 units, 42 public HCOs were eliminated due to a lack of financial and governance data.

This skimming led to a final sample of 158 units, including 95 LHAs, 23 HEs, 15 UHs, 4 UHIs, 17 NHSRs and 4 NHSRFs (Table 1).

4.2 Data collection and coding framework

Once the sample had been identified, a manual content analysis was performed to determine the extent to which sampled HCOs provide ICD via websites.

Content analysis is a “research technique for making replicable and valid inferences from data according to their context” (Krippendorff, 1980, p. 21). It is the foremost method used in accounting studies to examine any publicly available information in a systematic, reliable, objective and cheaper way (Guthrie *et al.*, 2004; Lodhia *et al.*, 2020). In such a way, content analysis allows systematising wide pieces of information into an efficient number of categories that express similar meanings based on pre-defined coding rules (Lodhia *et al.*, 2020).

To ensure the comparability and reliability of the study, the content analysis was conducted by selecting a coding instrument from prior literature (Guthrie *et al.*, 2004). Accordingly, the framework adopted by Ramírez *et al.* (2022) to examine ICD voluntary practices in local governments was employed as a basis for the content analysis. It was selected as the basis for our analysis as it is the most comprehensive coding framework developed in studies investigating IC disclosure practices in the public sector context and contains a series of items retrieved from well-recognised prior studies (e.g. Schneider and Samkin, 2008). Also, since prior studies investigating IC disclosure practices in the context of HCOs are scarce or limited in scope, Ramírez *et al.* (2022) appear to be an appropriate source for our study.

However, some amendments were made to Ramírez *et al.*s (2022) checklist to ensure that all items were suitable to the context (Italian public HCOs) and source (websites) analysed (Schneider and Samkin, 2008). To this end, a pilot study was conducted independently by two researchers on a sample of 20 HCOs’ websites. Accordingly, based on the pilot study and – considering prior literature on ICD in universities (Manes-Rossi *et al.*, 2018; Nicolò *et al.*, 2021c) and HCOs (Mazzotta, 2018) – the framework used by Ramírez *et al.* (2022) was partially modified as detailed in Table 2.

As a result, a coding framework composed of 31 items grouped into 3 IC categories was finally obtained.

Content analysis was conducted manually on the official websites of sampled Italian public HCOs, with the information recorded in electronic format (e.g. in Excel) to ensure easy classification, checking, correction and complementary statistical data analysis (Nicolò *et al.*, 2021a, b). Data were collected from March 2021 to September 2021 on all websites’ sections and contents, including documents.

To analyse and quantify the information gathered through content analysis, an unweighted disclosure index, based on a dichotomous procedure, was developed (Lee *et al.*, 2007; Alcaraz-Quiles *et al.*, 2015; Manes-Rossi *et al.*, 2018; Nicolò *et al.*, 2020). Accordingly, a score of (1) was attributed if the HCO disclosed the IC item on the website, and a score of (0) was assigned otherwise. This approach confers the same importance to all items and reduces

Italian public HCOs	Code	Number	%
Hospital Enterprise	HE	23	14%
National Hospital for Scientific Research	NHSR	17	11%
National Hospital for Scientific Research’s Foundation	NHSRF	4	3%
University Hospital integrated to INHS	UHI	4	3%
University Hospital	UH	15	9%
Local Health Authority	LHA	95	60%
<i>Total</i>		158	

Table 1.
Sample description

IC components	Cod	IC variables	Descriptions	Source
Human Capital	HC1	Work-related knowledge/know-how/creativity	Individual competencies of workers, employee knowledge or skill obtained from the job or training	Adapted from Ramírez et al. (2022)
	HC2	Employee composition and qualification	Information regarding organisational structure of the HCO's employees (number of employees, staff age structures, type of contract, salaries, etc.)	Adapted from Ramírez et al. (2022)^a
	HC3	Employee compensation	Information on HCO's employee salaries	Adapted from Ramírez et al. (2022)
	HC4	Employee benefit	Information referring to welfare or other benefits for employees provided by the HCO	Adapted from Ramírez et al. (2022)
	HC5	Cultural diversity	HCO's employee demographic information	Adapted from Ramírez et al. (2022)
	HC6	Researchers	Information on HCO's employees involved in research activities	Adapted from Manes Rossi et al. (2018) , Nicolò et al. (2021c)^b
	HC7	Training programme	Education or training programmes for employees provided by the HCO (investment, employees who benefited from training, total training days)	Adapted from Ramírez et al. (2022)
	HC8	Conditions of service	Information referring to HCO's work environment, promotion opportunities, incentives and job security	Adapted from Ramírez et al. (2022)
	HC9	Employee satisfaction	Information on HCO's employee satisfaction	Adapted from Mazzotta (2018)^c
	HC10	Women	Information on the distribution of women workers in each of the services and hierarchical positions	Adapted from Ramírez et al. (2022)
	HC11	Turnover of personnel	Information on HCO's employee turnover or mobility	Adapted from Ramírez et al. (2022)
Relational Capital	RC1	Events organised by the HCO	Information on initiatives, conferences, meetings and other cultural events organised by the HCO	Adapted from Ramírez et al. (2022)^d
	RC2	Patient satisfaction	Information relating to the patients and their satisfaction with HCO's services; existence of a section for complaints and suggestions of patients	Adapted from Ramírez et al. (2022)^e
	RC3	Relationship with patients	Information on the presence of public relations office for conflicts' mediation, web sections for patients' complaints and suggestions about HCO's services	Adapted from Mazzotta (2018)^f

