Healthcare is one of the major concerns of the American public. It has emerged as a major component of the affordability challenge in the 2026 election, at a time when 85% of the public agrees that the healthcare system needs major structural change. In this issue, we report a new national analysis of how these views are translated into the campaigns of political candidates for House, Senate and Gubernatorial races in the midterm elections.

The ability to collect these data from individual campaign websites has advanced greatly with the advent of AI and AI agents. These data are fascinating in what the candidates find as compelling issues, and as fascinating for what is missing.

The study reviewed 972. The authors found that reproductive health and abortion access was mentioned on 53% of sites, followed by 44% for Medicare, 41% for mental health, and 40% for prescription drug pricing. Only half of sites (51% overall, 73% Democratic, and 28% Republican) mentioned any of the six issues that the authors suggest explicitly concern affordability (drug pricing, insurance premiums, hospital prices and price transparency, surprise billing, medical debt and health care costs in general). Even when these affordability issues were mentioned, the most common message was about drug pricing. Excluding drug pricing, only 33% of sites (43% of Democratic and 22% of Republican) mentioned any of the remaining five affordability issues.

What is missing from the campaign websites is a set of policy ideas that can tackle the top issues identified by voters: affordability and health system structure. Medicare for All is really the only concept that addressed systematic reform of the healthcare system, and this concept has been extensively litigated at the federal and state level. Not only is there concern about the structure of such a program, but there are significant concerns about the financing of such a program, and, as importantly, the capacity for the government to implement and manage such a massive program. The National Health Service in the UK, a potential model of such a system, is in perpetual crisis addressing the needs of a rapidly aging population with limited resources. Of course, creating the fiscal space for an expansion of Federal healthcare spending will be extremely challenging with a $2 trillion deficit.

The dearth of policy ideas to tackle persistent problems such as those confronting healthcare is starting to achieve recognition by the broader policy community.

At Stanford, we are trying to address this gap. We have initiated the RUSH Project-Re-Platform US Healthcare, to tackle seven underlying problems in the healthcare system: primary care, provider productivity, financing structure, administrative costs, rural healthcare, healthcare governance, and healthcare communications. This project is based on the methodology of "Precedents Thinking," developing a systematic search for firms and markets elsewhere that have tackled some or all these core challenges. An effort to use this approach to address the massive administrative costs of the healthcare system was featured in a previous issue of HMPI.

It is beyond time for the health policy community to develop and offer real solutions to the problems of healthcare to the American public. Let's hope that a repeat survey of the candidate platforms for 2028 offers more actionable choices to the public desperate for help.

[1] https://fiscaldata.treasury.gov/datasets/monthly-treasury-statement/summary-of-receipts-outlays-and-the-deficit-surplus-of-the-u-s-government

[2] https://www.nytimes.com/2026/10/16/opinion/affordability-republicans-democrats.html?searchResultPosition=1

[3] Brooke Istvan, Perry Nielsen Jr, Megan Eluhu, Bryan Kozin, Walt Winslow, David Scheinker, Kavita Patel, Kenneth Favaro, Stefanos Zenios, Kevin Schulman. 2024. Applying Precedents Thinking to the Intractable Problem of Transaction Costs in Healthcare. Health Management, Policy and Innovation (HMPI.org). Volume 9, Issue 3.

David Scheinker, Stanford Medicine, Maya Shah, University of Vermont, Anton Backer, Grouper Education, and Kevin Schulman, Stanford Medicine and Stanford Graduate School of Business

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BAHM BUSINESS SCHOOL ALLIANCE FOR HEALTH MANAGEMENT

Support: The Stanford Department of Medicine and the Division of Hospital Medicine

Timeline: Submitted October 16, 2026; accepted after review October 20, 2026.

Cite as: David Scheinker, Maya Shah, Anton Backer, Kevin Schulman. 2026. The Healthcare Policies of the November 2026 Candidates. Health Management, Policy and Innovation (HMPI.org). Volume 11, Issue 3.

Abstract

Background: Most American adults report healthcare as their top affordability concern and support a fundamental redesign or major changes to our healthcare system.

Objective: To analyze and make publicly available the healthcare issues and policy proposals of the candidates in the House, Senate, and gubernatorial races in November 2026.

Methods: For each November 2026 race we identified the top two candidates by probability of victory on Polymarket. From each candidate's official campaign website we coded which healthcare issues were explicitly mentioned and, for those mentioned, the candidate's position (expand, protect, reform, oppose/repeal, or no position), as well as any specific proposals. All sites were initially coded using AI and a sample of 360 coded responses was manually reviewed; we then revised the codebook and recoded all sites with two AI models, each of which audited the other's coding, followed by a second manual review. Mistakes and changes were logged along with a quote from the website to support the finding. We compared results by issue, party, office, state, and by race competitiveness as rated by the Cook Political Report.

Results: We identified 972 readable campaign websites: 100% of Senate slots (70 of 70), 99% of gubernatorial slots (71 of 72), and 96% of House slots (831 of 870). We coded 58 issues: 10 main issues, 27 other predefined issues, and 21 issues that did not fit into these

categories and were added by coders. Among the 965 Democratic and Republican sites, reproductive health and abortion access was mentioned on 53% of sites, followed by Medicare on 44%, mental health on 41%, and prescription drug pricing on 40%. Only half of sites (51% overall, 73% Democratic, and 28% Republican) mentioned any of the six issues that explicitly concern affordability: drug pricing, insurance premiums, hospital prices and price transparency, surprise billing, medical debt and health care costs in general.

The median number of issues mentioned on Democratic and Republican candidate sites was, respectively, 8 and 2 overall, 8 and 2 in House races, 10 and 2 in Senate races, and 10 and 3 in gubernatorial races. In competitive races, Republican candidates mention mental health, drug pricing, Medicare, and food and nutrition more often and reproductive health and abortion access less often, while Democratic candidates mention cost and access issues more often and universal coverage less often. The data and interactive tools are freely available online.

Discussion: A systematic analysis of the healthcare policy positions stated on 972 campaign websites for the November 2026 election reveals significant differences in the frequency with which healthcare is mentioned between political parties, in more competitive races, and between issues that do and do not explicitly address affordability.

Introduction

Recent polls show that healthcare costs are a top affordability concern for American adults and that a large majority of adults, 90% of Democrats and 75% of Republicans, support a fundamental redesign or major changes to our healthcare system.1

Across states, political parties, and different types of office, politicians and constituents hold different views on healthcare policies and support different proposals. Various stakeholders such as patients, physicians, nurses, veterans, employers, and industry groups could potentially

benefit from access to data on how their representatives' views align with their own. There is no systematic, openly available database and analysis of these views.

We sought to create the first systematic, openly available database and analysis of the healthcare policies and proposals of the leading candidates in the November 2026 elections and beyond.

Methods

Data

We considered up to two candidates for every November 2026 election for the U.S. House (435 seats), U.S. Senate (35 seats) and governor (36 seats), a total of 1,012 candidate slots (870 House, 70 Senate, 72 governor). For each race we identified the two candidates with the highest probability of victory on Polymarket as of Monday, October 12, 2026. Races where the nominee has not yet been determined (Louisiana's November 3 all-party primaries for House races) were marked as placeholders. Campaign website URLs were identified from FEC filings, Ballotpedia, and a Google search for the candidate's name, office, and the term "official campaign site." Only campaign sites were used. Documents hosted or linked by the campaign as part of its platform were included; news coverage, official government pages and social media were not.

Issues

In a preliminary analysis, Claude was used to identify and code every healthcare issue explicitly mentioned on every website. Based on a review of the initial coding data, we conducted a secondary analysis in which Claude examined the 100 sites that listed the most healthcare issues and a random sample of 100 sites. From this we predefined 37 issues with a standard coding approach: 10 main issues (reproductive health and abortion access, Medicare, mental health, drug pricing, veterans' health, substance use, Medicaid, the Affordable Care Act, food and nutrition, and universal coverage), coded for every site, and 27 other predefined issues, recorded when a site named them (Supplement 1). Coders added a new label when a site named a health topic that fit none of the 37 pre-defined issues; this produced 167 free-text labels, which were consolidated into 21 additional issues, for a total of 58 (Supplement 1).

For each candidate and issue, coders recorded whether the issue was explicitly mentioned (yes, no, unclear) and, if mentioned, the candidate's position: expand or support; protect the existing program or oppose cuts; reform how it works; oppose, restrict or repeal; or mentioned without a position. For example, Medicare for All and Medicare expansion were coded as "Medicare" under the policy proposal to "expand" and non-Medicare single-payer and universal healthcare coverage proposals were coded as "Universal Coverage." Explicit opposition to Medicare for All, single-payer, "government-run," or "socialized" medicine was coded as opposing Medicare expansion or opposing Universal Coverage, depending on context (Code definitions in Supplement 1). Coders recorded a quote of at most 15 words and the page URL for every mention, and one row for each additional health topic the site named.

Coding

In the primary analysis, after the issues and codes had been determined, coders (Claude and ChatGPT) read each site's home page and every issues, priorities, or platform page and sub-page. Claude Sonnet 5.5 coded all Senate and gubernatorial sites and 610 House sites; ChatGPT Sol 6.1 coded 231 House sites. Sites that blocked automated access were read through a browser.

Verification

After the preliminary analysis of all sites by Claude Sonnet 5.5, 360 coded responses were manually reviewed against the sites.

After the primary analysis, each model audited the other. Claude re-read all 231 ChatGPT-coded sites and agreed with 93.1% of 2,640 coded rows; the 183 disagreements, mainly mentions missed because only the home page had been read, were corrected with a logged quotation. ChatGPT re-read 419 Claude-coded House sites and proposed coding changes to 65 of 5,206 rows (1.2%), of which 57 were accepted after checking the saved page text. All change logs are available online.

After the model-based auditing, 186 coded responses for 16 House candidates were manually reviewed against the sites.

Analysis

We report the share of candidates mentioning each issue overall and by party, office and state, the distribution of positions among candidates who mention an issue, and the number of issues per candidate. Analyses were conducted with R and Python.

Results

Coverage

We identified 972 readable campaign websites: 70 of 70 Senate slots (31 D, 35 R, 4 I), 71 of 72 gubernatorial slots (35 D, 35 R, 1 I; the Wyoming Republican has no website), and 831 of 870 House slots (426 D, 403 R, 2 I). The 39 House slots without a coded site were 19 with no identified nominee (including Louisiana's 5th and 6th districts, described below), 10 Republican candidates for whom no campaign website was found, and 10 slots in 5 districts not yet included in the data.

Two Louisiana House districts (the 5th and 6th) have no candidates in the analysis set. After the Supreme Court's 2026 ruling in *Louisiana v. Callais*, the state redrew its congressional map and moved all House races to an all-party primary on November 3, with a December 12 runoff between the top two finishers. After the general-election candidates are chosen, their policies will be added to the ongoing analysis on the website.

There were 7 independents with a readable site: 4 Senate, 1 governor, and 2 House candidates (Supplement Figure 1) and they were omitted from the subsequent analyses comparing the frequencies of the issues and positions mentioned by Democrats and Republicans. Unless stated otherwise, percentages are of the 965 Democratic and Republican candidates with a readable site (492 D, 473 R).

Verification

In the first manual verification of 360 coded responses, manual review flagged 43 responses; after adjudication against our coding rules, 28 (7.8%) were deemed errors, 25 of which were mentions the model had failed to find on the site and 3 of which were incorrectly coded positions. In the second manual verification, after Claude and ChatGPT had each audited the

other's work, manual review flagged 17 of 186 coded responses; after adjudication, 12 (6.5%) were deemed errors, 8 of which were associated with content that required a secondary action such as downloading a policy document or opening a drop-down menu.

Issues mentioned by office, party, and state

Overall, 89% of sites mentioned at least one health topic. Reproductive health and abortion access was the most common issue, mentioned on 53% of sites, followed by Medicare (44%), mental health (41%), drug pricing (40%), veterans' health (36%), Medicaid (33%), the Affordable Care Act (ACA) (29%), universal coverage (23%), food and nutrition (22%), substance use (21%), and any other issue (72%) (Figure 1).

The relative frequency with which issues were discussed was similar across offices, with a few exceptions. Gubernatorial candidates mentioned mental health (60%), substance use (36%), and food and nutrition (36%) more often than House or Senate candidates, and mentioned Medicare (10%) and the ACA (19%) less often. No Republican gubernatorial site mentioned Medicare, the ACA, or universal coverage (Figure 1).

