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ORIGINAL RESEARCH

Digital Health: A Market Survey of Multinational Companies and Lessons From Global Peers

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Abstract

Background: Digital health increasingly influences pharmaceutical research, evidence generation, and patient engagement strategies worldwide. However, the pace and pattern of adoption differ substantially across markets, and few scientific publications examine how pharmaceutical companies incorporate these tools into their operations. Here, the authors evaluate the status of digital health adoption among multinational pharmaceutical companies operating in Brazil and compare these findings with regulatory and market developments in the United States, Europe, and Canada.

Methods: A structured survey was administered to 37 multinational pharmaceutical companies representing approximately 40% of companies operating in Brazil. The questionnaire explored stage of adoption, priority use cases, objectives, governance structures, workforce preparation, perceived barriers, and collaboration patterns. Brazilian findings were compared to international regulatory frameworks and recent industry analyses.

Results: Among respondents, 43% reported scaling digital health initiatives, 16% were piloting or planning projects, 19% were exploring the field, and 5% reported full integration at the enterprise level. The most frequent areas of focus were AI and machine learning (65%), patient engagement platforms (51%), and big-data analytics (49%), whereas telemedicine and electronic health record (EHR) integration (8%) were comparatively underdeveloped. Primary objectives included improving medication adherence (60%), enhancing patient outcomes (51%), and reducing costs (43%). Only 38% of companies reported having a dedicated digital health team, and fewer than half offered formal staff training. Cybersecurity, interoperability, and organizational resistance were the most significant barriers. Collaboration with technology companies, startups, providers, and academic institutions was reported by 77% of respondents.

Conclusions: Multinational pharmaceutical companies in Brazil demonstrate strong interest and activity in AI and data-driven approaches but face limitations related to governance, workforce readiness, interoperability, and regulatory alignment. Addressing these areas may allow Brazilian affiliates to more fully realize near-term opportunities in adherence programs, real-world evidence generation, and decentralized clinical research.

Plain Language Summary

A survey of 37 multinational pharmaceutical companies operating in Brazil assessed the adoption and implementation of digital health technologies. The results reveal that the most commonly reported digital health initiatives included:

- artificial intelligence,
- patient engagement platforms,
- data analytics.

Companies primarily use digital health to improve medication adherence, patient outcomes, and operational efficiency. A review of recent international pharmaceutical industry literature compared with the Brazilian findings was evaluated to compare with global trends in digital health adoption. Cybersecurity, interoperability, workforce capabilities, and governance remain key barriers to broader adoption and scaling.

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The pharmaceutical industry is undergoing gradual but significant transformation driven by digital technologies. Advances in artificial intelligence (AI), real-world data (RWD), connected sensors, and patient-engagement platforms are influencing how companies design clinical studies, generate evidence, monitor safety, and interact with patients and healthcare professionals. These developments are contributing to the expansion of digital biomarkers, clinical-grade evidence, and broader use across therapeutic areas.[1]

In the U.S. Food and Drug Administration (FDA) guidance on digital health technologies (DHTs) for remote data acquisition in clinical investigations has clarified

expectations for validation, data integrity, and monitoring, facilitating the use of decentralized and hybrid trials.[2] Additional guidance addressing software as a medical device and digital endpoints further supports the use of software-driven evidence in clinical development.[3]

In Europe, the *European Medicines Agency* (EMA) initiatives such as DARWIN EU® and the Real-World Evidence (RWE) framework signal sustained regulator-led use of *RWD* to inform benefit–risk decisions, creating a favorable environment for digital technologies and digital therapeutics (DTx).[4]

Canada has documented widespread adoption of digital tools among clinicians and patients, creating an ecosystem where electronic prescribing, virtual care, and data exchange are increasingly routine.[5]

Brazil represents a large and dynamic pharmaceutical market with a strong presence of multinational companies and growing policy attention to digital health, telemedicine, and data protection. The Ministry of Health's Strategic Planning for Digital Health (2020–2028) emphasizes the consolidation of the National Health Data Network (NHDN) and integration of electronic medical records, hospital systems, and telehealth services.