(continued)

Table 2.
IC components,
variables, and
descriptions

IC components	Cod	IC variables	Descriptions	Source
Structural Capital	RC4	Collaborations and partnerships with national entities	Information on collaborations and partnerships between the HCO and other national entities (e.g. firms, non-profit organisations, local governments, national and regional public authorities), except universities	Adapted from Ramírez et al. (2022)^g
	RC5	International relationships and partnerships	Information on collaborations and partnerships between the HCO and International entities	Adapted from Ramírez et al. (2022)^g
	RC6	Collaborations and partnerships with Universities	Information on collaborations and partnerships between the HCO and public or private Universities	Adapted from Ramírez et al. (2022)^g
	RC7	Media divulgation	Information on press releases; press conferences; news	Adapted from Ramírez et al. (2022)
	RC8	Quality Standards	Information referring to the quality of service provided by workers; adherence to quality assurance programs/standards, quality certificates obtained	Adapted from Ramírez et al. (2022)
	RC9	Initiatives on social commitment	Information about scholarships and grants granted, courses or talks offered free of charge to the patients or population; support for disadvantaged people; reintegration policies; and collaborations with voluntary associations	Adapted from Ramírez et al. (2022)
	RC10	Transparency	Information on the implementation of anti-corruption and transparency policies	Adapted from Ramírez et al. (2022)
	SC1	Information/ Networking systems	Information on the development, use, application and influence of information systems (document processes, databases, ICT use, technological capacity, intranet/ Internet use, etc.)	Adapted from Ramírez et al. (2022)
	SC2	HCO culture/value	Comprising the vision, attitudes, experiences, beliefs and values of the HCO	Adapted from Ramírez et al. (2022)^h
	SC3	Management Philosophy	Information referred to the HCO's strategy, mission, aims, priorities and key factors for the short-medium term	Adapted from Ramírez et al. (2022)
SC4	Management Processes	Information about HCO's processes, regulation for procurement procedures, annual operating plan, procedure manuals, plans and programmes	Adapted from Ramírez et al. (2022)	

Table 2.

(continued)

IC components	Cod	IC variables	Descriptions	Source
	SC5	Ethical or good governance code	Existence of a Code of Ethics or Good Governance	Adapted from Ramírez et al. (2022)
	SC6	Achievement of objectives by HCO managers	Information about the degree of achievement of “essential levels of care” (LEA)	Adapted from Ramírez et al. (2022) ⁱ
	SC7	Financial relations	Relationship between the HCO and finance providers	Adapted from Ramírez et al. (2022)
	SC8	Investment in health technology	Information about the investments in new technologies and instruments to improve the quality of HC services	Adapted from Mazzotta (2018) ¹
	SC9	Research projects	Information about HCO’s research projects	Adapted from Mazzotta (2018) ¹
	SC10	Promotional tools	Information about HCO’s advertising and promotion	Adapted from Ramírez et al. (2022)

Note(s): Methodological: The coding framework was adapted from [Ramírez et al. \(2022\)](#) to the Italian HCOs’ context with some amendments

^a The items “Employee composition” and “Employee qualification” ([Ramírez et al., 2022](#)) were merged into one item “employee composition and qualification” to avoid redundancy and confusion

^b Considering the presence of several Research and University HCOs in the sample, this item was adapted from [Manes-Rossi et al. \(2018\)](#), [Nicolò et al. \(2021c\)](#) to the HC context to examine the information about employees involved in research activities

^c This item was included to capture the degree of HCOs’ transparency about the satisfaction of their employees regarding their working conditions ([Mazzotta, 2018](#))

^d Adapted from the item “Events organized by the municipality” ([Ramírez et al., 2022](#))

^e Adapted from the item “citizen satisfaction” ([Ramírez et al., 2022](#))

^f This item was added to examine the degree of disclosure about the presence of public relations office for conflicts mediation, patients’ complaints and suggestions about HCO’s services ([Mazzotta, 2018](#))

^g The item “projects with the collaboration of external partners” was split into the following three items: (RC4) collaborations and partnerships with national entities; (RC5) International relationships and partnerships; (RC6) Collaborations and partnerships with Universities to have a more comprehensive picture of how HCOs inform stakeholders about the extent to which they open their boundaries to the external ecosystem ([Mazzotta, 2018](#); [Aversano et al., 2020](#))

^h Adapted from the item “Municipality culture/values” ([Ramírez et al., 2022](#))

ⁱ Adapted from the item “Achievement of objectives by service managers” ([Ramírez et al., 2022](#))

¹ Adapted from [Mazzotta \(2018\)](#) to consider disclosure about investment in health technology and research projects conducted by HCOs

Table 2.

subjectivity biases inherent in weighting ([Lee et al., 2007](#); [Manes-Rossi et al., 2018](#)). If the same item was repeated several times, it was recorded only once.

