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MEDICAL INFORMATION MANAGEMENT IN PUBLIC HEALTH CARE IN THE CONTEXT OF BUILDING REGIONAL COMPETITIVE ADVANTAGE

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Purpose: To analyse the role of medical information as a management resource in shaping the region's competitive advantage, with particular emphasis on patients' perceptions of the quality and availability of information in the public health care system.

Design/methodology/approach: A quantitative research method in the form of a web-based survey (CAWI) addressed to patients using public health care was used. Their ratings of the reliability of sources and forms of medical information, the staff's empathy, and the level of information asymmetry were analysed. Based on synthetic variables, an analysis of the relationships between information factors and ratings of the quality and accessibility of medical information was conducted, supplemented by patient segmentation using cluster analysis.

Findings: The results indicate that the quality of medical information, the way it is communicated, and the communication attitudes of medical staff significantly impact the perceived value of health services. Efficient information management promotes patient trust and strengthens the potential of public institutions as a pillar of social development in the region, thereby creating a source of competitive advantage.

Research limitations/implications: The study relies on patients' self-reports, which may be subject to perceptual biases and subjective assessments. The analysis covers only the public health sector; therefore, conclusions should not be automatically applied to other segments of medical services or private institutions.

Practical implications: It is recommended that health care units systematically manage the quality of information messages, strengthen staff communication competence, and invest in multichannel patient information. These measures can improve service efficiency and enhance public perception of services in the region.

Social implications: Improving the quality of medical information fosters better patient orientation to health and services, increasing patient empowerment and satisfaction. Improving the transparency and accessibility of information strengthens trust in public institutions and can positively impact the quality of life in the region.

Originality/value: The article attempts to integrate management and information approaches in the analysis of the communication function of public health care. The novel framing of the problem in the context of building regional competitive advantage and trust in public institutions brings value to both research on systemic information management and regional development of health services. The work may be helpful to researchers studying information quality in the public sector, as well as to policymakers and managers responsible for improving patient relations and the effectiveness of communication activities.

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Keywords: medical information, public health care, information management, patient communication, regional competitiveness.
Category of the paper: Research paper.

1. Introduction

Modern health care is increasingly based not only on the provision of medical services but also on the effective management of patient relationships, which is founded on access to reliable and transparent information. In this context, medical information is becoming a key resource to support the quality of health services, and its management is an important element of public marketing. Properly designed and communicated information builds trust, strengthens the patient's sense of security and supports a positive image of the medical facility. The quality and availability of information also shape perceptions of the health system's efficiency and professionalism in a given region, thereby influencing its competitiveness.

In the age of the information society, patients are becoming increasingly aware and demanding - they expect not only expert care, but also partner communication and easy access to understandable medical data. Under such conditions, information management cannot be treated marginally. Communication principles, information channels, and medical staff's empathetic attitudes directly impact the quality of the patient experience, their loyalty to the system, and their overall evaluation of public health institutions.

This study aims to assess medical information management in health care and its importance in shaping the region's competitive advantage based on patients' perceptions. In particular, the patients' perceived quality and reliability of the information, the empathy of medical staff and the level of information asymmetry were analysed. In order to achieve this objective, the following research questions were formulated:

1. How do patients assess the quality and forms of medical information in public health care?
2. What information and communication factors determine the evaluation of medical information?
3. Does the quality of medical information reflect the level of trust in health care institutions?

2. Research Methodology

This study used a quantitative approach using the CAWI (Computer-Assisted Web Interviewing) survey technique. The survey tool was developed in-house and included closed-ended, scaled, and cafeteria-style questions on the following key areas: reliability and availability of medical information sources; forms of communication; empathy of medical staff; level of information asymmetry; and overall assessment of the quality of medical information in public health care. Respondents rated each aspect on a five-point Likert scale, ranging from 'very low' to 'very high', with the option to indicate a 'no opinion' response.

The survey was conducted in February-March 2025 on 247 adult patients using public health care services in Poland. The non-random selection was used: 1. purposive (students of the Wrocław University of Economics and Business); 2. convenience (friends of the Author); 3. voluntary (a link to the survey was made available on Facebook and LinkedIn platforms).

For the analysis, synthetic variables were developed, which would be formed as arithmetic averages of the assigned scores for the answers: very low (1); low (2); medium (3); high (4); very high (5); no opinion (0).