Despite these developments, there is limited scientific literature examining how pharmaceutical companies are adopting digital health in practice, particularly in emerging markets. This study addresses this gap by analyzing a survey of multinational pharmaceutical companies operating in Brazil and comparing these findings with developments in the United States, Europe, and Canada.

Methods

A structured electronic questionnaire containing 22 closed and open-ended questions was distributed to multinational pharmaceutical companies operating in Brazil. Thirty-seven companies submitted valid responses, representing approximately 40% of multinational pharmaceutical affiliates in the country and a substantial proportion of national pharmaceutical revenue. This sample is insufficient to provide meaningful insight into market behavior and investment priorities.

The Questionnaire Explored

1. Stage of digital health adoption (from exploration to full integration)
2. Priority technology areas (AI/machine learning [ML], analytics, DTx, mobile apps, telemedicine, wearables, patient engagement platforms, and electronic health record [her] integration)
3. Organizational objectives (adherence, outcomes, cost reduction, competitive advantage, personalization, compliance)
4. Governance and workforce preparation (existence of dedicated teams and training)
5. Implementation status of digital initiatives
6. Expectations regarding emerging technologies
7. Perceived barriers and their relative severity
8. Patterns of collaboration and partnerships

Responses were analyzed descriptively and expressed as percentages or mean severity scores (scale 1–5).

For analytical purposes, it is important to distinguish between technology enablers and application domains within digital health. In this study, AI and ML were captured as priority areas by respondents. However, AI/ML should be interpreted as a transversal enabling capability rather than a standalone application category. In contrast, items such as patient engagement platforms, telemedicine, EHR integration, and DTx represent functional use cases implemented in real-world clinical, commercial, or operational workflows.

This distinction is relevant for interpreting survey responses, as high prioritization of AI/ML might reflect underlying investments in data-driven capabilities that support multiple application domains, rather than discrete deployment of AI as an independent solution.

To contextualize the Brazilian findings, we compared the results with recent scientific publications, regulatory documents, and industry analyses from the United States, Europe, and Canada (2022–2025). These included reports from IQVIA Technologies, FDA, RWD, European Federation of Pharmaceutical Industries and Associations (EFPIA),

Table 1. Brazil market survey results.

Domain	Variable	Percentage
Adoption Stage		
	Scaling initiatives	43.2
	Pilot projects	16.2
	Formal planning	16.2
	Full enterprise integration	5.4
Focus Areas		
	AI / ML	64.9
	Patient engagement platforms	51.4
	Big data analytics	48.6
	Mobile applications	27.0
	Telemedicine & EHR integration	8.1
	Wearables	2.7
Governance & Workforce		
	High/very high perceived impact	76.7
	Implemented digital projects	56.8
	Training programs available	46.8
	Dedicated digital health team	37.8
Trends & Expectations		
	RWD/RWE analytics interest	83.0
	AI in drug discovery	67.7
	Precision medicine	46.7
	IoMT	36.7
Barriers		
	Privacy & security concerns	66.7
	Organizational resistance	43.3
	Interoperability limitations	40.0
	Unclear ROI	30.0
Collaboration Patterns		
	Active collaboration	46.7
	Planned collaboration	30.0

EHR: electronic health record; AI: artificial intelligence; IoMT: Internet of Medical Things; ML: machine learning; ROI: return on investment; RWD/RWE: real-world data/real-world evidence.

Deloitte, International Society for Pharmaceutical Engineering (ISPE), Healthcare Information and Management Systems Society (HIMSS), Canada Health Infoway, and peer-reviewed studies addressing AI and digital adoption in healthcare and life sciences.

Results: Brazil Market Survey

The results of this survey are presented descriptively and, for better visualization, summarized in Table 1.