Therefore, the Intellectual Capital Disclosure Index (ICDI) was constructed as a ratio obtained by dividing the number of IC items disclosed by the total number of IC items (31) for each sampled HCO as follows:

$$ICDI = \frac{\sum_{i=1}^n d_i}{n}$$

where $d = 1$ if the item was disclosed and 0 otherwise; $n =$ the maximum number of items (31 items).

The reliability and validity of the content analysis process have been ensured through the following steps. Firstly, two members of the research teams (coders) developed a set of

explicit and specified coding rules. Secondly, the two coders conducted a pilot study on a sample of 20 HCOs' websites to check for the suitability of the initial coding instrument and made the necessary amendments. Thirdly, after defining the final coding scheme of 31 items, the two coders independently analysed a sample of 15 websites. After this step, they met to solve discrepancies and clarify grey areas. Fourthly, the two coders analysed another sample of 20 websites. In the wake of this step, the reproducibility or intercoder reliability was checked by calculating Krippendorff's α coefficient through an SPSS macro. The results provided an agreement value above the minimum threshold of 0.80 (α of 0.8878), confirming intercoder reliability. Then, the two coders run the content analysis on the remaining sample.

4.3 Empirical model

An OLS regression model was estimated to assess the extent to which selected explanatory variables (size, gender diversity, financial performance and indebtedness) affect the level of online ICD provided by the sample of 158 Italian HCOs. In addition, to enhance the regression model's accuracy and minimise biases, the effect of three control variables that are likely to influence the level of online ICD has been tested. Therefore, the model is represented as follows:

$$\text{ICDI} = \beta_0 + \beta_1 (\text{Size}) + \beta_2 (\text{Gender diversity in top governance positions}) \\ + \beta_3 (\text{Financial performance and indebtedness}) + \beta_4 (\text{Control variables}) + \epsilon_i$$

The dependent variable ICDI is represented by the disclosure index computed for each Italian HCO.

The independent variables were operationalised as follows:

- (1) *Size* was measured by the natural logarithm of the number of hospital beds (Andrades-Peña *et al.*, 2020; Arena *et al.*, 2021);
- (2) *Gender diversity in top governance positions* was measured by three distinct binary variables. While prior research usually measured board gender diversity as the proportion of women directors on the board, this study had to take into account the peculiar governance structure of Italian HCOs' context based on three top governance figures: General Manager (GM); Chief Executive Officer (CEO); and Chief Health Officer (CHO) as defined by the Italian Law 502/92 and Legislative Decree 229/99 (Toth, 2014). Each of these figures has specific tasks and competencies. Specifically, the GM is responsible for the overall management and performance of HCOs, represents the organisation with external stakeholders and appoints the CEO and CHO (Manes-Rossi *et al.*, 2020; Naciti *et al.*, 2022). The CEO is responsible for all administrative procedures and supervises the operational tasks assigned to subordinate managers (Manes-Rossi *et al.*, 2020; Naciti *et al.*, 2022). Last, the CHO is a qualified health professional who is responsible for all issues and procedures related to health protocols (Manes-Rossi *et al.*, 2020; Naciti *et al.*, 2022). Therefore, to consider the peculiarities and relevance of these governance figures, we evaluated the women's representation in each of them using three variables. The first variable takes a value of (1) when the *General Manager (GM)* is female and (0) otherwise. The second variable takes a value of (1) if the *Chief Executive Officer (CEO)* is a woman and (0) if it is male. The third variable takes a value of (1) if the *Chief Health Officer (CHO)* is a woman and (0) if it is male (Naciti *et al.*, 2022);
- (3) *Financial performance and indebtedness* were proxied by two distinct variables. The first assesses the HCOs' financial performance in terms of profitability, i.e. their

assets' capacity to generate financial results. It is computed by the Return On Assets (ROA), the ratio of total net income to total assets (Andrades-Peña *et al.*, 2020; Matos *et al.*, 2021). The second assesses the level of HCOs' indebtedness and is proxied by the ratio of total debt to total assets (Matos *et al.*, 2021; Uyar *et al.*, 2021).

Furthermore, the proxies of the control variables are the following:

- (1) *Research* was proxied by a dichotomous variable equal to (1) if the HCO is an NHSR or NHSRF and (0) otherwise (Arenas *et al.*, 2021; Pizzi *et al.*, 2021);
- (2) *University* was computed by a binary variable equal to (1) if the HCO is a UH and (0) otherwise (Arenas *et al.*, 2021);
- (3) *Localisation* was proxied by a dichotomous variable equal to (1) if the HCO is located in the South of Italy and (0) if not (Pizzi *et al.*, 2021).