1. "Reliability of sources of medical information": assessment of the reliability of various sources of medical information in public health care: general practitioner, nurse, NHF website, information brochures and leaflets, medical telephone helplines, information obtained from the pharmacist, websites of hospitals and clinics, e-registration and patient portals (e.g. Internet Patient Account), social media (e.g. Facebook, LinkedIn, Twitter), online health forums, educational programmes on TV and radio, mobile health monitoring apps, medical articles and research, patient organisations, WHO (World Health Organisation) recommendations.
2. "Reliability of forms of medical information": assessment of the reliability of different forms of medical information in public health care: verbal information from the doctor, verbal information from the nurse, written recommendations after the visit, websites of medical institutions, patient portal (e.g. Internet Patient Account), SMS appointment reminders, telephone medical consultations, information brochures and leaflets, mobile applications for health management, video medical consultations.
3. "Empathy of medical staff": assessment of different aspects of empathy of medical staff: ability to listen to the patient, showing understanding and support, giving sufficient attention to the patient, patience when talking to the patient, politeness and respect when interacting with the patient, giving clear and understandable explanations.

In addition, the following variables were taken for analysis:

1. "Quality and accessibility of medical information" - formed based on the following responses: very low (no access to reliable information) - 1; low (difficult access, unclear information) - 2; medium (partial accessibility, need to search for information by oneself) - 3; high (good educational materials, availability of consultations) - 4; very high (complete transparency, high quality of information) - 5; no opinion - 0.
2. "Level of information asymmetry" denoting the difference in access to information between the doctor and the patient: very low asymmetry (complete transparency of information for the patient) - 5; low asymmetry (patient has access to most information) - 4; medium asymmetry (some information difficult to obtain) - 3; high asymmetry (relevant information is not made available to the patient) - 2; very high asymmetry (patient has minimal knowledge, full domination by the doctor) - 1; I have no opinion - 0.

The survey results, collected in a spreadsheet, were analysed quantitatively using measures of central tendency (mean, median) and variation (standard deviation) to assess the distribution of respondents' answers. Spearman's rank correlation analysis was also conducted to determine the strength and direction of the relationship between the dependent variable - quality and availability of medical information - and information and communication variables such as reliability of sources, forms of communication, staff's empathy and level of information asymmetry. The analysis was complemented by response frequency distributions, which allowed identification of dominant ratings and the degree of variation in patients' opinions. To separate homogeneous groups of respondents, cluster analysis was performed using the k-means method, followed by an assessment of the optimal number of clusters based on the silhouette coefficient. Preliminary interpretation of the results identified significant relationships between the assessment of information quality and communication and information factors, and differences in perceptions of the medical information system within public health care.

A narrative literature review was conducted to set the research issue in the context of the functioning of the health care system, the quality of medical information and its importance for the socio-economic development of the regions. Key words and their combinations were used for the literature search: "medical information", "communication", "regional development", "regional competitiveness", "information management". The following databases were searched (the number of publications in each database is given in brackets): ScienceDirect (5), Taylor and Francis Online (2), Emerald (2), Springer (3).

3. Theoretical framework of the study

Health information refers to the data, knowledge and content related to health, disease, treatment and care used by healthcare professionals, patients and organisations to support decisions and improve health outcomes. It includes both clinical data (such as patient records) and broader health knowledge, and its value depends on how it is collected, processed, communicated and used.

Health information includes the data and knowledge people and systems use to support healthcare decisions, including patient records, clinical guidelines and research findings (Hersh, 2002; Wyatt, Sullivan, 2005). These can be categorised into records maintained by hospitals, personal health records maintained by users and patient-generated health data (Lee et al., 2021). Medical information is not just raw data; it includes processed, contextual and practical knowledge (Hersh, 2002; Wyatt, Sullivan, 2005).

The relevance and usefulness of medical information are closely related to the context in which it is produced and used. Extracting information from its original context for wider use (such as research or administration) requires additional work to ensure that it remains accurate and meaningful (Berg, Goorman, 1999; Gorman, 1995). Doctors and health care professionals rely on medical information to answer complex, contextual questions during patient care, often needing more than facts; narrative and context are important (Gorman, 1995) .