Adoption Stage

Most companies are beyond the exploratory phase. While only 5.4% report full enterprise integration, 43.2% indicate that digital health initiatives are already being scaled. An additional 16.2% are piloting projects and another 16.2% are in formal planning. This distribution suggests a market that is actively experimenting and expanding digital initiatives but has not yet fully incorporated them into routine organizational structures.

Focus Areas

The most frequently cited priorities include AI/ML (64.9%), followed by patient-engagement platforms (51.4%) and big-data analytics (48.6%). Mobile applications remain present but secondary (27%). Telemedicine and EHR integration are markedly less developed (8.1%), and wearables remain rare (2.7%).

It should be observed that AI/ML differs conceptually from the other categories reported. While patient engagement platforms, telemedicine, and EHR integration correspond to specific operational use cases, AI/ML functions as a cross-cutting capability that can be embedded within these applications. Therefore, the high frequency of AI/ML prioritization reflects a strategic emphasis on enabling technologies rather than direct deployment in isolated workflows.

Objectives

The primary goals are pragmatic and patient-oriented: improving medication adherence (59.5%), enhancing outcomes (51.4%), reducing costs (43.2%), and gaining competitive advantage (43.2%). Personalization and precision medicine are emerging themes (21.6%). Fewer respondents indicated immediate emphasis on compliance or trial streamlining, suggesting that most efforts are concentrated on medical and commercial value rather than research transformation.

Governance, Workforce, and Implementation

Only 37.8% of companies report having a dedicated digital health team, and 46.8% offer any form of training. Nevertheless, 56.8% have implemented digital projects. Respondents show high optimism regarding the transformative potential of digital health, with 76.7% rating this impact as high or very high.

Trends and Expectations

Respondents expressed strong interest in RWD/RWE analytics (83%), AI in drug discovery (67.7%), precision medicine (46.7%), and the Internet of Medical Things (36.7%). Virtual trials and blockchain technologies attracted less enthusiasm.

Barriers

The most frequently cited obstacles are privacy and security (66.7%), organizational resistance (43.3%), interoperability (40%), and unclear return on investment (30%). When rated by severity, cybersecurity risk (mean 4.0), cultural change (3.8), interoperability (3.77), and budget constraints (3.43) stand out.

Collaboration Patterns

Almost half of respondents (46.7%) are collaborating with external partners, and another 30% plan to do so. Partnerships most commonly involve technology companies and startups, followed by healthcare providers and academia. The primary objectives are access to innovative technologies, skills development, and faster innovation. Risk-sharing partnership models remain uncommon.

International Benchmarks

Canada

Canada Health Infoway surveys demonstrate broad use of EMRs, e-prescribing, virtual care, and data exchange among providers.[5] This connectivity enables pharmaceutical companies to develop adherence programs and RWE collaborations embedded in routine care.[5]

United States

The FDA guidance on DHTs for remote data capture has reduced uncertainty around validation requirements for decentralized trials and digital endpoints.[2,3] Industry analysts also describe rapid AI adoption but persistent gaps in governance and risk management.[6,7]

Compared to this environment, Brazilian companies show similar enthusiasm for AI but fewer structural supports in EHR connectivity and workforce preparation.

Europe

The RWD's DARWIN EU® and RWE frameworks emphasize regulator-led use of RWD4. Reports from EFPIA and industry groups describe increasing partnerships between pharma and digital health ventures, although success depends on governance and strategic alignment.[8–10]

Brazil's interest in AI and RWE is comparable, but limited emphasis on EHR integration and virtual trials reduces opportunities to participate in similar data ecosystems.