Figure 1

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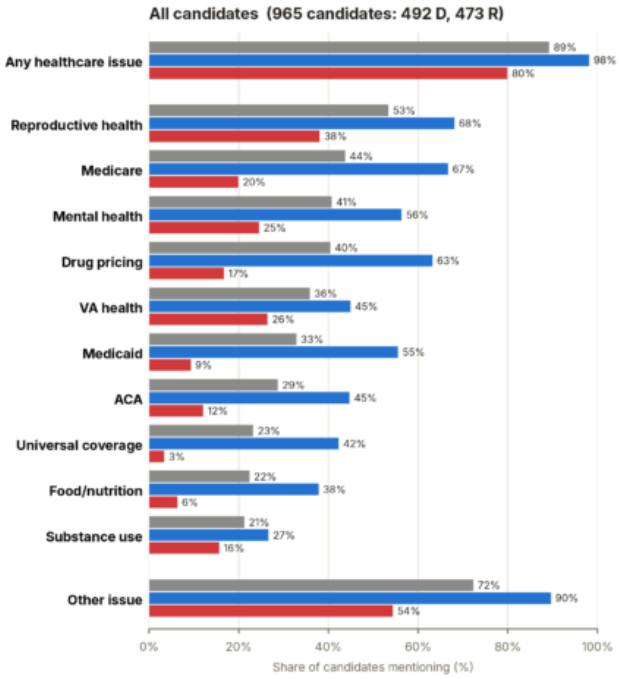
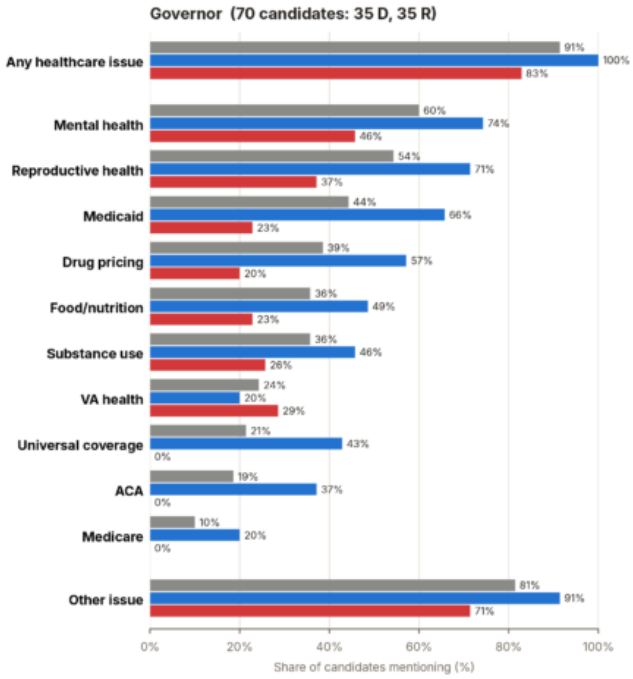
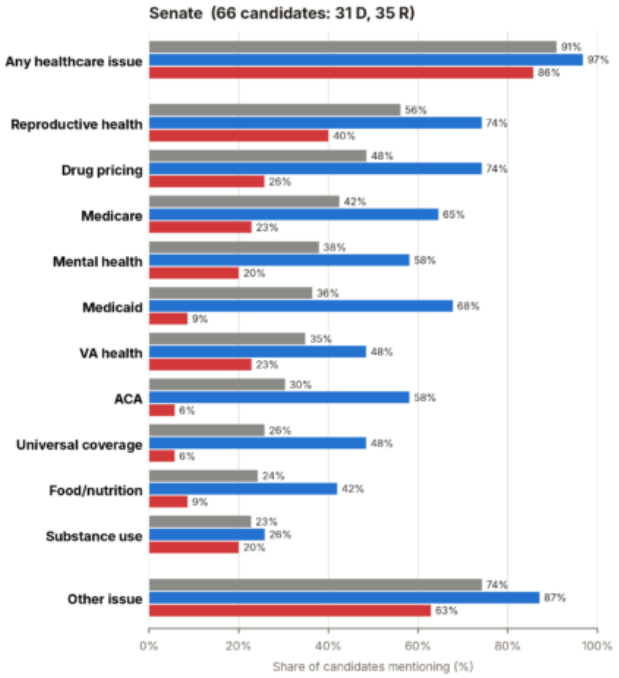
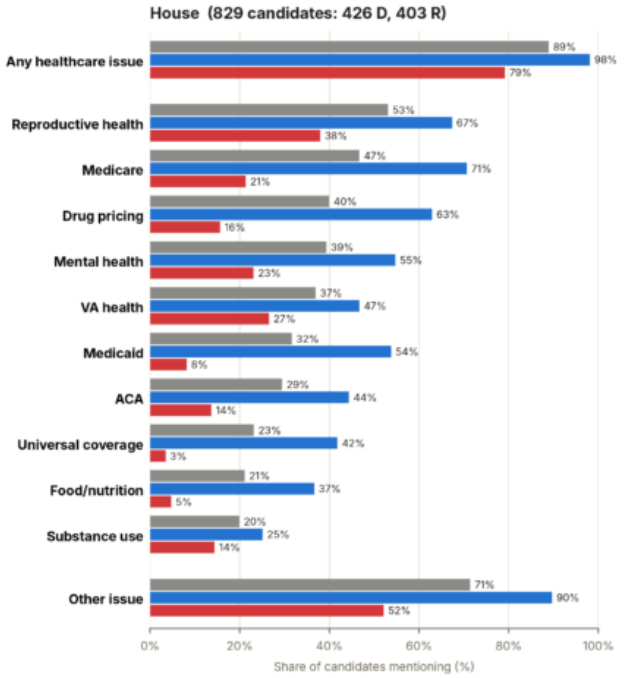








All candidates Democrats Republicans

Among other healthcare issues, rural hospitals and rural access were the most common (25%), followed by insurance premiums (20%), the healthcare workforce (15%), paid family and medical leave (13%), long-term and home care (12%), public health (11%), hospital price transparency (11%), medical research (10%) and market-based reforms such as health savings accounts (10%) (Supplement Figures 2,3).

Democratic candidate sites mentioned each of the top-10 issues more often than Republican candidate sites overall and, with one exception, within governor, Senate, and House races; the one exception was veterans' health among gubernatorial candidates, mentioned by 10 Republicans and 7 Democrats (Figure 1). Among other issues, Republican candidate sites mentioned market-based reforms (20% vs 1%) and price transparency (13% vs 8%) more often and Democratic candidate sites mentioned rural hospitals (40% vs 10%), paid leave (24% vs 1%) and long-term care (22% vs 3%) more often (Supplement Figures 2,3).

Reproductive health and abortion access was the most-mentioned issue in 33 states, Medicare in 6 (Colorado, Florida, Hawaii, Maine, New Hampshire, Pennsylvania), mental health in 5 (Alaska, California, New Jersey, New Mexico, Oregon), drug pricing in 5 (Connecticut, Massachusetts, Minnesota, Nevada, Washington) and universal coverage in 1 (Montana).

Affordability issues

Six of the coded issues explicitly concern the cost of care to patients or payers: drug pricing, insurance costs and premiums, hospital prices and price transparency, surprise billing, medical debt relief, and health care costs in general. Drug pricing was mentioned on 40% of sites, insurance premiums on 20%, price transparency on 11%, surprise billing on 6%, and medical debt relief and general affordability on 4%. Any of the six was mentioned on 51% of sites (493 of 963): 73% of Democratic and 28% of Republican sites, and 51% of House, 53% of Senate, and 50% of gubernatorial candidate sites. Excluding drug pricing, 33% of sites (43% of Democratic and 22% of Republican) mentioned any of the remaining five.

Candidate positions on issues

Among candidate sites that mentioned one of the top-10 issues, the positions taken differed across and within parties.

For reproductive health and abortion access, 96% of Democrats would protect or expand abortion access while 89% of Republicans would restrict abortion access. For the ACA, 78% of Democrats would protect it or restore its premium subsidies while 47% of Republicans would repeal it, 23% of Republicans would reform or replace it, and 23% would protect it. For Medicaid, 71% of Democrats would protect it from cuts and 25% expand it while 58% of Republicans proposed work requirements, fraud enforcement or other reforms and 23% would protect it.

On Medicare, 55% of Democrats proposed expansion (Medicare for All, a lower eligibility age or added benefits) and 41% protection, while 68% of Republicans proposed protecting the existing program and 9% opposed expansion. On food and nutrition, 53% of Democrats would expand and 40% protect the Supplemental Nutrition Assistance Program (SNAP), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and school meals while 70% of Republicans proposed reforms such as work requirements or restrictions on eligible foods (Figure 2).

For drug pricing, 96% of Democrats and 95% of Republicans proposed reforms to lower drug prices. For mental health, 94% of Democrats and 82% of Republicans would expand services. For substance use, 82% of Democrats and 73% of Republicans would expand treatment or prevention. On veterans' health, 81% of Democrats and 62% of Republicans would expand or fund VA care, and 32% of Republicans proposed reforms such as community care choice (Figure 2).

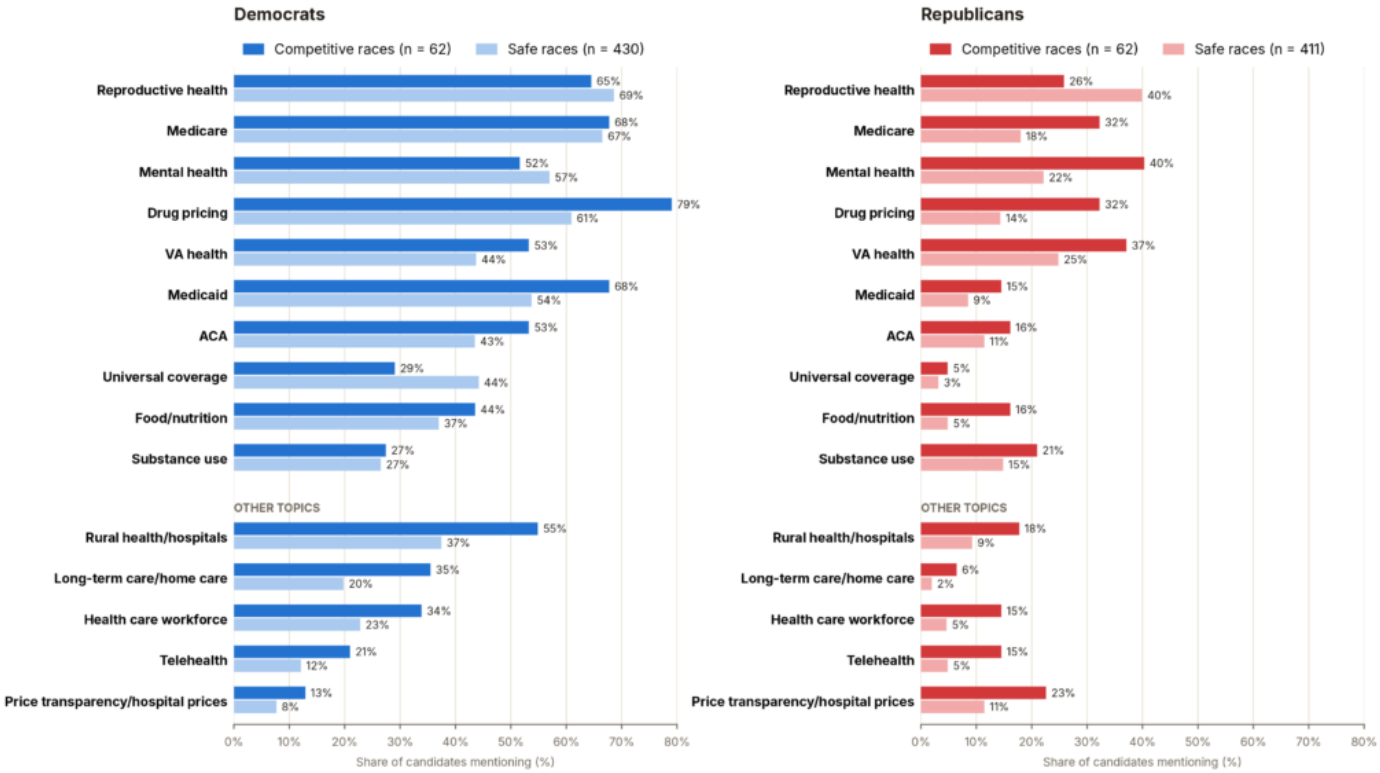
Figure 2

Issues mentioned in competitive races

In competitive races, those rated Toss Up or Lean by the Cook Political Report in early October 2026, there were 62 Democrats and 62 Republicans with a readable site and 430 Democrats and 409 Republicans in safe races, rated Likely or Solid by the Cook Political Report. The websites of Democrats and Republicans in competitive races mentioned more of the top-10 issues, an increase from an average of 5.0 to 5.4 for Democrats and an increase from an average of 1.6 to 2.4 for Republicans.

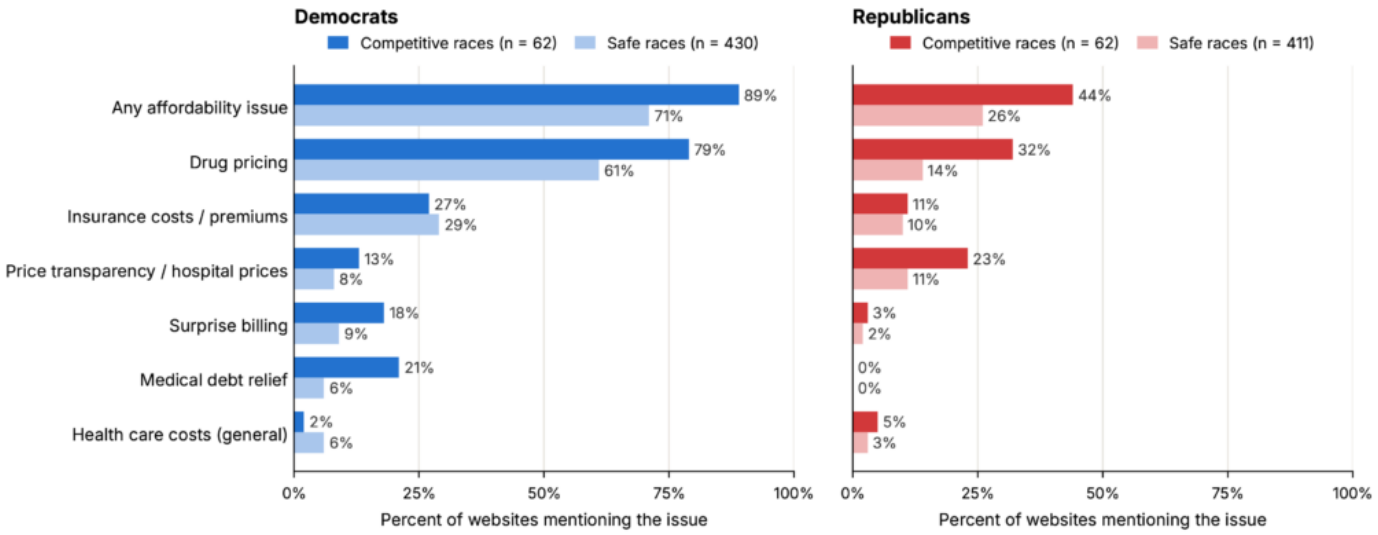
Republican candidate websites in competitive races mentioned mental health, drug pricing, Medicare, and food and nutrition more often than in safe races, and they mentioned reproductive health less often. Democratic candidate websites mentioned cost and access issues more often in competitive races and mentioned universal coverage less often (Figure 3).

Figure 3



Candidates in competitive races mentioned an affordability issue more often than those in safe races: 89% versus 71% of Democrats and 44% versus 26% of Republicans (Figure 4).

Figure 4



Policy proposals

Among the 335 Democratic websites that mentioned reproductive health and abortion access, 78% proposed protecting or restoring abortion access, and among the 178 Republican websites that mentioned it, 88% proposed restricting abortion access. The most common proposal on Medicare was to protect the program, oppose cuts or keep it solvent; this was mentioned by 58% of Democratic and 75% of Republican websites. On Medicaid, 60% of Democratic candidate websites that mentioned it proposed opposing cuts, and on the ACA, 55% proposed extending premium tax credits. On drug pricing, the most common Democratic proposals were Medicare drug price negotiation (43%) and capping insulin or out-of-pocket costs (38%). The most common Republican proposals were reining in pharmacy benefit managers (31%) and taking on pharmaceutical companies (29%) (Figure 5).

Proposals on reproductive health and abortion access and the ACA differed most between parties. No Democratic website proposed restricting abortion or repealing the ACA, while 88% of Republican websites that mentioned reproductive health proposed restricting abortion and 54% of those that mentioned the ACA proposed repealing or replacing it. Protecting or restoring abortion rights was proposed by 78% of Democratic websites and 1% of Republican websites. Extending premium tax credits was mentioned by 55% of Democratic and 7% of Republican websites. On Medicaid, 60% of Democratic and 16% of Republican websites opposed cuts, while

49% of Republican and 2% of Democratic websites proposed fighting fraud, waste or ineligible enrollment. Medicare for All or a single-payer system was proposed by 30% of Democratic and 0% of Republican websites while 9% of Republican websites opposed it. On drug pricing, Medicare drug price negotiation was proposed by 43% of Democratic and 6% of Republican websites (Figure 5).