Medical information is essential for clinical decision-making, patient education, research and public health (Hersh, 2002; McCurry et al., 2023; Wyatt, Sullivan, 2005). The development of digital health technologies and the Internet has made medical information more accessible, but has also highlighted the challenges of ensuring quality, equity and comprehensibility for all users (Kubiak, 2018; Landolsi et al., 2023; Lee et al., 2021; McCurry et al., 2023). Ensuring that medical information is reliable, understandable and accessible is critical to patient rights and adequate healthcare (Kubiak, 2018; Lee et al., 2021).

In summary, medical information is a broad term encompassing all healthcare data and knowledge, from patient records to research. Their value depends on context, quality and accessibility, making them crucial for effective, equitable and patient-centred healthcare systems.

Patients in public healthcare settings interact with a variety of sources of medical information, including printed materials, online resources and social media. Overall, patients rate the quality of medical information as variable, with apparent gaps in clarity, completeness and reliability, especially online. The form and presentation of information - such as readability, use of everyday language and inclusion of evidence - significantly affect patient perceptions and usability.

Printed patient information documents in hospitals often meet basic standards (clear purpose, logical order, respectful tone), but often lack quantified risks, balanced perspectives, everyday language, contact details and evidence-based references. Few documents identify authors or funding sources, and none explicitly mention patient participation (Charvet-Berard et al., 2008). Online health information is widely available but generally rated as suboptimal. Few websites receive high-quality ratings, and most lack certification or evidence-based content. Government sources tend to be more reliable than academic or commercial sites (Daraz et al., 2019).

Surveys of patients in Polish hospitals show an almost equal split between opponents (37%) and supporters (36%) of the quality of care and information, with older patients rating the information more positively (Borowska et al., 2023). Patients value clear formats and explanatory messages that improve understanding and attitudes towards quality information. However, the impact of quality information on actual healthcare choices depends on other factors, such as cost and provider choice (Faber et al., 2009). Patients increasingly use social media and rating sites to share and access information on healthcare quality. Although these platforms may reflect objective quality measures, ratings are often based on a small, non-representative sample and are overwhelmingly positive (Lagu, Greaves, 2015; Verhoef et al., 2014).

The quality of information and communication between patients and providers strongly shapes perceptions of the healthcare system as patient-centred. Key factors include patient-centred communication, trust, access to relevant information and patient involvement in care decisions.

Clear, empathetic, and responsive provider communication is consistently associated with higher perceptions of patient-centred care. This includes listening, providing understandable information, involving patients in decision-making and addressing concerns (Asan et al., 2021; Cvetanovska et al., 2023; Czerwinski et al., 2021; Hong, Oh, 2020; Hou, Shim, 2010; Langford et al., 2024; Okamura et al., 2024; Rohimakumullah et al., 2025). Trust is both an outcome and a mediator of effective communication. When patients perceive communication as patient-centred, their trust in providers increases, which in turn improves their overall evaluation of the healthcare system (Asan et al., 2021; Czerwinski et al., 2021; Gaffney, Hamiduzzaman, 2022; Hong, Oh, 2020; Rohimakumullah et al., 2025). Timely, tailored and easy-to-understand medical information helps patients feel more comfortable, better informed and optimistic about their care, directly influencing their perception of patient-centredness (Cvetanovska et al., 2023; Gaffney, Hamiduzzaman, 2022; Rohimakumullah et al., 2025). Patients who feel empowered to participate in their care, through access to medical information, involvement in decision-making and the ability to communicate electronically, report greater satisfaction and a stronger sense of patient-centredness (Cvetanovska et al., 2023; Esmaeilzadeh et al., 2021; Langford et al., 2024).

High-quality medical information can significantly support regional development by increasing public trust and the effectiveness of public institutions, especially in health care. Trust in public institutions is closely linked to the quality, accessibility and delivery of medical information, affecting public satisfaction, health outcomes and regional competitiveness.