Key Points are Summarized as Follows:

1. AI/ML leadership is common across markets; Brazil's 65% focus is consistent with global signals.
2. RWE/RWD capacity is scaling in the U.S./EU (FDA/RWD frameworks); Brazil's enthusiasm (83% trend interest) is encouraging but requires data partnerships and standards to be operational.
3. EHR/telemedicine integration remains a relative gap in Brazil's pharma agenda, unlike U.S./Canada where provider-system connectivity is mainstream.
4. Governance and workforce investments lag in Brazil (dedicated D-H Telehealth teams in 38%; training in 47%), broadly echoing global concerns about standard operating procedures, auditing, and risk management in rapid AI adoption.

5. Security/interoperability is a universal barrier, Brazil's high severity mirrors global cybersecurity concerns in healthcare ecosystems.

Discussion

Brazilian multinationals show clear momentum in digital health adoption: nearly half are scaling initiatives, with AI/ML and patient engagement at the center of these efforts.

This orientation, combined with high optimism, creates practical opportunities for measurable gains in areas such as medication adherence and patient-reported outcomes integrated into medical and commercial activities.

An important interpretative consideration relates to the classification of AI/ML within the survey results. Unlike other reported categories, which correspond to clearly defined operational use cases, AI/ML represents a foundational capability that underpins a wide range of digital health applications. The prominence of AI/ML in the responses therefore signals a strategic orientation toward data-driven transformation but does not necessarily indicate mature or scaled implementation at the application level. This distinction may partly explain the coexistence of high AI prioritization with relatively low adoption of integrated solutions such as telemedicine and EHR-linked workflows.

Important structural and operational limitations, however, still restrict scalability and global alignment. A central weakness is the lack of connection with routine clinical workflows, as only about 8% of companies prioritize telemedicine and EHR integration. This limits the ability to generate pragmatic evidence, automate outcomes capture, and intervene along patient care pathways at scale. In contrast, U.S. and Canadian ecosystems rely on mature EHR and virtual-care infrastructures to support decentralized trials and outcomes-based programs, illustrating the potential of integrated data environments.[5]

At the organizational level, governance and capability remain insufficient. Only 38% of respondents report a dedicated digital health team, and fewer than half offer formal training. Global analyses show that rapid adoption of AI and digital tools without standard operating procedures, audit structures, and clearly defined roles increases operational and compliance risks.[7]

Prior analyses of AI implementation in healthcare have shown that the primary determinants of sustainable value creation are governance maturity, interoperability, and the ability to scale solutions across departments, rather than the novelty of algorithms themselves.[11] Beyond governance structures, evidence from AI implementation in healthcare indicates that the decisive differentiation between organizations that realize sustained value and those that stall lies in their ability to anticipate organizational fitness and economic impact early in the investment cycle. High levels of enthusiasm for AI, when not paired with mechanisms to pre-assess scalability, workflow integration, and operational burden, tend to reinforce a proliferation of pilots that accumulate complexity faster than enterprise value. This dynamic is particularly pronounced in mid-sized organizational units, such as national affiliates, where absorptive capacity is constrained and the margin for corrective iteration is limited.[11]

These challenges are intensified by security and interoperability concerns, identified as some of the most significant barriers. This reflects HIMSS findings that cybersecurity remains a top enterprise risk across healthcare; insufficient investment in these areas can delay or even reverse scaling efforts.[12]

Partnership models also remain immature. Although 77% of organizations collaborate with or plan to collaborate with startups, international experience shows that success rates are low without structured governance, co-development plans, and clear value propositions.[10] Together, these gaps suggest that without targeted investments in governance, interoperability, and evidence infrastructure, Brazil risks falling behind more mature ecosystems despite growing interest in innovation. Sindusfarma's advocacy for the creation of a Health Intelligence Center reflects recognition of the need for coordinated, population-level data strategies.[13]

Brazilian affiliates participating in global programs should align digital health initiatives with FDA and RWD frameworks to reduce barriers to cross-border evidence acceptance (e.g. validation plans for DHT sensors, data integrity pipelines, privacy/security controls, audit trails).[2] Ensuring compatibility with RWD's RWE expectations (e.g. common data models, provenance, and methods transparency) can increase the relevance of Brazilian real-world studies for multinational submissions.[4]

Digital health also presents clear opportunities when aligned with national healthcare priorities. Adherence and persistence programs developed in collaboration with experts, payers, and providers represent immediate possibilities for improving outcomes in chronic diseases with high population impact.