Data about the size, type of HCO (e.g. NHSR, NHSRF or UH) and localisation have been directly extracted from the open database of the INHS. Information about governance (GM, CEO and CHO) have been retrieved from the official websites of the HCOs. Last, financial variables (*indebtedness* and *profitability*) have been built by gathering data from the official financial statements based on accrual accounting published by the HCOs on their websites (Table 3).

5. Content analysis results

The data contained in Table 4 illustrate the results of the content analysis conducted on the websites of the 158 Italian HCOs. Findings show that Italian HCOs disclose a high amount of IC information online. On average, each HCOs disclose about 81% of total items. Specifically,

Variables	Description	References	Source
Size	Natural logarithm of the total number of hospital beds	Andrades-Peña <i>et al.</i> (2021), Arenas <i>et al.</i> (2021)	INHS Open Data
Gender Diversity	Three binary variables (1) when the General Manager (GM) is female and (0) if it is male (1) when the Chief Executive Officer (CEO) is a woman and (0) if it is male (1) when the Chief Health Officer (CHO) is a woman and (0) if it is male	Toth (2014), Naciti <i>et al.</i> (2022)	Websites
Financial performance and indebtedness	Financial performance measures the profitability of Italian public HCOs (Ratio of total net income on total assets – ROA) Indebtedness measures the level of Italian public HCOs' debt (Ratio of total debt on total assets)	Uyar <i>et al.</i> (2021), Matos <i>et al.</i> (2021)	Financial Statements
Research	Dichotomous variable equal to (1) if the HCO is an NHSR or NHSRF and (0) otherwise	Arenas <i>et al.</i> (2021), Pizzi <i>et al.</i> (2021)	INHS Open Data
University	Dichotomous variable equal to (1) if the HCO is a UH or UHI and (0) otherwise	Arenas <i>et al.</i> (2021)	INHS Open Data
Localisation	Dichotomous variable equal to (1) if the HCO is located in the South of Italy and (0) if not	Pizzi <i>et al.</i> (2021)	INHS Open Data

Table 3.
Variables description,
references and sources

Table 4.
Content analysis
results

IC components	Cod	IC variables	HEs		Research		University		LHAs		Total	
			N	%	N	%	N	%	N	%	N	%
Human Capital	HC1	Work-related knowledge/know-how/creativity	19	83%	18	86%	16	84%	64	67%	118	75%
	HC2	Employee composition and qualification	23	100%	20	95%	18	95%	94	99%	156	99%
	HC3	Employee compensation	23	100%	20	95%	19	100%	94	99%	157	99%
	HC4	Employee benefit	21	91%	20	95%	19	100%	89	94%	150	95%
	HC5	Cultural diversity	1	4%	1	5%	0	0%	2	2%	4	3%
	HC6	Researchers	18	78%	19	90%	19	100%	46	48%	103	65%
	HC7	Training programme	23	100%	20	95%	19	100%	94	99%	157	99%
	HC8	Conditions of service	23	100%	20	95%	19	100%	95	100%	158	100%
	HC9	Employee satisfaction	10	43%	12	57%	12	63%	41	43%	76	48%
	HC10	Women	11	48%	11	52%	12	63%	40	42%	75	47%
	HC11	Turnover of personnel	21	91%	19	90%	17	89%	89	94%	147	93%
<i>HC TOT</i>												
Relational Capital	RC1	Events organised by the HCO	18	78%	18	86%	15	79%	83	87%	135	85%
	RC2	Patient satisfaction	20	87%	19	90%	16	84%	64	67%	120	76%
	RC3	Relationship with patients	23	100%	20	95%	19	100%	95	100%	158	100%
	RC4	Collaborations and partnerships with national entities	20	87%	20	95%	18	95%	80	84%	139	88%
	RC5	International relationships and partnerships	9	39%	17	81%	9	47%	19	20%	55	35%
	RC6	Collaborations and partnerships with universities	19	83%	20	95%	19	100%	56	59%	115	73%
	RC7	Media divulgation	22	96%	20	95%	19	100%	95	100%	157	99%
	RC8	Quality Standards	18	78%	19	90%	17	89%	63	66%	118	75%
	RC9	Initiatives on social commitment	22	96%	18	86%	16	84%	92	97%	149	94%
	RC10	Transparency	23	100%	20	95%	19	100%	93	98%	156	99%
<i>RC TOT</i>												
Structural Capital	SC1	Information/Networking systems	22	96%	18	86%	15	79%	90	95%	145	92%
	SC2	HCO culture/value	23	100%	21	100%	18	95%	90	95%	152	96%
	SC3	Management Philosophy	23	100%	21	100%	18	95%	82	86%	144	91%
	SC4	Management Processes	23	100%	21	100%	18	95%	93	98%	155	98%
	SC5	Ethical or good governance code	22	96%	19	90%	19	100%	85	89%	145	92%
	SC6	Achievement of objectives by HCO managers	23	100%	20	95%	18	95%	92	97%	153	97%
	SC7	Financial relations	23	100%	21	100%	19	100%	95	100%	158	100%
	SC8	Investment in health technology	16	70%	20	95%	17	89%	38	40%	91	58%
	SC9	Research projects	15	65%	21	100%	16	84%	43	45%	95	60%
	SC10	Promotional tools	15	65%	14	67%	13	68%	68	72%	110	70%
<i>SC TOT</i>												
<i>AVERAGE ICD</i>												
			83%		87%		86%		77%		81%	