Figure 5

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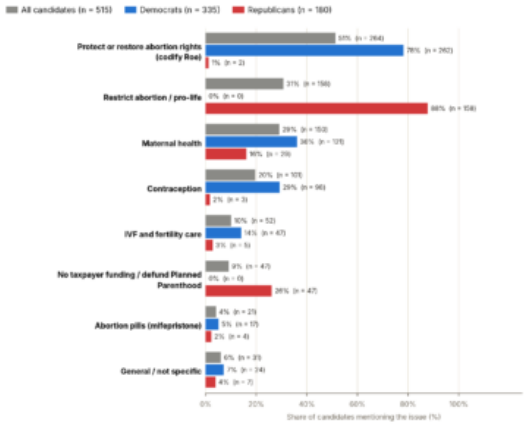
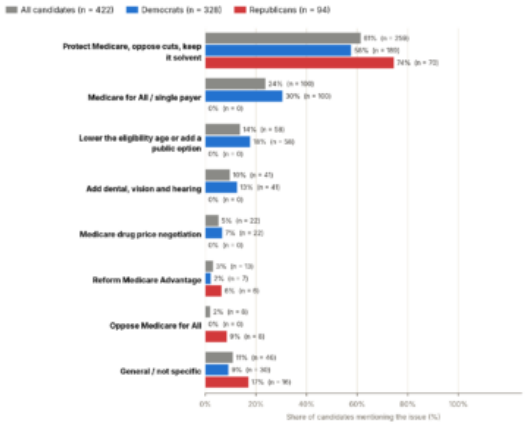
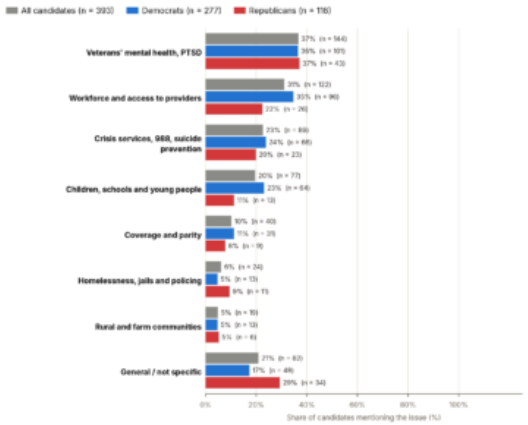
Reproductive health



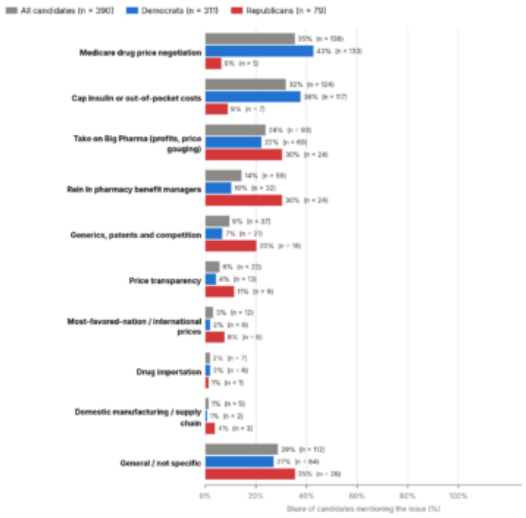
Medicare



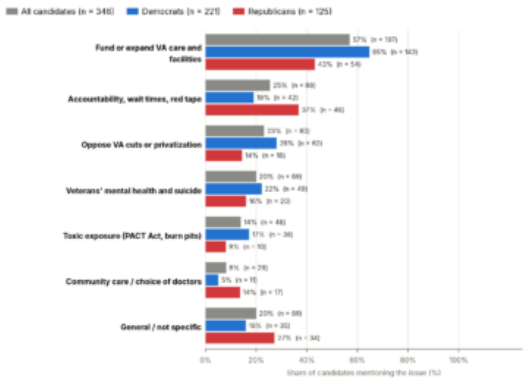
Mental health



Drug pricing



VA health



Proposals on substance use and mental health were the most similar between parties. On substance use, treatment and recovery was the most common proposal, made by 64% of Democratic and 56% of Republican websites that mentioned the issue. The largest difference was fentanyl enforcement, border security, or trafficking, which was proposed by 22% of Republican and 2% of Democratic websites. On mental health, veterans' mental health and PTSD was proposed by 36% of Democratic and 38% of Republican websites. Crisis services, 988 and suicide prevention were proposed by 24% of Democratic and 20% of Republican websites. Rural and farm communities were mentioned as a policy by 5% of the sites for each party. For food and nutrition, 37% of Democratic and 45% of Republican websites proposed school meal programs. Of the websites that discussed universal coverage separately from Medicare for All, 82% of Democratic websites supported a universal coverage program as did 69% (11 of 16) of Republican websites (Figure 6).

Proposals on substance use and mental health were the most similar between parties. On substance use, treatment and recovery was the most common proposal, made by 64% of Democratic and 56% of Republican websites that mentioned the issue. The largest difference was fentanyl enforcement, border security, or trafficking, which was proposed by 22% of Republican and 2% of Democratic websites. On mental health, veterans' mental health and PTSD was proposed by 36% of Democratic and 38% of Republican websites. Crisis services, 988 and suicide prevention were proposed by 24% of Democratic and 20% of Republican websites. Rural and farm communities were mentioned as a policy by 5% of the sites for each party. For food and nutrition, 37% of Democratic and 45% of Republican websites proposed school meal programs. Of the websites that discussed universal coverage separately from Medicare for All, 82% of Democratic websites supported a universal coverage program as did 69% (11 of 16) of Republican websites (Figure 6).

Figure 6

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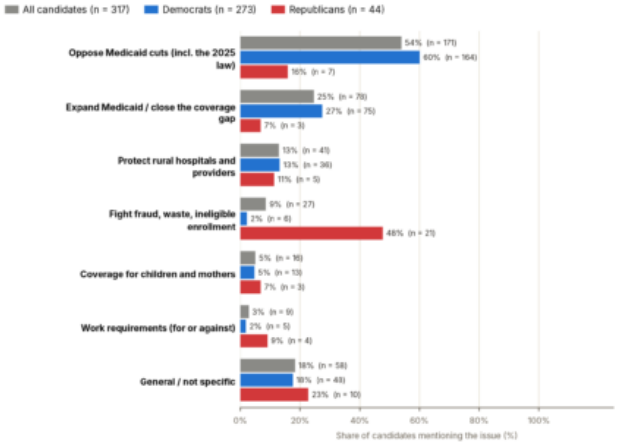
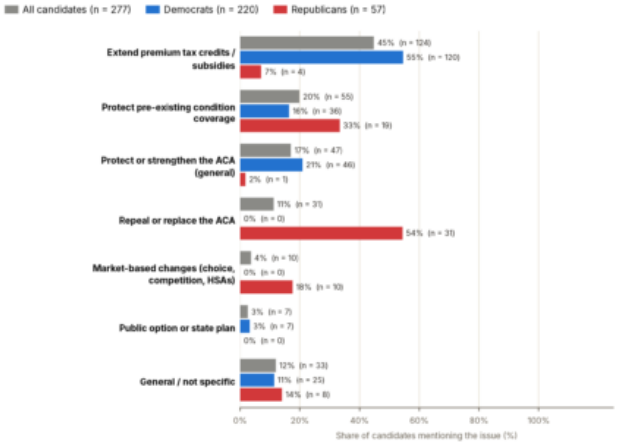
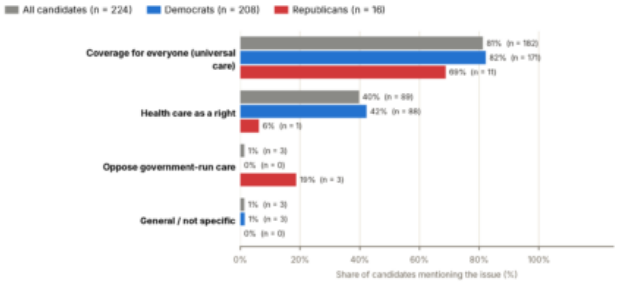
Medicaid



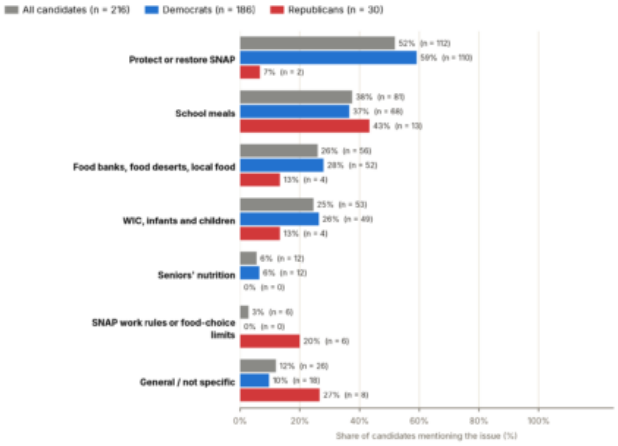
ACA



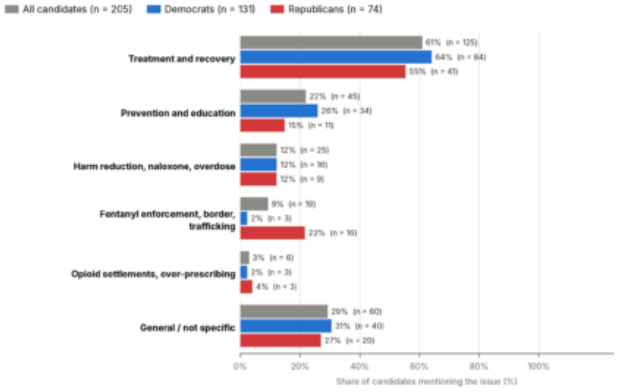
Universal coverage



Food/nutrition



Substance use



Further analyses and detailed data

The list of candidates, their campaign website URLs, the quotes based on which we coded their position on each issue, and their policy proposal are available as raw data for download and through the features of an interactive website healthcarepolicies.org, which will be maintained and updated for this and future elections.

Discussion

By analyzing the campaign websites of 972 of the top-two candidates for the House, Senate and governor in November 2026, we identified the healthcare issues most commonly discussed and how the frequency of their mention, candidate views, and candidate proposals differ across states, office, and political party.

On issues that have been litigated in prior campaigns, such as abortion access and the ACA, positions were consistent within each party and opposed between the parties.

Beyond these issues, we were able to assess how candidates responded to concerns of likely voters regarding health care affordability and concerns over the healthcare system more broadly. While a few candidates have advanced their campaigns with their own policy proposals,[2] most rely on policy proposals advanced by others.

There was a strikingly narrow range of policies proposed and discussed to address public concerns about healthcare affordability and the structure of the healthcare system. Outside of drug pricing, only a minority of candidates of both parties attempted to address healthcare affordability concerns. The most frequent response to these issues was a subset of campaigns that supported either a single-payer proposal or addressed ACA subsidies.

Single-payer proposals were advanced in the 2020 presidential campaign[3] and at the state level.[4] However, these plans have not advanced over concerns about costs, feasibility, governance, and potential disruption to the healthcare delivery system.

Limitations

Campaign websites are one channel, and candidates with sparse websites may campaign on healthcare elsewhere. Coding was performed by large language models and only a small subset of coded findings was manually reviewed. Cross-model audits agreed on 93% of rows and nearly all spot checks of the quotes provided to justify model conclusions found the quoted text on the site. Positions were coded from text alone and as a single position per issue; candidates who, for example, oppose Medicare for All while pledging to protect Medicare were coded once.

Models may have a higher chance of missing information mentioned only in a downloadable policy document, a drop-down menu, or in another format that requires an additional dedicated action; ongoing revisions of the search approach aim to reduce such omissions. All errors identified in manual review were mentions the models had missed rather than misread positions, and they occurred on the sites of candidates of both parties; none suggest bias by issue, race, or political party. Sites change during a campaign; coding reflects the sites as read in October 2026.

Conclusion

Almost every candidate for the November 2026 elections mentions healthcare on their campaign website, but Democrats and Republicans differ in the number of issues they discuss and their policies on the issues, with a few areas of agreement including drug pricing, mental health, and substance use. There appears to be a significant need for novel policy proposals that can bridge the gap between the concerns of the electorate focused on affordability and significant reform and the limited menu of policy responses proposed by political candidates.

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Supplement

Supplement 1. Issues coded

Ten main issues were coded for every site, in the order below. An issue was coded as mentioned (Yes) when the site addressed the content in the second column; the third column gives content that was not counted as that issue. Definitions are reproduced from the project codebook (healthcarepolicies.org, Data page).

#	Issue	Code Yes when the site addresses	Not this issue
1	Reproductive health	abortion (either direction), Roe/Dobbs, contraception, IVF, maternal health, Planned Parenthood	a pro-life group rating with no statement → Unclear
2	Mental health	mental health care/services, behavioral health, suicide prevention, 988, veterans' mental health	substance use alone (→ #4)
3	Drug pricing	prescription drug prices/costs, Medicare drug negotiation, insulin caps, importation, Big Pharma pricing, pharmacy benefit managers (PBMs)	generic "lower costs" with no drug or health specifics → No
4	Substance use	opioids, fentanyl (as addiction/overdose), addiction treatment/recovery, overdose prevention, drug abuse	fentanyl only as border/law enforcement with no health framing → Unclear
5	Medicare	Medicare for All, lowering the age, adding dental/vision/hearing, a public option, protecting or strengthening Medicare, opposing Medicare cuts, Medicare Advantage	Medicare fraud only → Unclear
6	VA health	veterans' health care, the VA health system, community care, PACT Act / toxic exposure, veterans' mental health (also code #2)	veterans' benefits/jobs with no health care → No
7	ACA	Affordable Care Act/Obamacare, marketplace, premium tax credits/subsidies, pre-existing conditions, repeal	
8	Food/nutrition	SNAP/food stamps, WIC, school meals, food insecurity/hunger, nutrition	MAHA or "healthy food" with no program or policy → Unclear
9	Medicaid	expansion, cuts, work requirements, the 2025 reconciliation-bill changes, protecting Medicaid (incl. state names: Medi-Cal, BadgerCare, TennCare…)	
10	Universal coverage	health care as a right, universal coverage, "health care for all", coverage for every American, not framed as Medicare for All	if framed as Medicare for All/single-payer → code #5 instead

Twenty-seven other issues were pre-defined and recorded, with the same position categories, whenever a site named them: Rural health/hospitals; Public health/pandemics; Health care workforce; Price transparency/hospital prices; Medical research/NIH/cancer; Insurance costs/premiums; Consolidation/antitrust; Prior authorization/claim denials; Medical debt relief; Surprise billing; AI in health care; Telehealth; Disability services; Long-term care/home care; Child health; LGBTQ/gender-affirming care; Community health centers; Health care fraud/waste; Women's health (non-reproductive); Dental/vision/hearing (outside Medicare); Vaccines/medical freedom; MAHA/chronic disease; Free-market/choice reforms (HSAs, competition); Cannabis; Gun violence as public health; Paid family/medical leave; Tribal/IHS health.