In parallel, AI-enabled analyses in medical affairs, market access, and pharmacovigilance can improve engagement quality, accelerate safety signal detection, and support more efficient resource allocation. Hybrid and virtual clinical trials supported by DHTs might expand recruitment into underserved regions and reduce operational burden on sites, provided that validation, cybersecurity, and data protection standards are carefully observed.[2] RWE partnerships with leading healthcare systems and academic centers can also generate locally relevant data to inform reimbursement and formulary decisions, linking global evidence expectations to Brazilian healthcare realities.

The survey findings and issues discussed here may be relevant for pharmaceutical markets in other countries. Existing publications examining digital innovation in the multinational pharmaceutical industry often focuses on the provision of objective, non-promotional information to healthcare professionals and patients.[14,15]

These studies describe a growing number of companies offering Medical Information Contact Centers and self-service patient websites as engagement channels (e.g. email, websites, live chat, FAQs). Analysis of anonymized data from these sources can reveal educational needs, safety signals, opportunities for device or label improvements, and insights to refine trial design and recruitment.[16]

Experiences from China show that pharmaceutical companies have used social media platforms such as WeChat to deliver digital medicine information services (DMISs) that include public information, professional services, education, and e-commerce activities.[17] The absence of specific legislation

for these services has led countries to explore regulatory adaptations within existing legal frameworks.

Recommendations: A Practical Roadmap for Brazilian Pharma

Brazilian pharmaceutical companies seeking to advance digital health and AI adoption may benefit from coordinated action across governance, data infrastructure, regulatory alignment, workforce preparation, and ecosystem partnerships.

From a governance and operational perspective, one practical step is the establishment of a cross-functional Digital Health Office bringing together medical, clinical, regulatory, pharmacovigilance, IT/security, and commercial representation. For AI and digital health governance, the development of SOPs addressing data governance, human-in-the-loop processes, bias and risk assessment, vendor management, and audit readiness would directly respond to many of the gaps identified in this survey.[7]

Alongside governance, companies should define a structured roadmap for capacity-building in digital health. This should include baseline literacy for medical and commercial leaders and more advanced training for teams involved in digital health, data science, and clinical operations. Partnerships with academic institutions can be particularly useful in supporting this training through joint educational initiatives.

From a data and cybersecurity standpoint, the roadmap should prioritize adoption of interoperability standards, particularly Fast Health Interoperability Resource (FHIFR)-based Application Programming Interfaces (APIs) and standardized terminologies, enabling connection with hospitals, laboratories, and payers. Attention should be given to EHR integration as a means of enabling outcomes captured in both major private networks and the public health system. Security practices should follow a security-by-design philosophy, including zero-trust architecture, third-party risk management, continuous monitoring, and incident-response playbooks.[18] Privacy principles such as data minimization and robust consent management, aligned with Brazil's General Personal Data Protection Law and multinational requirements, are also fundamental components of this framework.

Regarding regulatory alignment and evidence generation, digital initiatives should be designed with global acceptability in mind. For DHT endpoints, companies should establish FDA- and RWD-aligned validation plans addressing accuracy, efficacy, reliability, and clinical meaningfulness, while applying Good Clinical Practice principles to remote data capture and monitoring.[2]

A structured RWE playbook can help define priority use cases such as adherence measurement, treatment pattern analysis, and safety signal detection. This should be supported by common data models and statistical analysis plans consistent with RWD's RWE framework, and by collaboration with leading registries and health systems.[4] In parallel, initiatives involving DTx and digital endpoints should monitor EFPIA discussions on reimbursement and access, with Brazilian pilot projects designed to generate evidence compatible with European and U.S. expectations.[8]