Better delivery, timeliness, professionalism, and, especially, the availability of accurate medical information in health services directly increase public satisfaction and trust in local authorities and institutions. This particularly impacts basic services such as health care and education, where better information provision leads to greater citizen trust and satisfaction with regional authorities (Allen-Duck et al., 2017; Lanin, Hermanto, 2018; Shan et al., 2016). Effective communication between healthcare providers and the public, supported by robust information policies, is essential for building trust. Weak information systems and low information literacy levels among professionals and the public are significant barriers. These areas can improve attitudes towards public healthcare institutions and foster a more accountable approach to health (Adjekum et al., 2018). In digital health systems, trust is built through data privacy, ease of use, clear communication and the reputation of service providers. Poor information quality and lack of transparency are significant barriers to trust (Adjekum et al., 2018).

There is a direct causal relationship between the quality of regional health systems (including medical information quality) and regional economic competitiveness. Strong health systems, supported by practical information and communication strategies, enhance regional development and stakeholder engagement (Letunovska et al., 2022). High-quality regional governance, which includes transparent and reliable information provision, increases overall trust among residents, further supporting regional development and effective public service delivery (Lombardo, Ricotta, 2022).

In summary, the quality of medical information and effective communication between healthcare providers and patients lead to higher patient satisfaction, adherence to medical recommendations and use of preventive services. This, in turn, improves the perceived and actual effectiveness of public health institutions (Kruk et al., 2018; Mechanic, 1996; Thom et al., 2004). Indeed, high-quality medical information and effective communication are fundamental to building trust in public institutions and improving their effectiveness. This trust enhances the use and impact of public health services and supports wider regional development by promoting well-being, satisfaction and institutional legitimacy.

4. Results and Discussion

In order to answer the first research question, "How do patients assess the quality and forms of medical information in public health care?", the following descriptive statistics were first determined: arithmetic mean, standard deviation and median for the two synthetic variables and the variable "Quality and accessibility of medical information" (Table 1).

Table 1.
Descriptive statistics for selected variables

Variable	Mean	Median	Standard deviation
Reliability of sources of medical information	3,00	3,00	0,61
Reliability of forms of medical information	3,34	3,36	0,69
Quality and accessibility of medical information	2,88	3,00	0,98

Source: own study based on the results of the CAWI survey.

The statistical analysis results indicate that respondents rate both the reliability of sources of medical information and the form of communication of this information at a moderate level. Average values oscillating around 3.00 indicate that the dominant part of the respondents perceives neither high nor low quality of these elements - an 'average' rating prevails, with a slight indication of greater satisfaction with the form of transmission than with the sources. This may suggest that patients perceive an improvement in how they communicate (e.g., e-services, graphical presentations of information), even if they still have limited trust in the sources (e.g., medical staff, institutional websites). The slightly higher average for the reliability of information communication (3.34) may indicate a positive perception of tools such as patient portals, educational graphics, electronic documentation, or online accessibility that facilitate orientation in the health care system.

The evaluation of the quality and accessibility of medical information also remains in the average range (mean: 2.88; median: 3.00), but it is worth noting the relatively higher standard deviation (0.98). This means that respondents' answers were more varied. Some patients may have assessed the system critically, while others may have assessed it positively, which may be related to their experience, digital skills, and local access to health services.

The conclusions from these results are relevant to the practice of health system management and to the development of patient communication tools. Indeed, the moderate scores indicate the need to strengthen further the credibility of sources (especially doctors, nurses, and the National Health Service), while confirming that investments in the quality and innovation of the message have a relatively positive effect.

Secondly, in the context of the first research question, response frequency distributions (%) were determined for the variable "Quality and accessibility of medical information": 0 - No opinion: 4.45%; 1 - Very low: 2.83%; 2 - Low: 16.19%; 3 - Medium: 55.87%; 4 - High: 17.81%; 5 - Very high: 2,83%. The distribution of respondents' answers shows that a dominant proportion of patients, as many as 55.87%, rate the quality and availability of medical information as medium. This means that more than half of the respondents are moderately satisfied with the information system in public health care. A rating of 'average' can be interpreted as a signal of the simultaneous perception of both positive and problematic aspects of patient communication - e.g., formal access to information while lacking clarity, timeliness, or language adaptation.