Coders added a new label when a site named a health topic that fit none of the 37 pre-defined issues. This produced 21 additional issues: Environmental health; Health care costs/affordability (general); Health system/payment reform (general); Preventive/primary care; Health equity/disparities; Drug supply/FDA/alternative medicine; Health IT/data privacy; Hospital funding/closures; Emergency services/hospital access; Occupational/first-responder health; Immigrant health care; Malpractice/tort reform; Other health topics (rare); Military health/TRICARE; Parental rights/consent in minors' care; End-of-life care; Global health/HIV; Experimental treatment access; Health care transparency; Insurance plan transparency; Site-neutral payments. In total, 58 issues were coded.

Coding instructions

Detailed instructions for how the coding was completed are available in the project codebook (version 2) as published on healthcarepolicies.org. They were given to every coder, model or human.

Supplement Figure 1: The seven independent candidates with a readable campaign website, the race for each, the main issues each mentions with the position taken, and the other issues each mentions

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Support or expand | Protect, oppose cuts | Reform | Oppose or repeal | No position

Candidate and race	Reproductive health	Mental health	Drug pricing	Substance use	Medicare	VA health	ACA	Food/ nutrition	Medicaid	Universal coverage	Other issues mentioned (position)
Todd Achilles Idaho, Senate	Support	Support	Reform			Support	Protect				Insurance costs/premiums (reform); Price transparency/hospital prices (reform); Consolidation/antitrust (reform); Surprise billing (reform)
Seth Bodnar Montana, Senate	Support	Support	Reform		Protect	Support	Protect		Protect	Support	Rural health/hospitals (protect); Long-term care/home care (protect); Price transparency/hospital prices (reform); Telehealth (support); Prior authorization/claim denials (reform); Surprise billing (reform); Tribal/IHS health (support)
Dan Osborn Nebraska, Senate	Support	Protect	Reform		Protect	Protect			Protect		Rural health/hospitals (protect); Long-term care/home care (support); Consolidation/antitrust (reform); Cannabis (support)
Brian Bengs South Dakota, Senate	Protect		No position		Protect	Protect	No position				Insurance costs/premiums (reform); Consolidation/antitrust (reform); Tribal/IHS health (support)
Ken Block Rhode Island, Governor	No position										none
Bill Hill Alaska, House, at-large	Support	Support	Reform	Support			Protect	Support	Support		Insurance costs/premiums (reform); Occupational/first-responder health (support)
Kevin Kiley California, House, District 6					Protect						none

These seven candidates are excluded from all comparisons of Democrats and Republicans in the main text.

Supplement Figure 2: The percent of all, Democratic and Republican candidate websites mentioning each healthcare issue overall and in governor and Senate races

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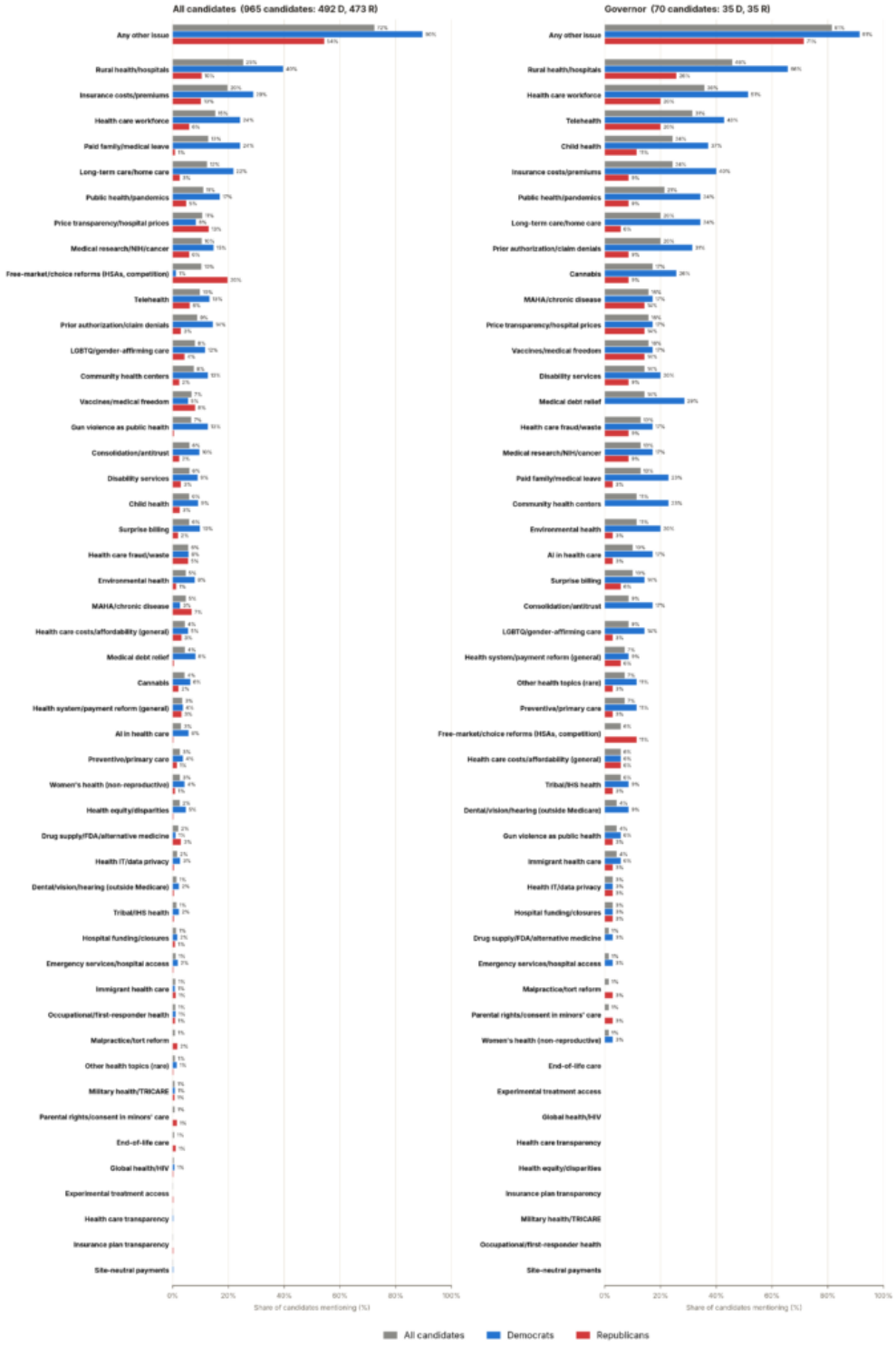

Supplement Figure 3: The percent of all, Democratic, and Republican candidate websites mentioning each healthcare issue in Senate and House races

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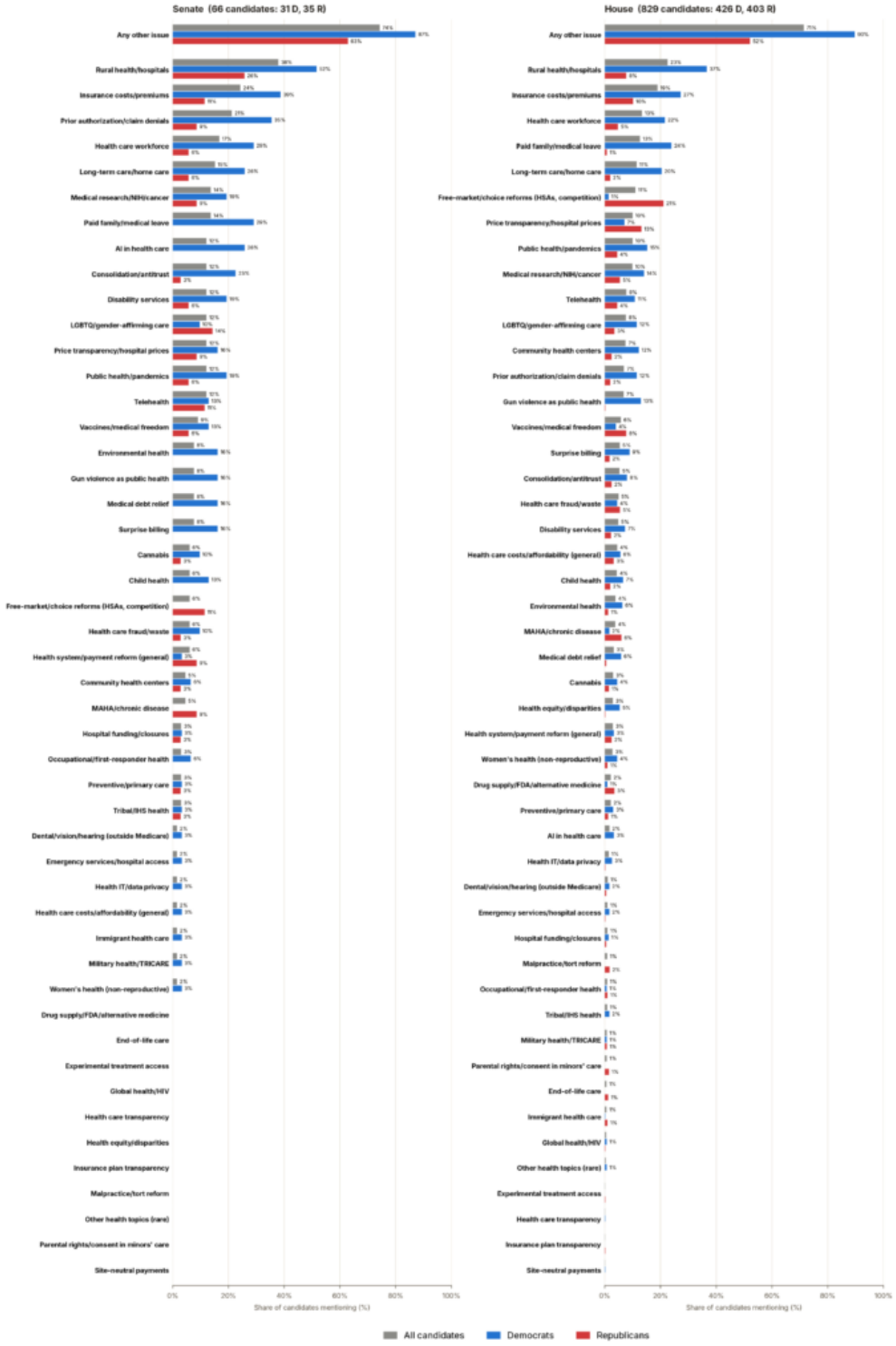

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BAHM BUSINESS SCHOOL ALLIANCE FOR HEALTH MANAGEMENT

Becca Nelson, Stanford University School of Medicine, Margaret C Nikolov, Clinical Excellence Research Center, Stanford University School of Medicine, and Kevin Schulman, Stanford University School of Medicine, Clinical Excellence Research Center, Graduate School of Business, Stanford University

Contact: kevin.schulman@stanford.edu

Abstract

What is the message? The United States has seen an increase in healthcare administrators, both absolutely and as a ratio to physicians, with a significant acceleration of these trends, since the 2010 passage of the Affordable Care Act.

What is the evidence? Analysis of data obtained from the U.S. Bureau of Labor Statistics Occupation Employment and Wage Statistics (OEWS) data.

Keywords: Healthcare Administration, Healthcare Workforce, Affordable Care Act

Timeline: Submitted June 30, 2026; accepted after review June 30, 2026.

Cite as: Becca Nelson, Margaret C Nikolov, Kevin Schulman. 2026. The Growth in Healthcare Administrators since 2004 in the United States. *Health Management, Policy and Innovation* (HMPI.org). Volume 11, Issue 2.

Introduction

Healthcare administration costs in the United States are the highest of any country,[1] yet understanding factors driving these costs remains poorly characterized. One open question is

the growth of administrators in the healthcare system.[2] Since the passage of the Affordable Care Act (ACA) in 2010, the healthcare delivery system has been transformed by provider consolidation, the migration of physicians to an employment model, consolidation in the health insurance market, and the implementation of myriad value-based payment programs in the public and private sector.[3,4]

We sought to better characterize the growth of administrators in the U.S. relative to the growth of practicing physicians, and to assess whether the ACA and the subsequent changes to the healthcare market had an impact.

Methods

Data on healthcare administrators was obtained from the U.S. Bureau of Labor Statistics Occupation Employment and Wage Statistics (OEWS) data. Healthcare administrators were defined using the O*NET code 11-9111 for healthcare administrators. O*NET defines healthcare administrators as individuals who “Plan, direct, or coordinate medical and health services in hospitals, clinics, managed care organizations, public health agencies, or similar organizations.” Physicians were defined using all O*NET codes that cover physicians which varied by year over the course of the dataset.

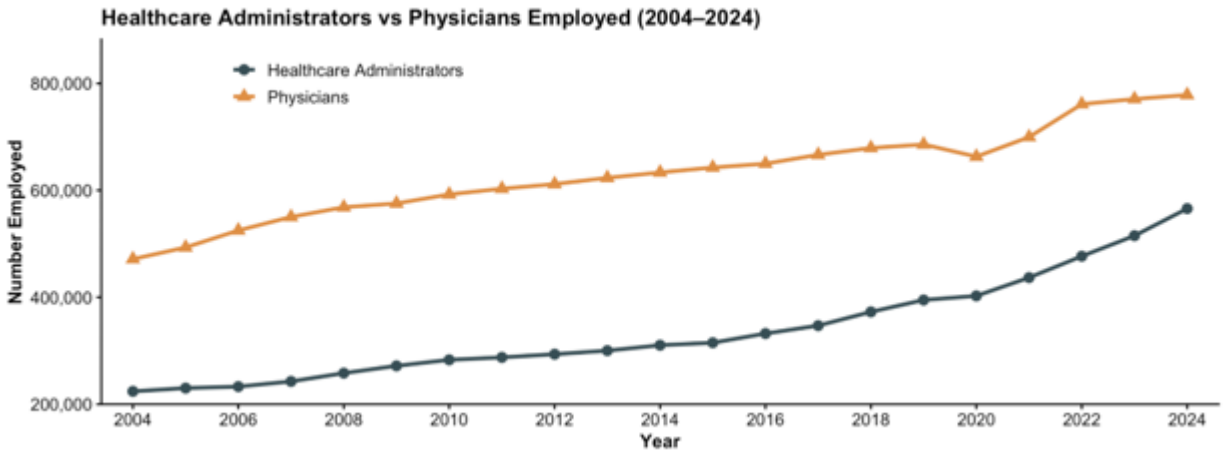
The ratio of healthcare administrators to physicians was computed for each year. Ratios pre-ACA (years 2004-2010) and post-ACA (2011-2024) were compared using one- and two-sample t-tests. Trend over time was assessed using simple linear regression, stratified by period (pre- vs post-ACA). Data analysis was conducted in RStudio v2025.05.1.

Results

The number of healthcare administrators increased from 224,070 in 2004 to 565,840 in 2024 while physicians saw an increase from 471,390 to 778,450 over the same period (Figure 1). Over this period, the ratio of healthcare administrators to physicians increased from 0.48 in 2004 to 0.73 in 2024.