Note(s): HEs = Hospital Enterprises; Research HCOs = National Hospitals for Scientific Research (NHSRs), and National Hospitals for Scientific Research's Foundations (NHSRFs); University HCOs = University Hospitals (UHs), University Hospitals integrated to INHS (UHIs), LHAs = Local Health Authorities
*The percentages have been approximated upwards

Research and University hospitals disclose 86% and 87% of the total IC items on their websites. Hospital Enterprises cover 83% of the total IC items, while Local Health Authorities cover 77%.

These findings confirm that Italian HCOs are aware of the importance of ICD in meeting stakeholders' accountability and transparency needs. Also, the results are consistent with the strand of literature on ICD that considers websites as one of the most valid tools to disclose IC information in a timelier, more accessible and transparent manner (Alcaraz-Quiles *et al.*, 2015; Nicolò *et al.*, 2021a). This result supports the role of websites as a complementary communication tool to convey information on IC resources whose value is absent or underestimated in traditional financial reports (Manes-Rossi *et al.*, 2018; Nicolò *et al.*, 2021a, b).

Looking at the IC categories, Structural Capital presents the highest level of disclosure (85%), followed by Relational Capital (82%) and Human Capital (75%). The primary attention toward Structural and Relational Capital disclosure is shared among the different types of HCOs, as shown in Table 4.

These results are consistent with the study by Mazzotta (2018), in which Structural Capital was found to be the most disclosed IC category by an Italian University Hospital. Furthermore, the results also align with Paoloni *et al.*'s (2020) literature review, which observed that most studies on ICD in the healthcare context focused on Structural Capital issues. On the other hand, this finding differs from other studies conducted in local governments and universities (e.g. Ramírez *et al.*, 2022; Manes-Rossi *et al.*, 2018; Nicolò *et al.*, 2020), where Relational and Human Capital were found to be the most discussed IC categories. This difference might be explained by the peculiarities of HCOs whose value-creation process is based on exploiting Structural Capital's resources (Mazzotta, 2018; Paoloni *et al.*, 2020). In particular, HCOs tend to rely on Structural Capital's resources such as procedures, organisational routines, health technologies and Information Technology systems to fulfil their mission to create high-quality services for patients or implement education and research programmes in the case of Research and University HCOs. Also, the need to treat rare diseases and complex patients has stimulated the production of specialised services based on advanced technology that is at the core of the HCOs' Structural Capital (Vagnoni and Oppi, 2015). For these reasons, information about Structural Capital is pivotal to accommodating stakeholders' information needs.

It is worth noticing that also Relational Capital disclosure was highly addressed by HCOs on their websites. HCOs are involved in a network of external relationships with a vast forum of stakeholders like governments, patients, universities and citizens whose satisfaction and service quality perceptions are crucial (Zigan *et al.*, 2009). Therefore, also considering the increasingly competitive environment in which HCOs are inserted, maintaining and establishing good relationships with external actors may represent a successful survival strategy, enhancing reputation and attracting more patients (Zigan *et al.*, 2009). This justifies the great attention devoted to disclosing information on Relational Capital's elements, such as *relationships with patients, initiatives on social commitment, collaborations and partnerships with national entities and transparency*.

6. Hypotheses testing results

6.1 Descriptive statistics and correlation analysis

Table 5 shows the results of the descriptive statistics for the independent variables, outlining minimum, maximum and mean values, as well as the standard deviation, while Table 6 presents the Pearson correlation matrix for the dependent and independent variables. All the correlation values are below the critical threshold of 0.8, indicating no severe multicollinearity problems (Farrar and Glauber, 1967).

Table 5.
Descriptive statistics
for dependent and
independent variables

Continuous variables	Mean	Std. Dev	Min	Max
ICD	0.805	0.104	0.419	0.967
Size	6.43	0.835	3.55	8.36
Financial performance	-0.0253	0.064	-0.3032	0.1051
Indebtedness	0.430	0.243	0.00039	2.59465
Dummy variables				Y/N
General Manager				32/126
Chief Executive Officer				20%/80%
Chief Health Officer				57/101
Research				36%/64%
University				51/107
Localisation				32%/68%
				21/137
				13%/87%
				19/139
				12%/88%
				48/110
				31%/69%

6.2 Regression model results and discussion

An OLS regression model was used to test the hypotheses. Table 7 shows the results of the OLS regression model. The assumptions underlying the regression model were tested for multicollinearity [Variance Influence Factor (VIF)]; heteroscedasticity (White test); and normality issues (Lilliefors test) (Mertens, 2017). All the VIFs were lower than the critical threshold of 10, thus indicating no multicollinearity drawbacks. White's heteroscedasticity test provided p -values that were not significant, thus eliminating heteroscedasticity problems. Moreover, the test results for the normality of residuals (Lilliefors test) evidenced that the residuals showed normal behaviour.