Low ratings (1 - very low and 2 - low) were given by 19.02% of patients. This is a significant group that indicates serious deficiencies in the availability and quality of information. This could mean a lack of educational material, difficulty obtaining information about treatment, or limited contact with medical staff. Such results suggest an urgent need to improve not only the information infrastructure but also the staff's communication competence. In contrast, high ratings (4 - and 5 - very high) received 20.64% of indications. Although this is less than a quarter of the total, it represents an important group that sees positive changes and the functioning of effective patient information solutions. It can be assumed that these people use modern information channels (e.g. Internet Patient Account, EDM) or have contact with better-organised facilities. It is also worth noting that 4.45% of respondents answered "I have no opinion", which may indicate a lack of experience with public services, low patient involvement in information, or insufficient data to make an assessment.

In summary, the distribution of responses indicates that the information system in public health care is moderately effective, with a clear margin for improvement. The relatively high proportion of 'average' ratings and the scattered distribution of extreme ratings indicate an uneven patient experience, which may result from regional, organisational and technological variation between facilities.

In the context of answering the second research question: "What information and communication factors determine the evaluation of medical information?", Spearman's rank correlation coefficients (Table 2) were determined.

Table 2.
Correlations with the variable: quality and accessibility of medical information

Variable	Spearman's ρ	Interpretation of the strength of the relationship
Empathy of medical staff	0,298	Moderate positive
Reliability of forms of medical information	0,273	Moderate positive
Level of information asymmetry	0,268	Moderate positive
Reliability of sources of medical information	0,176	Weak positive

Source: own study based on the results of the CAWI survey.

The strongest correlation with rating the quality of medical information is the empathy of medical staff: patients rate the quality of the message higher when they feel listened to and understood. The reliability of medical information forms (e.g. e-services, brochures, websites) also significantly influences quality ratings - the form of communication is as important as its content. Information asymmetry is also important - the more knowledge a patient has access to, the better they rate the quality of information in the system. The reliability of sources has the weakest relationship - it can be taken for granted (doctor = source of knowledge). However, it is not necessarily sufficient to assess the overall quality of the information system.

Secondly, a cluster analysis was performed to distinguish patient clusters in the context of the second research question. Figure 1 illustrates the silhouette coefficients for different numbers of clusters. The values of this measure indicate that the optimal number of clusters for analysing patients' information and communication assessments is three. Based on this, K-means clustering was performed, and a profile for each group was developed (Table 3). Table 4 illustrates the characteristics of the identified clusters.

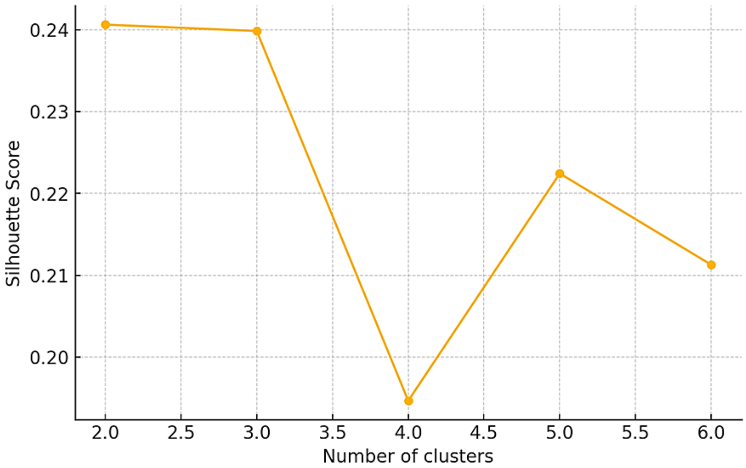

Figure 1. Silhouette coefficient values for different numbers of clusters.

Source: own study based on the results of the CAWI survey.

Table 3.
Profiles of patient clusters based on k-means clustering

Cluster	Reliability of sources of medical information	Reliability of forms of medical information	Empathy of medical staff	Level of information asymmetry	Quality and accessibility of medical information	N
1	3,29	3,70	3,58	3,50	3,39	119
2	2,44	2,63	2,49	2,78	2,68	82
3	3,24	3,65	3,04	1,91	1,91	46

Source: own study based on the results of the CAWI survey.

Table 4.
Characteristics of the three identified clusters

Cluster	Cluster name	Scores for variables	Patient behaviour	Summary	N
1	"Satisfied and well informed"	High scores for all variables	This group of patients feels well informed, has confidence in the system, and the staff show empathy.	High quality of information = high level of trust and communication effectiveness	119
2	"Moderately critical"	Medium or slightly downgraded scores on all indicators	Patients in this group are critical, expressing low trust in information sources and limited empathy, as reflected in lower ratings of the quality of medical information.	Patients may experience communication barriers, despite some access to information.	82

Cont. table 4.