Figure 1: Growth of Healthcare Administrators and Physicians 2004-2024 in the

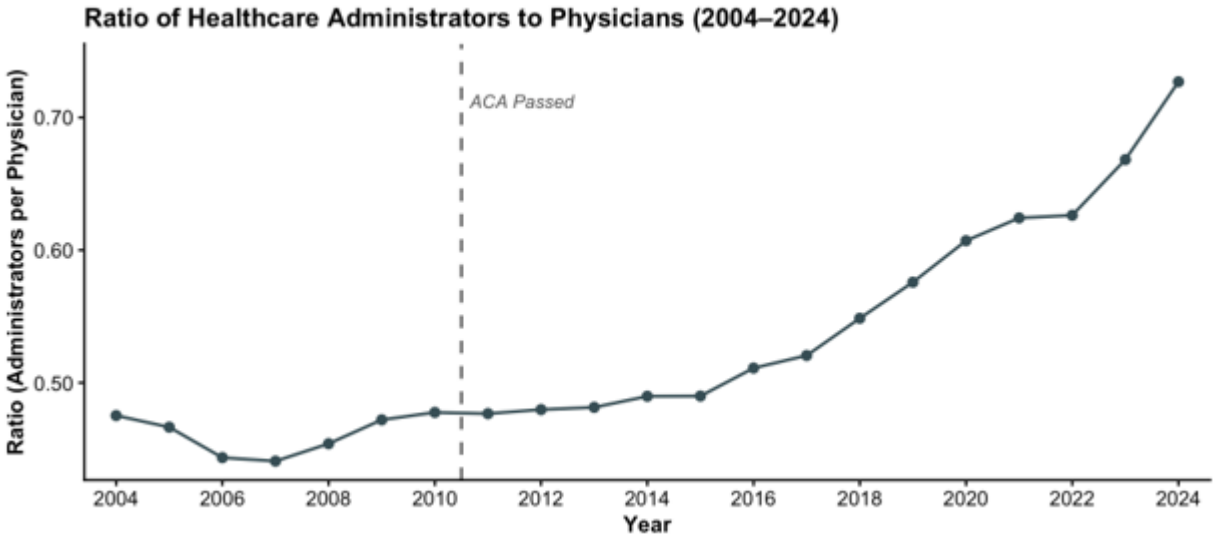
United States.



Analysis of U.S .Bureau of Labor Statistics Occupation Employment and Wage Statistics (OEWS) of the number of healthcare administrators and physicians over time. Healthcare administrators grew from 224,070 in 2004 to 565,840 in 2024 while physicians grew from 471,390 to 778,450 in the same period.

In examining changes in the market since the ACA, the mean ratio of healthcare administrators increased significantly from 0.46 (95% CI, 0.45-0.48) pre-ACA to 0.56 (95% CI, 0.51-0.61) post-ACA ($p < 0.01$) (Figure 2). Plotting the ratio of healthcare administrators to physicians over time, the trendline is constant pre-ACA ($\hat{\beta} = 0.001$ [95% CI, -0.01-0.01]), but is increasing over time post-ACA ($\hat{\beta} = 0.02$ [95% CI, 0.02-0.02]). (Figure 2)

Figure 2: Ratio of Healthcare Administrators to Physicians 2004-2024 in the United States.



Analysis of US Bureau of Labor Statistics Occupation Employment and Wage Statistics (OEWS) of the ratio of healthcare administrators to physicians over time. The dashed line indicates passage of the Affordable Care Act (2010). The ratio stayed relatively constant around 0.47 until 2011 when the ratio increased regularly until it reached a value of 0.73 in 2024. The trendline for the data points after the ACA from 2011 -2024 is increasing over time whereas there is no difference in the trendline from 0 pre-ACA.

Discussion

The data demonstrate an increase in healthcare administrators both absolutely and as a ratio to physicians, with a significant acceleration of these trends since the passage of the ACA in 2010. (Figure 1,2) The healthcare market has become more complicated over the last decade structurally on the delivery system side, and financially with myriad different payment models, each with distinct prior authorization and data reporting requirements. The result is the growth of non-clinical administrators across the system. Moreover, this growth is continuing (rather than reaching a new plateau). The implementation of technology during this period has not been associated with productivity gains seen elsewhere in the economy.[5] Unfortunately, this significant growth in expense and complexity has been associated with a decline in value in the delivery of services to patients.[6]

Reliable and reproducible data sources for the administrative workforce in healthcare are not readily available.[7,8] Data sources providing information about employment of health administrators are imperfect; OEWS data can be recoded frequently and may not include all administrative roles in healthcare systems, but the strength of the data are the survey sample of 1.1 million establishments and detail of 830 occupational categories.

The changes in the healthcare market since the passage of the ACA has led to a significant growth in the number of administrators across the healthcare system, and in the ratio of the number of administrators per physician.

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Southern California Permanente Medical Group: The Care Transformation Office (CTO) – Scaling Integrated Value-Based Care Through Strategic IT-Clinical Partnerships

(Stanford Graduate School of Business Case SM-403, May 7, 2026; 15 pages)

Authors: Sinjin Lee, Dinh Nguyen, Khang Nguyen, Ramin Davidoff, and Kevin A. Schulman

Southern California Permanente Medical Group (SCPMG), part of Kaiser Permanente, the largest nonprofit integrated health care system in the United States, faced the challenge of rising patient messages and the expectation of on-demand care, which added to the risk of physician burnout. Could SCPMG leverage the latest AI technologies to enhance integrated care delivery and streamline operations? And what would be the optimal approach to integrate AI-powered tools throughout Kaiser Permanente's extended network of physicians and care teams that served more than 12 million Kaiser members?

Kaiser Permanente had a long history of innovation—and disruption—in American health care, dating back to the organization's origins in 1933. This case study explores a new chapter in health care innovation, as doctors and clinics sought to improve patient care and provide quicker response times, particularly in managing low-acuity and chronic care cases. Hybrid care models, for instance, could help reduce the demand for in-person care, yet preserve Kaiser's focus on providing the highest quality of care to each patient and enhancing the patient experience. By exploring patient and clinician needs, Kaiser's investigations revealed new

opportunities for future AI-driven innovations in triage, bot-based communications, predictive analysis, and clinical decision support. Kaiser acknowledged that successful integration of new processes and technologies would require deep integration between IT capabilities and clinical workflows—and an organizational culture aligned with the advantages AI could offer.

Learning Objective

The case study offers a framework for students to understand and discuss the integration of AI technologies in the health care sector. By discussing the Kaiser Permanente group's experiences, students can learn about one approach to scale integrated care delivery in the rapidly evolving health care landscape.

This material is available for download by current Stanford GSB students, faculty, and staff, as well as Stanford GSB alumni. For inquires, contact Kevin Schulman: kevin.schulman@stanford.edu

Lawton Robert Burns, The Wharton School, University of Pennsylvania

Contact: burnsl@wharton.upenn.edu

"Concise Introduction to Healthcare Management" (Elgar Publishing, 2026)

Two topics

Like many of you, I teach our introductory course on the healthcare ecosystem and how to manage it. I have done so for nearly four decades at various schools. I also have the privilege of serving as an editor of the Shortell & Kaluzny textbook (along with Betsy Bradley and Bryan Weiner).

Healthcare and management are two different fields: a huge industry and a diverse discipline. The *Healthcare* industry spans 25 different "verticals" along a value chain that contract as buyers and suppliers. *Management* textbooks focus on a core set of functions needed to run these companies.

Elgar asked me to write *A Concise Introduction to Healthcare Management* (not easy for a windbag like me). This volume combines these two topics into what is hopefully an accessible and engaging text, discussing healthcare management using seven different approaches. Consider them as alternative frames of reference and skillsets.

- ***One approach*** is to have students confront a series of dilemmas and paradoxes. Wrestling with these is a source of cognitive dissonance and a major source of learning, which lend themselves to the Socratic style of teaching. Healthcare is full of conundrums, which is why I start the book with them. They dispel some conventional wisdom that is often incorrect.
- ***A second approach*** identifies the major sources of complexity in healthcare. Management sage Peter Drucker famously referred to hospitals as the most complex human organization ever devised. Consider that hospitals are a matrix inside a dual hierarchy inside a conglomerate. It is crucial that students know and embrace this complexity. Healthcare has multiple professions, each with specialized knowledge, and each of which thinks they are the center of the universe. Such knowledge workers make the system productive. Drucker explained, “In a traditional workforce, the worker serves the system; in a knowledge workforce, the system must serve the worker.” In practice, this means the typical organizational pyramid must be stood on its head.
- ***A third approach*** identifies the memes that dominate the fields of management and healthcare. These are ideas or phrases that become “sticky” by virtue of sheer mindless repetition (e.g., management buzzwords). They, unfortunately, substitute for rigorous analysis and critical thinking. Critical thinking as a vehicle to confront memes is an exercise which students find humorous; more importantly, they find it memorable and useful for discerning what is really going on around them. Your first task is to recognize a meme when you hear it; your second task is to know why it is (likely) bogus; your third task is to not repeat it to others; your fourth task is to stop wasting your time and hunt for another solution.
- **A *fourth approach*** tackles the dominant theme of integration and coordination. If THE big issue in healthcare is fragmentation (as many argue), then integration must be the solution. Integration and coordination are “must haves” in any management approach. The book explores the many management tools that have been deployed to bring them about. These include managing professionals (who need to be integrated), teams, integrated

delivery networks, and accountable care organizations. Unfortunately, the evidence base that supports the utility of integration and coordination needs reinforcement.

- ***A fifth approach*** is to identify the basic relationships that impact patient outcomes and firm success and, thus, need to be managed. These include relationships between people (e.g., patient-physician, physician-manager, scientist-manager) and between sectors (e.g., payer-provider, employer-payer). The first three of these occur at the micro-level and serve as the foundation for the rest of the healthcare ecosystem; the latter two illustrate the stakeholder relationships that need to be managed. Healthcare is more an enterprise that rests on human capital and relational capital than on technological capital. Relationships are key to hospital quality.
- ***A sixth approach*** concentrates on the important management skills that students should develop. These include learning, managing hairy problems, managing cost and quality, managing change, managing process (not structure), and focus. These topics have bedeviled the healthcare ecosystem for decades and pose perhaps the greatest challenge for students and managers.
- **A *seventh approach*** is to "disabuse" the student about some likely preconceived notions and persuade them that an idea or belief is mistaken. Here, the mistake is to believe (as many do) that new technology will solve healthcare's problems. I have seen this approach come and go under many guises. The book deconstructs many of the new technologies that currently fascinate everyone in the healthcare ecosystem. If healthcare is all about people and relationships, your task will be to figure out how to marry and harmonize that with technology – – what is called the "socio-technical" system approach.

This volume seeks to live up to the title of the Elgar series of which it is part: "Concise". It serves as a "pocket guide" (165 pages !!) to those looking for a quick introduction to the field and an overview of "what do I need to know to manage". It should thus appeal to executives, healthcare professionals, and students in professional programs. The book also features plenty of humor that makes it an enjoyable and memorable read.

Elman Amador Medina, Graduate School of Business, Stanford University; Steven Gong, Dashiell Miner, School of Medicine, Stanford University; Lauren Bilbo, Klara Klarowicz, Graduate School of Business, Stanford University; Sergio Mavridis, David Scheinker, Stefanos Zenios, Graduate School of Business, Stanford University; Kevin Schulman, Graduate School of Business, School of Medicine, Stanford University

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BAHM BUSINESS SCHOOL ALLIANCE FOR HEALTH MANAGEMENT

Support: The Ludy Family Foundation, The Hirsch Family Foundation, The Mindshare Institute, and the Government, Business and Society Initiative of the Graduate School of Business, Stanford University.

Abstract

What is the message? Healthcare fraud has always been a major concern for health payers. While public debate often equates healthcare fraud with improper beneficiary enrollment, most documented losses arise from provider-side and organized criminal schemes. The structural complexity of the U.S. healthcare and lack of governance over the market has resulted in significant lags in response emerging artificial intelligence (AI)-enabled fraud. This paper proposes a technical framework to transition the industry from reactive fraud detection to proactive fraud prevention by adapting multi-layered defense mechanisms proven effective in the financial services sector.

What is the evidence? The proposed solution comprises a three-layer architecture integrated into claims processing: (1) Healthcare Identity Management, analogous to Know Your Customer (KYC) protocols, for rigorous provider and patient identity verification; (2) Continuous Claim Validation using “Zero Trust” principles, where each claim is assumed to be fraudulent until proven valid; and (3) AI/Machine Learning (ML)-Powered Real-Time Detection using advanced analytics and collaborative intelligence to identify aberrant patterns before payment authorization.

Keywords: Artificial Intelligence, Healthcare Fraud, Health Insurance

Timeline: May 31, 2026; accepted after review June 12, 2026.

Cite as: Elman Amador Medina, Steven Gong, Dashiell Miner, Lauren Bilbo, Klara Klarowicz, Sergio Mavridis, David Scheinker, Stefanos Zenios, Kevin Schulman. 2026. The Emerging Risk of AI-Enabled Healthcare Fraud. Health Management, Policy and Innovation (HMPI.org). Volume 11, Issue 2.

Introduction

Transaction fraud in claims and reimbursement is an unfortunate feature of the U.S. healthcare market. Improper payments, generally attributed to fraud and abuse, are thought to exceed $100 billion annually across the Medicare and Medicaid programs [1]. Fraud is criminal activity to steal money through the insurance claims process, while abuse describes non-criminal clinical practices or billing patterns. This paper focuses on the issue of payment fraud.

Healthcare fraud takes two distinct forms. Provider-side fraud occurs when clinicians, suppliers, or organized criminal groups bill payers. Beneficiary fraud occurs when individuals enroll in coverage or use services to which they are not entitled.

While recent policy debates, including the Medicaid eligibility provisions of the One Big Beautiful Bill Act of 2025, have centered on beneficiary fraud, enforcement data tell a different story [2]. The large majority of documented fraud losses come from provider-side schemes and organized criminal enterprises [3-5]. Several patterns of provider-side fraud have been identified: medical identity theft, billing for unnecessary services, billing for services not provided, upcoding, unbundling, and kickbacks [3]. Historically, fraud has been a particular issue in the Medicare program, where Medicare must pay for services within a fixed period of time. When it discovers that it paid fraudulent claims, it must “chase” after the biller for a recovery (the so-called pay and chase model). Medicare began to check for fraud prior to payment in 2011 [6], but fraudulent billing still persists [4].

AI-Enabled Fraud

These legacy issues of fraudulent billing are now facing new challenges with the emergence of artificial intelligence (AI). The convergence of generative AI and healthcare’s analog infrastructure is creating an unprecedented fraud escalation.

According to data security vendors, deepfake fraud[1] incidents surged globally by over 700% between early 2024 and early 2025, with North America experiencing a 1,100% increase over the same period [7]. Synthetic identity document fraud—in which AI-generated credentials combine real and fabricated personal data—rose 311% in North America during Q1 2025 compared to Q1 2024 [7].