The regression model is statistically significant (p -value < 0.01) with an adjusted R^2 value of 0.29.

Size is negatively related to the dependent variable and statistically significant at the 10% level. The negative and significant relationship detected between the extent of online ICD and *size* rejects the first hypothesis (H1). This is not in line with previous studies focused on universities and local governments (e.g. Cuadrado-Ballesteros *et al.*, 2014; Brusca *et al.*, 2019; Ramírez *et al.*, 2022; Nicolò *et al.*, 2020) which found the *size* to be a positive driver of ICD. Surprisingly, this result pinpoints that – despite the more significant number of stakeholders involved or interested in their activities – larger Italian HCOs tend to provide a lesser extent of ICD. Probably, the higher social and political scrutiny to which larger HCOs are exposed prevents them from diffusing information that can harm their competitive advantage or trigger reputational risks. From the other perspective, smaller HCOs may be more interested in demonstrating how they use IC resources to enhance the effectiveness of their value-creation processes to increase their reputation and obtain more public funds.

As regards *gender diversity* (HC2), the results partially confirmed the hypothesis. While GM's variable is positively and statistically related to ICD (p -value < 0.01), the CEO and CHO variables do not significantly affect the dependent variable. This result shows how the governance structure may influence the level of ICD provided by Italian HCOs and highlights the particular importance given to the figure of GM. The GM is at the top of HCOs' governance structure as it is responsible for ensuring the proper and economic management

	1	2	3	4	5	6	7	8	9	10
1. ICD	1									
2. Size		-0.263**								
3. General Manager		1								
4. Chief Executive Officer			0.204*							
5. Chief Health Officer			0.039							
6. Indebtedness			1							
7. Financial performance				0.099						
8. Research				0.017						
9. University				0.031						
10. Localisation				1						
					0.038					
					-0.071**					
					0.282**					
					0.017					
					1					
						-0.223**				
						0.071				
						-0.013				
						-0.063				
						-0.028				
						1				
							-0.022			
							0.019			
							-0.085			
							0.035			
							-0.112			
							-0.169*			
							1			
								0.362**		
								-0.529**		
								-0.035		
								0.016		
								-0.071		
								-0.166*		
								-0.004		
								1		
									0.254**	
									0.053	
									-0.008	
									0.033	
									0.006	
									0.011	
									-0.168*	
									-0.112	
									1	
										-0.206**
										-0.118
										-0.198*
										-0.152
										-0.221**
										-0.139
										-0.078
										0.025
										-0.137
										1

Note(s): * $p < 0.05$; ** $p < 0.01$ (two-tailed)

Table 6.
Correlation analysis

	Coefficient	Std error	T-statistic	p-value	Sig	VIF
const	0.94055	0.0741494	12.6845	<0.0001	***	
Size	-0.0179121	0.0108164	-1.6560	0.0998	*	1.447
General Manager	0.0532565	0.018409	2.8930	0.0044	***	1.093
Chief Executive Officer	0.00907914	0.0156066	0.5817	0.5616		1.037
Chief Health Officer	-0.0128124	0.0170402	-0.7519	0.4533		1.191
Financial performance	-0.0187005	0.0986094	-0.1896	0.8498		1.113
Indebtedness	-0.0821759	0.0421947	-1.9475	0.0534	*	1.113
Research	0.0888927	0.0189914	4.6807	<0.0001	***	1.484
University	0.105473	0.0155842	6.7679	<0.0001	***	1.081
Localisation	-0.0423927	0.0201781	-2.1009	0.0373	**	1.222

Notes(s): The asterisks indicate statistical significance at the following levels: * 10%; ** 5%; *** 1%

Model specification			
Mean dep. variable	0.805839	Std dev. Dep. variable	0.104097
Sum of squared residuals	1.131476	Regression std error	0.087436
R^2	0.334932	Adjusted R^2	0.294489
$F(9, 122)$	12.75332	p -value(F)	0.000000
Observations	158		

White test: T statistic: $LM = 40.9449$; p -value = $p(\chi^2(47) > 40.9449) = 0.720382$ (no heteroskedasticity)
 Lilliefors test: T statistic: 0.053709 ; p -value = 0.31 (residuals are normally distributed)

Table 7.
OLS regression model
results and tests

of the assigned resources and the overall hospital's performance. Therefore, this positive association evidences that a female GM is likely to increase the governance's non-financial background, including expertise in soft components such as intangible assets (Tejedo-Romero *et al.*, 2017; Nicolò *et al.*, 2021b) and its sensitivity toward stakeholders' concerns. Accordingly, her presence seems to enhance the likelihood that IC information is put at the core of the HCOs' reporting agenda to the benefit of all stakeholders. This result is consistent with prior studies (Araujo and Tejedo-Romero, 2018; Tavares and da Cruz, 2020; Ramírez *et al.*, 2022), which found that municipalities governed by women exhibit significantly higher levels of online transparency.