3	"Confused with low accessibility"	High rating of sources and forms, but very low rating of information asymmetry and quality of information	Patients perceive sources and forms as "potentially good", but their real access to the content or understanding of the information is strongly limited.	This situation indicates a significant gap between the potential of systemic information and the patient experience.	46

Source: own study based on the results of the CAWI survey.

The cluster analysis revealed an apparent variation in patients' experiences of information communication in the health care system. The most satisfied patients are those who experience high-quality information, an empathetic staff, and more complete access to medical data simultaneously. In contrast, low empathy and information exclusion are key factors that lower message quality ratings. These results point to the need to adapt information strategies to the diverse needs of audiences to increase communication effectiveness and improve the quality of the patient-health system relationship.

Regarding the third research question "Does the quality of medical information reflect the level of trust in health care institutions?", the analyses to date empirically confirm that the quality of medical information reflects the level of patients' trust in health care institutions - both at the level of individual ratings (correlations) and the group level (clusters). Namely, moderate positive correlations between information quality and empathy ($\rho = 0.298$) and asymmetry ($\rho = 0.268$) indicate a systematic relationship that is independent of the data distribution. The low correlation with source reliability ($\rho = 0.176$) may indicate that patients value the relationship and mode of transmission more than the institutional label of the source itself (e.g., a doctor ≠ is automatically of high quality if there is no contact or empathy).

In cluster analysis, patients with the highest ratings of information quality were the most trusting group: high empathy, low asymmetry, and good forms of communication. In contrast, the 'critical' group rated the system lowest, declared a lack of empathy and limited access to knowledge, reflecting a lack of trust and a sense of information exclusion.

Medical information is not seen solely as a document or a source of knowledge, but as an integral part of the relationship between the patient and health care institutions. Its quality becomes a trusted vehicle - the patient trusts the system when he or she has access to understandable content, can interpret it and feels that his or her information needs are respected. Trust does not take a declarative form; it is revealed indirectly by assessing the usefulness, clarity, and accessibility of the information the system provides.

In summary, the study assessed how patients perceive the quality and forms of medical information in public health care, as well as the factors that influence these perceptions. Most respondents rated the information quality as average, with ratings of the communication forms slightly higher than those of the sources themselves. Moderate positive correlations with empathy, communication, and information asymmetry indicate that information quality is strongly related to the patient's experience in the system. Cluster analysis showed that more satisfied patients have better access to information and feel listened to, while critical groups experience information exclusion. These results confirm that the quality of information reflects the level of trust in health care institutions and can be a factor in building regional competitive advantage.

5. Limitations

The article has several limitations. Firstly, the CAWI survey method used non-random selection, which limits the generalisability of the results to the entire patient population and makes the conclusions relevant only to the analysed group. Secondly, the scope of the analysis was limited to selected information and communication variables, omitting other potentially relevant factors, such as digital competence, educational level, and regional differences. Third, using cluster analysis and synthetic indicators derived from PCA may have simplified the phenomena and lost some interpretative context. Fourthly, the statistical analyses were cross-sectional, which precluded the assessment of changes over time and limited the ability to identify the direction of evolution of the health care information system.

6. Conclusions and Practical Implications

The literature review showed that patients using public healthcare rated the quality of medical information variable, with significant room for improvement in clarity, completeness and evidence-based content. While new forms, such as online resources and social media, are popular, they often lack credibility. The results of our study confirm these observations: patients mostly rate the quality and accessibility of information as average, with staff empathy, the message form, and the level of information asymmetry having a key influence on their perceptions. Improving the patient-healthcare system relationship requires better information tools, competent, attentive staff, and tailored communication. The results indicate that effective health information management, grounded in trust, empathy, and accessibility, can be an important factor in building the region's competitive advantage by increasing public trust and improving the efficiency of public institutions.

Given the above, it is recommended, among other things, to strengthen healthcare professionals' communication competence, develop user-friendly information tools, reduce information asymmetry by improving access to medical data, segment communication to account for patient diversity, and systematically monitor information quality.

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