These capabilities are already being weaponized against healthcare payment systems. Deepfake medical identities enable phantom billing schemes, fraudulent prescription access, and insurance claims filed under fabricated patient profiles. Voice cloning technology, which now requires as little as three to five seconds of audio to produce a convincing replica, has driven a 475% year-over-year increase in attacks targeting insurers [8]. Telemedicine platforms present particular vulnerabilities; the 2025 DOJ National Health Care Fraud Takedown included $1.17 billion in fraudulent telemedicine and genetic testing claims, with foreign actors using AI to generate fraudulent audio recordings of Medicare beneficiary consent [4]. In August 2025, the Department of Justice announced its first healthcare AI fraud enforcement action against Troy Health, Inc., which used an AI platform (Troy.ai) to fraudulently enroll over 300 Medicare beneficiaries in a single day without their knowledge or consent—a harbinger of how AI reduces the marginal cost of fraud execution [9]. CMS prevented over $4 billion in fraudulent claims from being paid in the lead up to the June 2025 enforcement action [10].

Nation State Threat Actors

Healthcare’s vulnerability extends beyond financially motivated criminal enterprises to include advanced persistent threat (APT) groups operating with the tacit or explicit support of foreign governments. These groups can target intellectual property for theft and commit financial crimes.

Iranian state-sponsored group Pioneer Kitten provides network access to ransomware affiliates who deploy attacks against healthcare systems, creating a cooperative model between nation-state espionage and criminal extortion [11]. North Korean actors deployed the Maui ransomware specifically against U.S. hospitals between 2021 and 2022, with ransom payments funding the state’s nuclear weapons program [12]. Chinese APT groups have targeted biomedical research institutions for COVID-19 vaccine intellectual property theft and deployed malware through medical imaging DICOM files [13]. Russian-linked APT29 (Cozy Bear), attributed to the Russian Foreign Intelligence Service (SVR), has conducted persistent espionage campaigns against healthcare and pharmaceutical organizations in the United States and Europe [14]. Ransomware attacks against healthcare organizations have increased 300% since 2015, and in 2024, healthcare reported the most cyber threat incidents of any sector: 458 ransomware incidents targeting the health sector [15][16].

In June 2026, Google sued a Chinese enterprise, Outsider Enterprise, for using Gemini's AI tools to create fake websites including websites that appear like government sites including the Postal Service and New York State's E-Z Pass system. Google reported that hundreds of thousands of people had been exposed to these fraudulent sites. Google was cooperating with the Federal Bureau of Investigation in the case, with wireless carriers to try to shut down the network. [17]

These APT groups could use AI technology to develop billing fraud schemes using advances in AI technology.

Data Security

The full scope of the 2024 Change Healthcare data breach included 192.7 million individuals, nearly two-thirds of the U.S. population, making it the largest healthcare data breach in history [18]. The breach exposed names, Social Security numbers, dates of birth, medical information, driver's licenses, passports, and financial payment card data [17]. The Change Healthcare attack is not an isolated incident but part of an accelerating pattern. In 2024, the healthcare sector experienced 742 breach incidents affecting over 276 million records [19]. Since 2020, more than 500 million individuals, exceeding the entire U.S. population, have had healthcare records stolen or compromised [19]. All of these identify data on individual patients can be available on the dark web to further develop claims fraud schemes.

Escalating Threats

These escalating threats—AI-enabled fraud, nation-state exploitation, and systemic breaches—succeed not because they are undetectable, but because the healthcare transaction infrastructure was never designed to address these challenges.

Several structural deficiencies in the current claims processing environment create the conditions that both enable and conceal fraud at scale:

Fragmented Processing: A single claim often passes through five to seven different, often disconnected, systems before adjudication [20]. Each handoff represents a potential point of data degradation or manipulation, making holistic transaction analysis difficult.

Lack of Standardization: While X12 is the standard format for electronic data interchange

(EDI), [21], each payer uses distinct “companion guides” governing specific implementation rules. This variability forces providers to manage dozens of slightly different workflows, creating operational friction that disincentivizes participation by smaller payers and creates loopholes that sophisticated fraudsters exploit [22].

Incomplete Data for Detection: Current fraud detection systems are often trained on public or siloed claims data lacking integration with clinical and practitioner data from Electronic Health Records (EHRs). This incomplete picture limits fraud prediction model accuracy, as payers rarely possess the information needed to algorithmically validate claims [23].

Limitations of Supervised Fraud Models: Supervised fraud detection models depend on court validation of previous fraud cases. If a model incorrectly processes a fraudulent claim as legitimate, similar fraudulent claims may subsequently evade detection.

Legend: ChatGPT completed CMS-1500 professional claim form, the standard form used by non-institutional providers and suppliers to submit claims to Medicare, using synthetic data. Source:

National Uniform Claim Committee (NUCC); study authors.

Together, these infrastructure gaps create a compounding vulnerability: fragmented systems prevent the holistic visibility needed to detect fraud, while the absence of standardized, real-time data pipelines makes it impossible to apply the kind of continuous transaction monitoring that has proven effective in financial services. The result is a system structurally locked into post-hoc detection.

The persistence of the reactive model in healthcare creates a systemic barrier to modernization. Payers are hesitant to adopt fully automated claims processing because, without intelligent safeguards, automation could scale fraudulent payments alongside legitimate ones. This creates a critical challenge: payers must either continue with expensive, labor-intensive manual reviews that are overwhelmed by volume, or invest in automated systems equipped to differentiate between legitimate and fraudulent claims in real time.

This paper proposes a strategic and technical framework to address this challenge by adapting proven, multi-layered defense mechanisms from the financial services sector.

Banking Sector Lessons

The financial services industry, shaped by decades of evolving fraud schemes, has developed multi-layered defenses that offer a blueprint to prepare healthcare for the emerging threat of AI-driven fraud mechanisms. These mechanisms have reduced electronic payment fraud losses to a few cents per $100 transacted—a level of integrity to which healthcare can aspire [24].

The banking industry has achieved a 6% to 10% improvement in fraud detection accuracy using AI-powered, real-time systems that analyze transactions in milliseconds [25]. These strategies have also led to the development of novel identity and transactions enterprises that are focused on fraud prevention (Plaid and Stripe).

Insurers in other domains have reported a 30% increase in fraud detection rates and returns on investment (ROI) exceeding 210% within the first year of implementing similar technologies [26]. Deloitte projects that comprehensive AI-driven approaches could save property and casualty insurers between $80 billion and $160 billion by 2032 [27].

Core Banking Anti-Fraud Mechanisms

Robust Customer Identification: Financial institutions use Know Your Customer (KYC) processes to verify identity and credentials of new customers, performing background checks and risk scoring to prevent bad actors from entering the system. This continuous process of identity verification forms the first line of defense against fraud.

Multi-Layer Payment Authorization ("Zero Trust"): No transaction is trusted by default. Layers of verification—including PINs, biometrics, one-time passwords, and geolocation matching—are dynamically applied based on transaction risk profiles.[2] This philosophy assumes every transaction may be fraudulent until proven otherwise through automated verifications.

Continuous Transaction Monitoring (Anti-Money Laundering Analytics): Banks employ real-time anti-money laundering (AML) analytics to detect suspicious transactions as they occur. Algorithms flag anomalies against expected behavior—such as unusual spending patterns, transactions from high-risk geographies, or rapid fund movements—triggering automated reviews or holds on funds.

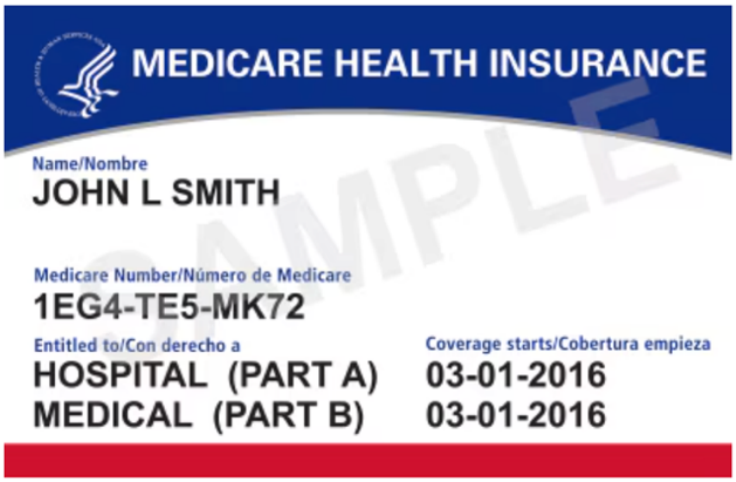
Translation to Healthcare

These principles can be translated to the healthcare ecosystem:

KYC → Member Credentialing

One of the most familiar aspects of the US healthcare system is the need to copy or type the member health plan identification information into a provider registration system. This simple process highlights one of the most critical failures of the current healthcare system: it is based on an analog process of identification where data can easily be copied incorrectly, while data on the patient and the plan (and the plan contract with the provider) are not digitally linked.

The simple contrast between a typical health insurance card and a credit card is illustrative. The health insurance card carries no digital information; it even lacks the most rudimentary digital technology of barcodes.



Legend: Medicare insurance card and Visa card with embedded EMV chip.

Source: https://www.medicare.gov/basics/get-started-with-medicare/using-medicare/your-medicare-card; Bachelot Pierre J-P, CC BY-SA 3.0 https://creativecommons.org/licenses/by-sa/3.0, via Wikimedia Commons

The scale of the gap between banking and healthcare payment security is well documented. The average cost to process a single primary care claim is $20.49 [28] and claims routinely traverse a multi-step adjudication process taking days to months. By contrast, the Visa payment network processes approximately 1,700 transactions per second [29], with AI-powered fraud detection analyzing over 500 features per transaction in real time and preventing $25 billion in fraud in 2019 alone [30]. Banking has developed the EMV (an acronym for Europay, Mastercard, and Visa) chip-enhanced payment security that establishes a unique digital key for each transaction. EMV chip technology reduced counterfeit payment fraud by 76% within three years of adoption [31,32], although this effort pushed fraud to card-not-present transactions [33]. Healthcare's estimated fraud rate of 3% to 10% of total spending, representing $59 billion to $84 billion across the U.S. healthcare system, persists in part because the sector lacks any comparable realtime digital verification mechanism [34].

Member credentialing also faces adoption obstacles that banking did not. Public resistance to digitally coded patient identity is well documented: HIPAA directed HHS to create a unique health identifier for individuals in 1996, but Congress has prohibited funding it since 1999 over privacy objections, and a 2019 House vote to lift the ban stalled in the Senate [35]. National survey data reflect the same sensitivity, with roughly seven in ten individuals reporting concerns about the privacy of their medical records, even as a similar majority supports electronic records and health information exchange [36]. Access is a second obstacle: 91% of U.S. adults own a smartphone and 78% have home broadband, with adoption lowest among older and lower-income adults, the populations most likely to depend on Medicare and Medicaid [37]. Digital member credentials will therefore require clear communication about what data they carry and how they are used, simple non-digital fallback processes for members who cannot or will not adopt them, and visible benefits such as faster eligibility verification at the point of care. Implementation of this solution would have to account for the challenges of vulnerable patient populations, patients with disabilities, and patients that lack full broadband connectivity. Of course, in-person verification of patient identification at the time of a visit is a robust security check.

KYB-Provider Credentialing and Enrollment: Currently, each health plan must develop a provider directory, creating duplication across plans and increasing paperwork burden for providers. A secure KYB transaction environment would establish secure digital credentials (National Provider Identifier [NPI], licensure, billing entity, billing location) for transaction

platform entry. Since fraudulent claims submissions is the largest scale risk of AI-generated fraud, KYB efforts likely have the highest return on investment in developing ore robust identity schemes.

Prepayment audits and account verification would establish an additional level of security. Real-time screening of network applicants against the HHS Office of Inspector General's (OIG) List of Excluded Individuals/Entities (LEIE) [38] could further reduce entry of potentially fraudulent entities. The Centers for Medicare and Medicaid Services' (CMS) enhanced screening programs have already deactivated over 660,000 suspect enrollment records from 2011 to 2015, demonstrating the scale of this opportunity [39].

Zero-Trust Payments → Zero-Trust Claims: Payers need systems to validate each transaction as legitimate: verifying the provider, patient, and transaction itself. Banks validate credit card transactions through EMV (Europay, Mastercard, and Visa) chips using one-time codes. According to Visa, chip-enabled cards reduced card-present counterfeit payment fraud by 76% at chip-enabled merchants within three years of the 2015 U.S. EMV transition [32]. A zero-trust model for healthcare would require that high-risk claims clear additional automated and, when necessary, human checks before payment authorization. The GAO has noted that pre-payment audits are more cost-effective than post-payment recovery efforts [40].

AML Analytics → Claims Pattern Recognition: A digital backbone for the transaction system enables new tools to detect digital fraud, from unexpected surges in claims from a single NPI to ensuring that coded services reflect a provider's practice pattern. Graphical analysis of payer-provider relationships can be used to further enhance the effectiveness of this security layer.

Implementation Framework

This framework adapts the banking sector's three-layer architecture to healthcare fraud prevention, integrating defenses directly into claims workflows

Layer 1: Healthcare Identity Management (KYC/KYB)

The first layer prevents fraudulent actors from entering the system by strengthening provider and patient identity controls.

Enhanced Provider Credentialing: Implement rigorous, automated, continuous credentialing processes including: primary source verification of licenses through API calls to state medical boards; continuous background checks against federal and state exclusion lists (such as the OIG's LEIE, which contains over 660,000 excluded parties); and physical or virtual validation of practice addresses to expose phantom clinics [40]. Providers can be stratified by risk level, with higher-risk entities (e.g., durable medical equipment providers) facing enhanced due diligence.

Digital Provider and Patient ID Authentication: Introduce modern identity-proofing for claim submission, such as multi-factor authentication or digital certificates tied to provider identity. This prevents use of stolen billing credentials. Similarly, strengthening patient identification at the point of service, potentially through biometric-linked insurance cards or secure digital wallets, can reduce identity swapping and medical identity theft. REAL ID verification is a powerful identity mechanism now in place [41]. Patient identity verification should leverage existing FHIR-based standards to enable interoperable identity tokens that travel with the patient across providers and payers.

Unified Provider Directory Infrastructure: Rather than each health plan maintaining its own provider directory, a centralized or federated provider registry, modeled on the NPPES database but enhanced with real time credentialing status, would reduce duplication, lower administrative burden, and close gaps that enable phantom providers to enter the system undetected. Such infrastructure already has precedent in CMS's Provider Enrollment, Chain, and Ownership System (PECOS), though the current system lacks real time validation capabilities.

Layer 2: Continuous Claim Validation (Zero Trust)

This layer applies the "never trust, always verify" principle to every transaction.

Pre-Payment Review and Smart Adjudication: High-risk claims identified by analytics are automatically routed for pre-payment review or checked against additional data before disbursement. This approach shifts from "pay and chase" to proactive loss prevention.