The roadmap also highlights several high-value use cases for immediate attention. These include adherence and patient-support platforms that integrate e-prescribing data, pharmacy dispensing information, and patient-reported outcomes in closed feedback loops. Telemedicine is a particularly important tool to expand access in remote regions, improve follow-up, and support adherence, aligning directly with pharmaceutical objectives related to outcomes and persistence.[13] Other relevant applications include AI-driven risk stratification and behavioral nudges; AI tools in medical affairs and pharmacovigilance for literature monitoring, signal detection, and quality assurance of healthcare provider engagement under clear governance and explainability standards; RWE programs to support market access decisions using claims and EHR data were available; hybrid and virtual trials using FDA-aligned DHTs for remote patient-reported outcomes and physiological data collection integrated with Brazilian research centers[2]; and, in manufacturing contexts, the application of Pharma 4.0 principles guided by ISPE recommendations, particularly where global manufacturing strategies intersect with Brazilian operations.[18]

Finally, sustained progress depends on a deliberate partnership and ecosystem strategy. Given the well-documented low success rate of healthcare startup collaborations, companies should adopt gated governance models (discovery → pilot → scale), milestone-based funding, and explicit IP and data agreements, with a designated partnership lead responsible for both technical and business outcomes.[9] Partnerships with major provider systems and payers are especially important to secure data access and enable outcomes measurement, as demonstrated in Canadian and U.S. experiences with real-world programs.[5] To further align with global developments, Brazilian companies should engage with international digital health organizations such as the IQVIA Institute, EFPIA working groups, and the Digital Medicine Society (DiMe), adopting emerging standards and practical toolkits that strengthen interoperability and evidence credibility.[11]

Study's Limitations

This study is based on a cross-sectional, self-reported survey, and causal conclusions cannot be drawn. Respondents may represent companies with greater interest or activity in digital health. International comparisons rely on heterogeneous data sources, including regulatory publications and industry surveys with different sampling methods. Where possible, multiple sources were triangulated to reduce bias.

Additionally, the survey grouped enabling technologies such as AI/ML alongside application domains, which may introduce interpretative ambiguity. Future studies could benefit from explicitly separating these layers to better capture the maturity of both technological capabilities and their translation into operational use cases.

Conclusions

Multinational pharmaceutical companies in Brazil are progressing beyond early experimentation with digital health and are actively scaling initiatives centered on AI, analytics, and patient engagement. Nonetheless, gaps in governance, workforce preparation, interoperability, and integration with clinical systems limit the full realization of these efforts.

By strengthening organizational structures, improving data integration, aligning with international evidence standards, and developing structured partnerships, Brazilian affiliates can translate current enthusiasm into consistent and measurable value for patients and healthcare systems.

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Application of Ai-Generated Text or Related Technology

Not applicable.