As regards *financial performance and indebtedness*, the first dimension does not show any significant effect, while the second dimension is statistically and negatively related to ICD at the 10% level. This result highlights that the level of HCOs' debt negatively influences the extent of HCOs' online ICD. Accordingly, we supported the argument that higher debt levels inhibit PSOs from providing IC information to conceal the inefficiencies they may have had in managing financial resources or the negative results of prior investments in IC (Guillamon *et al.*, 2016). Moving from this perspective, a reduced level of debt also implies more financial autonomy and less dependence on external subsidies (Ramírez *et al.*, 2022). Therefore, the negative association between debt and ICD detected also underlines that HCOs with reduced debt levels tend to disclose more information probably to evidence their ability to pursue positive financial performance and reduce public debt through the exploitation of IC resources (Ramírez *et al.*, 2022).

Regarding the control variables, both *research* and *university* show positive and statistically significant coefficients at the 1% level. These results testify how the level of online ICD is influenced by the peculiarities of Research and University HCOs. Such kinds of HCOs put the human resources' knowledge at the core of their value creation processes and are specifically focused on generating innovation and new knowledge through research programmes, developing care and clinical protocols, regular rotation of medical actors in

training and clinical supervision sessions conducted by their specialist staff (Vagnoni and Oppi, 2015). Therefore, the IC represents their processes' primary input and output (Vagnoni and Oppi, 2015; Nicolò *et al.*, 2021a). Consequently, our results witness that such HCOs rely on websites to reveal the value of IC resources that escape traditional financial reports and satisfy stakeholders' instances. Also, regression results show that the geographical localisation of HCOs matters for ICD behaviours. In particular, *localisation* presents a negative and statistically significant coefficient at the 1% level. This pinpoints that HCOs in the North of Italy tend to disclose higher levels of ICD through their websites than those in the South of Italy. This may be justified by the fact that some Northern regions, such as Lombardy, tend to have higher per-capita income and public healthcare expenditure than some Southern regions, such as Calabria (Toth, 2014; Cicchetti and Gasbarrini, 2016; MeF, 2021). Accordingly, they may have higher financial resources to be invested in online communication tools, such as the Internet, to fulfil stakeholders' expectations. Also, they are exposed to higher political and social pressures to justify how their higher expenditures may depend on investments in strategic resources such as IC.

Table 8 proposes an additional analysis to increase the consistency of the findings. An OLS regression model was used to test the hypotheses against the specific category of LHAs.

The assumptions underlying the regression model were tested for multicollinearity [Variance Influence Factor (VIF)]; heteroscedasticity (White test); and normality issues (Lilliefors test). All the VIFs were lower than the critical threshold of 10, thus indicating no multicollinearity drawbacks. White's heteroscedasticity test provided *p*-values that were not significant, thus eliminating heteroscedasticity problems. Moreover, the test results for the normality of residuals (Lilliefors test) evidenced that the residuals showed normal behaviour.

The regression model is statistically significant (*p*-value < 0.01) with an adjusted R^2 value of 0.23.

In this case, the analysis was restricted to a subsample of 95 Italian LHAs. The main purpose was to test if the factors driving the ICD at a general level also impact the level of ICD

	Coefficient	Std error	T-statistic	p-value	Sig	VIF
const	0.962341	0.0920074	10.4594	<0.0001	***	
Size	-0.0228054	0.0136642	-1.6690	0.0987	*	1.081
General Manager	0.0641231	0.0225974	2.8376	0.0057	***	1.118
Chief Executive Officer	0.0211124	0.0166448	1.2684	0.2080		1.074
Chief Health Officer	-0.054119	0.0195336	-2.7706	0.0068	***	1.197
Financial performance	0.184776	0.163797	1.1281	0.2624		1.050
Indebtedness	-0.0562996	0.0335742	-1.6769	0.0972	*	1.027
Localisation	-0.074712	0.0221696	-3.3700	0.0011	***	1.188

Note(s): The asterisks indicate statistical significance at the following levels: * 10%; ** 5%; *** 1%

Model specification

Mean dep. variable	0.768761	Std dev. Dep. variable	0.089852
Sum of squared residuals	0.540338	Regression std error	0.078809
R^2	0.288001	Adjusted R^2	0.230713
$F(9, 122)$	5.418198	<i>p</i> -value(F)	0.000035
Observations	95		

White test: T statistic: LM = 39.18; *p*-value = $p(\chi^2(30) > 39.18) = 0.276039$ (no heteroskedasticity)

Lilliefors test: T statistic: 0.0768156; *p*-value = 0.18 (residuals are normally distributed)

Table 8.
Additional
analysis-LHAs

of the solely LHAs. So, the dichotomous variables *research* and *university* have been excluded from the analysis.