Machine-Readable Digital Contracts: The technical foundation uses machine-readable standards (X12, FHIR) to encode provider agreements, fee schedules, and benefit plans into computable formats [21]. When a claim is submitted, it can be automatically validated against

digital contract terms. For example, a system could automatically deny a second claim for a procedure that a contract specifies is covered only once annually or flag a claim for a service billed by a provider whose digital contract excludes that service. Research indicates that decision tree algorithms embedded in smart contracts can achieve high accuracy in detecting contractual fraud [41].

Clinical Plausibility Engine: Beyond contractual validation, claims should be assessed against clinical logic rules that reflect medical practice standards. For instance, a claim billing for a complex surgical procedure at a facility lacking the appropriate licensure or equipment, or a claim for an office visit submitted on the same day as an inpatient admission, represents clinically implausible activity that can be flagged automatically. Integration with EHR data, where available and permissible under HIPAA's "minimum necessary" standard, would further strengthen clinical validation without requiring manual chart review. Risk stratification engines would assign dynamic risk scores to each claim based on provider history, claim characteristics, patient demographics, geographic patterns, and clinical plausibility. Only claims exceeding a configurable risk threshold would require enhanced scrutiny, allowing the vast majority of legitimate claims to process at current or faster speeds.

Layer 3: Advanced Analytics and Risk Scoring (AI/ML)

This layer deploys advanced analytics to detect anomalous behavior in real time.

Predictive Modeling and AI: ML models trained on historical claims data generate real-time fraud risk scores for each new claim. High-risk claims are automatically flagged for intervention. These models continuously learn from confirmed fraud cases, adapting to new schemes and improving accuracy while reducing false positive rates over time. CMS's Fraud Prevention System has demonstrated greater than 3-to-1 ROI [42].

Graph and Outlier Analysis: Graph analytics visualizes and analyzes complex, often hidden networks connecting providers, patients, claims, and locations. This technique effectively uncovers collusion, such as kickback rings or organized fraud using multiple shell companies linked to a common address [43].

Collaborative Defense Network: The framework leverages a federated data model inspired

by the Healthcare Fraud Prevention Partnership (HFPP). As of 2016, HFPP represented over 65% of covered lives in the U.S. and has since grown to over 300 partner organizations as of 2023 [44][45]. Participants contribute anonymized fraud pattern data and gain access to collective intelligence, enabling smaller payers to access enterprise-grade detection capabilities and larger payers to identify schemes spanning multiple networks.

The framework proposes expanding this federated model to include real time threat intelligence sharing, analogous to the financial sector's FS-ISAC (Financial Services Information Sharing and Analysis Center), enabling participating organizations to disseminate indicators of compromise as they emerge rather than in periodic retrospective reports. Network analysis can detect patterns that evade individual claim review, such as patient sharing rings, unusually concentrated referral patterns, and geographic clustering of high-cost services at addresses associated with minimal physical infrastructure.

Measuring Success

Effective implementation requires clearly defined performance metrics tracked across all three layers. Layer 1 (KYC) metrics include time to credentialing for new providers, percentage of enrollment applications flagged and confirmed as fraudulent, and reduction in phantom provider entries compared to baseline. Layer 2 (Zero Trust) metrics include percentage of claims validated against digital contract terms in real time, reduction in contractual fraud such as duplicate billing and out of scope services, and claim processing speed relative to pre implementation benchmarks. Layer 3 (AI/ML) metrics include fraud detection rate (true positive rate), false positive rate and its trend over time, dollar value of fraud prevented per dollar invested, and average time from claim submission to fraud identification. System wide metrics include overall improper payment rate for participating organizations versus nonparticipants, provider satisfaction and administrative burden metrics, and return on investment at each phase of implementation. These metrics should be independently audited and published to build the evidence base for broader adoption and to inform regulatory policy.

Risk Considerations

An aggressive fraud prevention program must be implemented thoughtfully to mitigate potential risks. Each layer of the framework carries potential unintended consequences for beneficiaries,

providers, and payers. Acknowledging these risks explicitly and building mitigation into the design is as important as the fraud prevention itself. Provider risks are addressed in Section 6.3, payer risks in Section 6.4, and beneficiary risks in Section 6.5.

Regulatory and Legal Risks

All activities must comply with privacy laws including HIPAA and various state regulations, as well as prompt pay laws. While HIPAA permits use of protected health information (PHI) for fraud detection, a “minimum necessary” standard must be enforced. Pre-payment reviews must avoid violating claim payment timelines. To prevent False Claims Act liability, any automated denial process must include human oversight for ambiguous cases, a principle now required by law in states including California [46].

Cybersecurity and System Integrity

New analytics platforms and data-sharing networks expand cybersecurity risk. All systems require robust end-to-end encryption, multi-factor access controls, and regular penetration testing. If utilized, smart contracts require intensive code security audits to prevent exploitation of vulnerabilities [21].

False Positives and Provider Relations

The most significant operational risk is flagging legitimate claims (false positives), which can delay payments and damage provider relationships. This risk requires active management through:

- **Calibrating AI Thresholds:** Start with conservative settings flagging only high-confidence outliers, tuning to minimize provider friction initially while allowing threshold adjustment as models improve.
- **Transparent and Rapid Processes:** Establish clear, expedited appeals processes for providers to contest flagged claims.
- **Provider Education and Collaboration:** Communicate program goals and mechanics to network providers, framing it as collaborative effort to protect system integrity and accelerate payment for legitimate claims.

Pre-payment review also carries cash flow and workload consequences for providers. Physician practices already devote substantial resources to payer review processes: in the 2025 American Medical Association survey, physicians completed an average of 40 prior authorization requests per week, consuming roughly 13 hours of physician and staff time, and more than a quarter reported that these review processes led to serious adverse events for patients [47]. Fraud screening must not impose a comparable burden on honest providers. Risk-based exemptions offer one proven mitigation: under the Texas “gold card” law, providers whose requests are consistently approved earn exemptions from preauthorization review, a model that could similarly exempt consistently low-risk providers from enhanced claim scrutiny [48]. Clean claims from exempt providers should be paid within contractual and statutory prompt pay timelines, with flagging criteria disclosed to network providers and screening performance published as described in Section 5.4.

Implementation, Operational, and Payer Risks

AI system success depends on data quality. The project requires strong interdepartmental governance ensuring coordination between IT, compliance, claims, and provider relations. A phased rollout, starting with less complex claim types, and continuous performance monitoring are essential. For payers, the principal risks are financial and reputational: large technology investments may underdeliver if data quality is poor, and poorly calibrated models can create regulatory exposure and erode provider and member trust. Phased rollouts with published performance metrics (Section 5.4) help contain these risks. Payers also face model risk that is specific to an adversarial setting: fraud perpetrators actively probe and adapt to detection systems, so model performance degrades without continuous retraining, monitoring, and validation [49]. Governance should therefore include periodic independent model audits, documented retraining cycles, and fallback to human review when model confidence is low.

Risks to Beneficiaries

Beneficiaries ultimately bear the consequences of fraud prevention errors. A legitimate claim wrongly flagged can mean a delayed authorization, an unexpected bill, or an interruption in care. Any adverse action that affects access to care should therefore require human review before it takes effect, and patients should be held harmless while payer and provider disputes are resolved. Beneficiaries affected by a flagged claim should receive plain language notice and

a simple appeal channel; payer review processes are already associated with care delays and treatment abandonment [50]. Stronger identity verification can also create access barriers for beneficiaries who lack smartphones, reliable internet access, or digital literacy; simple non-digital pathways to verify identity and receive care must be preserved. Aggregating identity, clinical, and financial data for fraud analytics raises privacy concerns beyond regulatory compliance, so programs should collect the minimum data necessary, disclose plainly how the data are used, and submit to independent audits. Finally, detection models should be monitored for disparate impact to ensure fraud controls do not systematically burden specific patient populations, such as those in underserved areas where documentation practices may differ.

Conclusion

The healthcare industry is increasingly vulnerable to threats of AI-enabled digital fraud, especially in the claims financial transaction system. Addressing this challenge will require transformation of the payment system to preserve the integrity of payment processes against this emerging risk by adopting a proactive prevention framework inspired by the financial services sector. A three-layer defense system built on rigorous identity management, zero-trust validation, and AI-powered analytics, can transform claims processing from a reactive, cost-intensive function into a proactive platform. Further leveraging machine-readable contracts as the foundation, payers can automate fraud detection at the point of submission, creating potential ROI that aligns financial incentives with technological modernization. Realizing these benefits will require managing the framework’s risks to beneficiaries, providers, and payers with the same rigor as the effort applied to fraud prevention.

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[1] Deepfakes are synthetic audio, video, or images created with artificial intelligence to convincingly impersonate real people.

[2] Some of these security approaches may be challenging for elderly patients or patients with dementia.

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Abstract

What is the message? U.S. hospitals face fragmented operational pressures across capacity, staffing, resource coordination, and equitable access. This paper proposes the CARE Framework, Capacity Optimization, Adequate Workforce Alignment, Resource Coordination Across Hospitals, and Equitable Access to Care, as a practical structure for using AI Command Centers to improve hospital operations while accounting for human factors, source-data reliability, and financial sustainability.

What is the evidence? Evidence is drawn from U.S. and international hospital examples showing improvements in bed assignment, discharge efficiency, staffing prediction, transfer coordination, ICU strain, and financial performance after command-center implementation. The paper also uses healthcare management literature to distinguish AICCs from traditional dashboards and to explain implementation limits involving adaptive staffing, source-data reliability, and return-on-investment attribution.

Keywords: Artificial Intelligence, Hospital Operations

Timeline: Submitted May 11, 2026; accepted after review July 12, 2026.

Cite as: Ron Varghese. 2026. The CARE Framework: A Pathway for AI Command Centers to Streamline Hospital Operations in the United States. *Health Management, Policy and Innovation* (HMPI.org). Volume 11, Issue 2.

Current State of Hospital Operational Pressures

U.S. hospitals face increasing pressure to deliver high-quality care amidst a variety of complicated operational challenges. Since the COVID-19 pandemic, emergency department overcrowding has become more pronounced, resulting in longer wait times for patients before they receive treatment or are admitted to inpatient units [1]. This crowding contributes to the unprecedented strain on the healthcare workforce. Over 130,000 registered nurses have left the field since 2022, and one million nurses are projected to leave the workforce by 2030 [2]. 86,000 physicians are predicted to leave the field within the next decade as well [3]. With fewer staff available to manage patient care, hospitals experience delayed discharges, while the added workload on remaining personnel yields high burnout and fatigue.

In addition to staffing shortages, hospital supply chains have struggled to keep up with growing workload and patient surges. The shortage of ventilators and personal protective equipment during the COVID-19 peak, as well as other disease-outbreak surges with high patient overflows, highlight the challenges of coordinating resources among facilities, especially in rural or underserved areas [4]. These operational pressures exacerbate existing, persistent inequities in chronic disease outcomes and access to timely specialty care, particularly for Black, Hispanic, rural, and low-income populations, as fragmented systems limit visibility into patient needs and create additional access barriers [5]. Collectively, these issues lead to the overarching problem of fragmented hospital operations. If patient flow, staffing, and equipment are managed separately, system-wide inefficiencies compound, leading to poorer overall health outcomes for patients.

Current Approaches to Managing Hospital Operations

Against these operational pressures, hospitals traditionally have tried to improve efficiency through digital dashboards, departmental analytics, or lean management systems [6]. However, these tools often leave patient flow, staffing, and supply chain decisions disconnected. Administrators may still rely on spreadsheets, calls, or incomplete data, and dashboards that track beds, staffing, and equipment may not provide a coherent real-time view of hospital performance [7]. COVID-19 exposed these limits when hospitals struggled to predict surges and allocate resources quickly [8]. Because traditional approaches are often reactive to problems, hospitals need systems that anticipate and coordinate patient flow, workforce, and resources in

real time. This drives the need for a comprehensive, data-driven system: the AI Command Center (AICC).

The AICC refers to a centralized operations model that combines real-time data, predictive analytics, escalation pathways, and assigned follow-up. Its inputs, outputs, and decision points differ by setting: a single hospital may use it for patient flow, a health system may use it for OR, clinic, and service coordination, and a multi-hospital network may use it for patient and resource routing. This paper explains how AICCs can be operationalized in hospital systems using the CARE Framework: Capacity Optimization, Adequate Workforce Alignment, Resource Coordination Across Hospitals, and Equitable Access to Care.

Using national and global examples, the paper describes each CARE pillar and outlines management actions that can be implemented through an AICC or pillar-specific AI-enabled operational tools: it explains how AICCs differ from ordinary reporting dashboards by linking prediction to operational decisions; describes each CARE pillar; and discusses implementation requirements, including human factors, data quality, financial risk, and the need to interpret reported savings cautiously.