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References

1. IQVIA Institute for Human Data Science. Digital health trends 2024: implications for research and patient care [Internet]. 2024 Dec 12 [cited 2026 Apr 26]. Available from: https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/digital-health-trends-2024
2. U.S. Food and Drug Administration. Digital health technologies for remote data acquisition in clinical investigations: guidance for industry, investigators, and other stakeholders [Internet]. 2024 [cited 2026 Apr 26]. Available from: https://www.fda.gov/media/155022/download
3. U.S. Food and Drug Administration. Guidances with digital health content [Internet]. 2025 [cited 2026 Apr 26]. Available from: https://www.fda.gov/medical-devices/digital-health-center-excellence/guidances-digital-health-content
4. European Medicines Agency. Real-world evidence framework to support EU regulatory decision-making—3rd report [Internet]. 2025 Feb [cited 2026 Apr 26]. Available from: https://www.ema.europa.eu/en/documents/report/real-world-evidence-framework-support-eu-regulatory-decision-making-3rd-report-experience-gained-regulator-led-studies-february-2024-february-2025_en.pdf
5. Canada Health Infoway. 2022 Canadian digital health survey [Internet]. 2022 [cited 2026 Apr 26]. Available from: https://insights.infoway-inforoute.ca/2022-digital-health-survey
6. Deloitte. 2024 outlook for life sciences: AI priorities and governance signals [Internet]. 2023 Dec 5 [cited 2026 Apr 26]. Available from: https://www2.deloitte.com/global/en/insights/industry/life-sciences/life-sciences-industry-outlook.html
7. Arnold & Porter LLP, Axios. Life sciences firms move ahead on AI, with concerns [Internet]. 2024 Nov 14 [cited 2026 Apr 26]. Available from: https://www.axios.com/2024/11/14/life-sciences-ai-governance-concerns
8. European Federation of Pharmaceutical Industries and Associations (EFPIA). Improving access to digital therapeutics in Europe [Internet]. 2023 [cited 2026 Apr 26]. Available from: https://www.efpia.eu/media/636408/improving-access-to-digital-therapeutics-in-europe.pdf
9. Galen Growth, Evaluate. Pharmaceutical digital health innovation index 2024 [Internet]. 2024 [cited 2026 Apr 26]. Available from: https://www.galengrowth.com/product/pharmaceutical-digital-health-innovation-index-2024
10. Research2Guidance. Only 13% of partnerships between startups and healthcare companies are successful [Internet]. 2023 [cited 2026 Apr 26]. Available from: https://research2guidance.com/only-13-of-partnerships-between-startups-and-healthcare-companies-are-successful
11. Keck A, Wolff J, Gretscher P. From potential to proof: how artificial intelligence in healthcare now delivers measurable return on investment—and why many companies risk falling behind. In: A Bohr, K Memarzadeh, editors. Artificial intelligence and machine learning in healthcare. Amsterdam: Elsevier; 2025. p. 197–206.
12. International Society for Pharmaceutical Engineering (ISPE). The 7th ISPE Pharma 4.0™ survey: digital transformation. Pharm Eng [Internet]. 2024;44(5):32–9 [cited 2026 Apr 26]. Available from: https://ispe.org/pharmaceutical-engineering/2024-09/pharma-40-survey-results
13. The impact of telemedicine on the pharmaceutical industry. Telehealth Med Today [Internet]. 2025 [cited 2026 Apr 26]. Available from: https://telehealthandmedicinetoday.com/index.php/journal/article/view/589/
14. Dupuy S, Opincar L, Pandya K, Wnorowsk S, Cuellar M, Riggins J, et al. An update from the benchmark survey of phactMI member companies on providing medical information in the digital space. Ther Innov Regul Sci. 2024;58(1):200–13. https://doi.org/10.1007/s43441-023-00587-1
15. DeLuca MJ, Rai R, Pandya K. Chavez L, Satpute P, Rocco M, et al. Benchmarking medical information services beyond unsolicited requests: a phactMI benchmarking survey. Ther Innov Regul Sci. 2025;59(4):848–58. https://doi.org/10.1007/s43441-025-00787-x
16. Barrias A, Di Lauro E, Dunnett S, Flick F, Smerdka P, Wardle F, et al. European pharmaceutical industry medical information: a role in providing medicine-related information to patients. Pharm Med. 2024;38(5):399–405. https://doi.org/10.1007/s40290-024-00534-x
17. Ge Y, Yao D, Ung COL, Xue Y, Li M, et al. Digital medical information services delivered by pharmaceutical companies via WeChat: qualitative analytical study. J Med Internet Res. 2023;25:e43812. https://doi.org/10.2196/43812
18. Healthcare Information and Management Systems Society (HIMSS). 2023 healthcare cybersecurity survey [Internet]. 2024 Mar 1 [cited 2026 Apr 26]. Available from: https://www.himss.org/resources/2023-healthcare-cybersecurity-survey