The additional analysis overall confirmed the results of the main regression model. *Size*, *indebtedness* and *localisation* are negatively related to ICD. Also, the presence of a female *General manager* remains a positive driver of online ICD. Nevertheless, contrary to initial expectations, in the restricted domain of LHAs, the presence of a female *CHO* negatively affects the level of online ICD.

7. Conclusions

The present research addressed the call of [Paoloni et al. \(2020\)](#) for more research investigating ICD practices in the healthcare context by providing several contributions to the existing body of knowledge. In particular, prior ICD research in the public sector mainly focuses on universities and local governments, largely neglecting the healthcare context. So, this study contributes to the body of ICDs research by providing novel insight into an unexplored context such as the HCOs. The research is also significant as it broadens the boundaries of previous research – mainly descriptive or normative in nature – providing new empirical evidence that has not been documented previously. Specifically, we uncovered some relevant antecedents of IC disclosure in the healthcare context, such as size, gender diversity in the top governance positions, financial performance and indebtedness that – despite their relevance – were absent in prior studies.

Therefore, the study makes both theoretical and practical contributions.

First of all, our study supports the stakeholder theory's arguments ([Gray et al., 1995](#); [Guthrie et al., 2006](#)), highlighting how the official websites may represent part of the dialogue between HCOs and their stakeholders. Considering the key role played by IC in supporting HCOs to achieve their strategic objectives, reduce costs and improve their overall performance ([Pirozzi and Ferulano, 2016](#); [Gravili et al., 2020](#)), it is fundamental to enhance its disclosure to meet stakeholders' information needs. So, in the absence of mandatory requirements for ICD, we provided evidence that Italian public HCOs use websites extensively to fill their accountability duties towards stakeholders and supply the limitations of traditional financial reports that widely neglect the value of IC resources. Our findings also witness that particular attention has been devoted to Structural and Relational Capital.

The most relevant factors contributing to higher online transparency on IC by Italian HCOs are size, gender and indebtedness. Specifically, contrary to initial expectations, smaller HCOs seem more prone to discharge accountability for using IC resources through websites. This result may be justified by the willingness of smaller HCOs to increase their reputation and gain additional financial resources from external providers, demonstrating their excellence in producing and managing IC. The gender of some key HCOs' governance actors also impacts online ICD practices. In particular, Italian HCOs appointing female GMs benefit from higher transparency on IC. Further, we noted that HCOs with reduced debt levels tend to disclose more information on IC resources. It is also worth noticing that this study's findings pinpointed that some types of HCOs are more prone to convey IC information through websites than others. Specifically, Research and University HCOs are the most attentive in providing ICD through the web. They are characterised by a high degree of intangibility that permeates all their processes and activities. So, to overcome the limitations of traditional financial reports and provide full explanations of their value creation processes based on IC, they exploit the potential of the web. Last, we found that also geographical location impacts the ICD levels. Specifically, Italian HCOs in the Northern regions provide more online transparency about IC than others. Considering that the provision of healthcare services in Italy is decentralised as it is entrusted to individual regions, the social, economic and cultural disparities among the different regions may impact the quality of healthcare services and the HCOs' transparency and accountability degrees.

Standing at the intersection between different literature streams, including IC, healthcare and gender diversity at the top governance positions, the study's findings might be of interest to policymakers, standard setters and academics.

Firstly, we add to the longstanding debate on the accounting treatment of intangibles and voluntary disclosure of IC by providing arguments supporting the need to make IC disclosure mandatory. In particular, our results let us contend that ICD should be regulated at least in intangible-based sectors such as the healthcare sector. While recognising the relevance of financial reports in discharge accountability towards stakeholders about the HCOs' financial performance, we suggest that websites may represent valid tools to complement financial reports and provide information about strategic resources such as IC.

Secondly, HCOs and policymakers should pay primary attention to the governance composition and seek to integrate it with female general managers. From this perspective, the study noted that the general manager position within Italian HCOs is still prevalently occupied by men. However, we observed that by appointing women to this top governance position, HCOs might experience positive effects on the level of transparency provided to stakeholders, probably due to the higher female orientation toward stakeholders' concerns. So, policymakers are encouraged to promote diversity policies that specifically foster women's participation in the role of general manager of HCOs.

This study's findings should be interpreted mindful of the following limitations, which offer avenues for future research opportunities. Firstly, the research was conducted in a single year due to the peculiarities of websites. So, further research may expand from our analysis considering the trend of online ICDs provided by HCOs. Secondly, the research focuses on a single geographical context, namely, Italy, as it was considered suitable for investigating voluntary online ICD practices. Considering the lack of empirical works on ICD practices in the healthcare sectors, future research may expand from this study to conduct cross-country comparisons. Thirdly, we adopted a disclosure index that only considered the extent of ICD. Scholars may consider developing future research in which the quality of ICD will also be investigated. Last, our additional analyses showed that, contrary to expectations, female CHO negatively affects the level of online ICD. This result deserves attention and calls for future studies.

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