The Usage of AI Command Centers in Hospital Operations

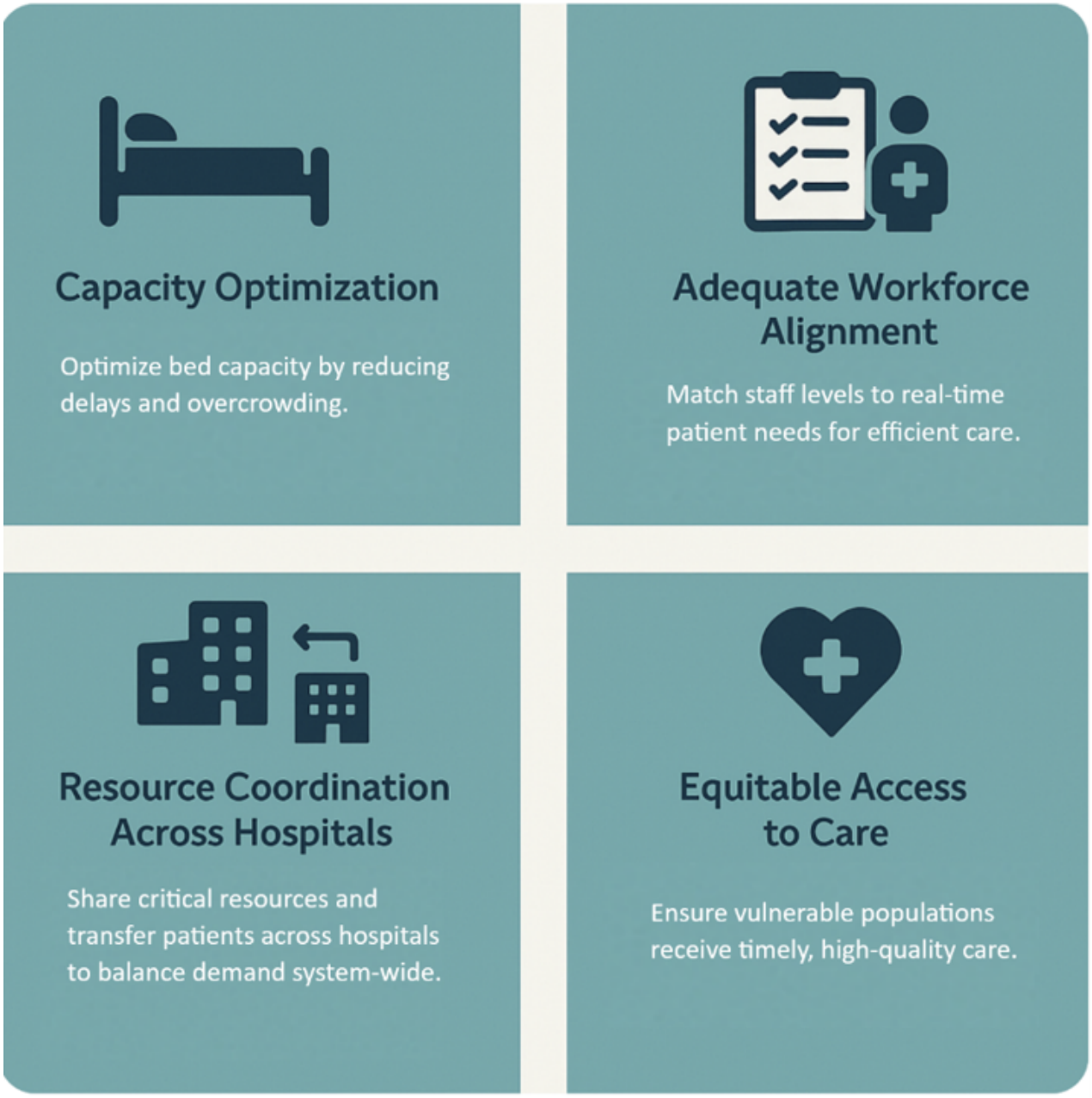
AI Command Centers (AICCs) offer hospitals a new way to help address operational challenges. Inspired by NASA’s mission control center, which covers the operational logistics of the International Space Station, AICCs cover the operational logistics of hospitals by combining real-time and predictive analytics on patient flow, staff deployment, and resource availability [9]. In practice, an AICC functions as a centralized operations hub that integrates electronic health record, bed, staffing, and supply chain data into shared operational views. However, the AICC model is intended to extend beyond visualization. Rather than only displaying current conditions, an AICC pairs real-time visibility with predictive analytics, escalation pathways, and assigned operational follow-up. Its value comes from turning shared data into coordinated action, not simply monitoring hospital performance [7]. The AI contribution may be advanced machine learning, simpler predictive rules, or older coordination technology connected to faster operational decisions; therefore, the paper emphasizes what centers did and how they organized decisions, rather than treating reported savings as rigorous causal proof.

Despite these benefits, U.S. adoption remains limited. Of 6,093 U.S. hospitals, only 68 have a fully operational AICC [12]. About 1% of U.S. hospitals and roughly 300 hospitals globally have implemented AICCs [10]. Still, many hospitals use predictive AI tools that can serve as AICC building blocks. Seventy-one percent of U.S. hospitals use some predictive AI, and 86% of system-affiliated hospitals integrate AI tools with electronic health records [13]. Most applications remain confined to single functions such as scheduling, imaging, or billing, leaving AI in silos rather than providing the system-wide visibility and coordination AICCs can offer [14]. The CARE Framework demonstrates how AICCs can integrate predictive analytics across capacity, staffing, resources, and access.

The CARE Framework

This paper presents the CARE Framework, which includes Capacity Optimization, Adequate Workforce Alignment, Resource Coordination Across Hospitals, and Equitable Access to Care (Figure 1). Each pillar represents an operational decision area. The acronym CARE was selected because the pillars support patient care through more responsive and sustainable systems. Capacity Optimization focuses on forecasting bed capacity, shortening discharge times, and reducing emergency department bottlenecks. Adequate Workforce Alignment matches staffing resources to predicted patient acuity to avoid underuse or overuse. Resource Coordination Across Hospitals tracks, predicts, and redistributes critical resources during surges to support timely transfers and system-wide balance. Equitable Access to Care uses AICCs to identify gaps in service capacity and improve timely access across hospitals. The first two pillars are mainly intra-hospital or intra-system opportunities; resource coordination is explicitly inter-hospital; and equity can operate at both levels. Together, the pillars show how AICCs can convert fragmented operations into an integrated, predictive care model.

Figure 1: Key Components of the CARE Framework



Capacity Optimization

Capacity optimization is a foundation of effective hospital operations, ensuring that patients move smoothly from admission to discharge without unnecessary delays. In many U.S. hospitals,

overcrowded emergency departments (ED) and prolonged boarding times disrupt the entire care continuum, increasing patient risk and reducing throughput efficiency. AICCs address this issue by using real-time dashboards and predictive modeling to track bed availability, anticipate discharges, and manage system-wide patient transfers. Here, inputs include ED boarding, staffed beds, surgery schedules, discharge readiness, and transport status; outputs include bed priorities, discharge forecasts, and bottleneck alerts.

Hospitals in Canada and the United Kingdom demonstrate how AICCs can be helpful in capacity management. At Canada's Humber River Hospital, command-center analytics reportedly supported discharge timing and bed turnover, creating 35 additional inpatient beds [15]. Humber River Hospital reduced acute conservable bed days by 52% and ED patient wait times by 23%, despite an 8% increase in ED visits [16]. Similarly, the UK's Bradford Teaching Hospitals used real-time data across an 800-bed network to help staff anticipate bottlenecks and place patients in the wards best suited to their care [17, 24]. Bradford reduced bed misallocations by 90% and increased early discharges from 35% to 54% [17]. These case-study outcomes are useful as implementation examples, but they should not be read as causal estimates of AICC impact.

Within the United States, AICCs have shown reported operational gains at Johns Hopkins and Tampa General hospitals. At Johns Hopkins, the AICC brought together access-line staff, bed placement nurses, transport staff, and admitting staff to coordinate incoming transfers, ED admissions, operating room status, staffed beds, and beds waiting to be cleaned [18]. They assigned ED patients to beds 38% faster (3.5 hours faster) after the admission decision [18]. The reported mechanism was faster bed assignment, transfer coordination, and earlier response to inpatient bottlenecks. Occupancy rates rose from 85% to 92% after the implementation of the AICC, with $16 million in incremental savings generated for the hospital. Another example includes Tampa General Hospital, where 30 new beds freed by eliminating 20,000 excess days in patient stay helped generate $40 million in annual savings [19]. These cases show how AICCs can tie capacity data to decisions, while the savings figures should be interpreted as reported operating outcomes rather than isolated causal effects.

Management Actions for Implementing Capacity Optimization:

For healthcare administrators and executives, capacity optimization should be managed using

three key indicators: time-to-bed, ED boarding hours, and discharges by noon [20]. Leaders should review these metrics in a daily capacity huddle and assign clear ownership for actions such as accelerating discharges, opening surge beds, and prioritizing inpatient placement from the ED [21]. When these metrics are monitored consistently, hospitals can intervene earlier to reduce boarding and avoid system-wide congestion.

This pillar can be supported through a full AICC or through specific platforms such as TeleTracking or LeanTaaS, which apply AI to bed placement, discharge prediction, ED-to-inpatient throughput, and real-time capacity forecasting [22]. This pillar supports smoother patient flow, reduces bottlenecks, and promotes safer care delivery through more balanced use of hospital capacity.

Adequate Workforce Alignment

Adequate workforce alignment means the ability of hospitals to consistently match available personnel with the intensity and timing of patient care demands. In other words, it means having the right people in the right place at the right time to meet patient needs. This, in practice, is often harder to implement than it sounds. Traditional staffing methods struggle to adapt in environments where patient acuity can change within hours. AICCs address this challenge by using predictive analytics to anticipate census changes and coordinate workforce distribution across departments or entire hospital systems [9].

Hospitals in Australia and Britain illustrate the use of AICCs in predicting and adjusting healthcare personnel. Australia’s Alfred Health has enhanced the accuracy of scheduling for nurses and minimized unexpected overtime through AICCs, which improved staff satisfaction [23]. Similarly, Britain’s Bradford Royal Infirmary implemented AICCs to monitor patient flow and staffing pressure across units [24]. Although quantifiable outcomes are unavailable to the public for these hospitals, the following cases illustrate how AICCs can use available data to optimize the number of staff according to the current circumstances in a hospital. In this pillar, the main decision-point is whether leaders should adjust schedules, float-pool coverage, or redeployment before a unit is understaffed. These hospitals show how AICCs can contribute to properly utilizing the workforce and aiding staff well-being.

Duke University Hospital and the Cleveland Clinic are U.S. hospitals that have shown measurable

results with workforce management. Duke Health reported a 95% accuracy rate in predicting staffing needs through using AICC-related tools, leading to $40 million in annual labor savings and a significant reduction in nurse burnout [25]. Similarly, Cleveland Clinic reported that AI-assisted staffing and scheduling reduced workforce response times and allowed supervisors to identify stress points before patient care is affected [26]. These instances show how AICCs help executives make evidence-based staffing interventions that influence staff well-being, patient care, and financial performance. This unique benefit of AICCs shows that staffing precision should be of importance for organizational sustainability.

Management Actions for Implementing Adequate Workforce Alignment

Healthcare leaders must ensure that their workforce is used effectively, starting with real-time monitoring of staff use and anticipation of overall patient surges and droughts via AICCs [10]. The administrative staff should conduct predictive staff meetings every morning to estimate changes in patient volumes and redeploy employees before they run out of capacity [27]. The AICC staffing data allows HR departments and nursing leaders to design float pools and redeploy nurses more efficiently, reducing premium labor costs and improving workforce utilization [28].

It is important to note that leaders should be aware of the human and clinical challenges involved in adaptive staffing. Redeployment is not interchangeable labor, especially in specialized units that require specific competencies, credentials, and orientation. For example, a nurse trained for one ICU environment may not be immediately prepared to work safely in another specialty ICU without orientation, cross-training, or supervisory support. Staff may also resist being flexed away from familiar units on short notice. Therefore, AICC-based staffing should be paired with competency mapping, cross-training, float-pool planning, and frontline feedback to ensure redeployment is safe and practical [29].

In practice, these workforce-alignment actions can be supported through an AICC or through workforce-focused platforms such as UKG and Qventus, which use AI to forecast staffing demand, optimize schedules, and enable real-time redeployment decisions during surges [30]. By incorporating these processes into everyday operations, leaders can maintain workforce preparedness and ensure staff satisfaction, where each staff member can provide the best care possible for patients.

Resource Coordination Across Hospitals

Resource coordination across hospitals is particularly helpful during periods of extreme strain, such as seasonal influenza surges or mass casualty events. During the COVID-19 pandemic, hospitals globally experienced severe operational strains due to shortages of ventilators, ICU beds, personal protective equipment, and infusion pumps [31]. Facilities operated in silos, where a given hospital could run out of required supplies, but nearby hospitals had idle supplies [32]. In this pillar, AICC inputs come from multiple facilities, and outputs include regional strain alerts, transfer recommendations, and resource-allocation priorities. AICCs can predict PPE shortages, manage ICU utilization, and facilitate quicker redistribution of essential resources or patient transfers across multiple hospitals. AICCs, especially those made by General Electric (GE), are data agnostic, meaning that hospitals with varying electronic health records (EHRs) can still feed their data to AICCs for combined analytics [10]. This interoperability enables hospitals with disparate data systems to cooperate efficiently in times of emergencies.

The Saudi Arabia Ministry of Health is a global example of inter-hospital AICCs effectively managing resource coordination in times of crises. AICCs were implemented in all 308 hospitals around the country [10]. The live visibility of ICU beds, available ventilators, and surgical resources were provided to all hospitals, allowing administrators to transfer patients or resources using inter-regional hospital networks. The decision-points were based on where a patient, ventilator, or surgical resource should move within the network. Compared with pre-COVID-19 baseline performance, the network reported a 27% decrease in hospital length of stay and a 60% reduction in surgical wait times, even during peak COVID-19 operational strain [33]. This case illustrates that AICCs may serve as the connective structure between hospitals where supply and demand are brought in line.

There are also examples of AICCs enabling effective resource coordination among U.S. hospitals. The AICC at Oregon Health and Science University received data from all 62 hospitals in Oregon to provide real-time information on ICU occupancy, ventilator utilization, N95 masks, and PPE distribution. Here, the input was statewide data rather than one hospital’s bed board, which helped leaders see where strain was emerging. The system assisted in filling patient populations and alleviated stress on the ICUs of urban and rural facilities in Oregon during the COVID-19 pandemic [34]. On average, the number of days ICUs were stressed (i.e., 80% total ICU capacity or higher) across the country, was approximately 500 days during COVID, while the number of

days of stressed ICUs in Oregon was 16 days [35]. Another example of resource coordination is Advent Health in Central Florida, where one AICC connected 11 hospitals and 18 emergency departments. According to this system, hospital-to-hospital lateral transfers increased by over 600% during the pandemic, allowing 2,500 patients to be reallocated to open locations with open ventilators and ICU units [36]. These examples show how AICCs can facilitate hospitals' ability to share strain during surges while sustaining care delivery.

Management Actions for Implementing Resource Coordination Across Hospitals

For healthcare administrators and executives seeking to manage resources better, data transparency across facilities is integral to gaining maximum benefit. Executives must think about and establish interoperability agreements to enable the exchange of information across hospitals, irrespective of the EHR platform, to identify real-time equipment capacity and availability [37]. The information produced by AICCs will help leadership teams model surge scenarios and know how to reallocate resources during future surges.

Platforms such as Palantir Technologies and WellSky can also support this pillar by strengthening cross-hospital data integration and providing analytics for regional patient transfer, bed capacity visibility, and resource distribution across facilities [19, 38]. The formation of regional logistics teams that move patients, supplies, medications, and staff across hospitals, can further improve resilience as sites approach capacity, allowing for better overall patient care [39]. That helps the AICC output lead to a transfer, resource move, or escalation rather than the creation of another report.

Equitable Access to Care

Increasing equitable access to care is essential to helping hospital systems fulfill their mission of serving patients with fairness and efficiency. Inequities in care tend to be concealed in disjointed hospital operations. These gaps can be seen with AICCs, where data can be integrated among different departments and locations. When wait times, discharges, and transfer approvals are stratified by geography, insurance, language, race, or service line, administrators can identify who is underserved and link that information to capacity decisions. AICCs helps address inequities in care by increasing access to care across diverse communities.

Examples from England and Australia suggest that AICCs can help decrease geographic and systemic inequality. The South Tees Hospitals in England used its AICC to help rural patients gain greater access to specialized services, performing 22% more surgical operations and providing access to 15% more ICU beds during periods of high strain [40]. In Australia, the New South Wales Hospital AICC connects metropolitan and rural hospitals to monitor care delays, reducing rural patient transfer times by 18% and increasing access to care for these patients [23]. These outcomes show how AICCs can bridge service gaps between urban and rural hospitals, ensuring that patients receive timely and equitable access to critical care.

AICCs in U.S. hospitals have also helped increase equitable access to care. Using predictive analytics, Deaconess Health System was able to add capacity without new buildings to serve 2,000 more patients annually, which helped treat underserved populations [41]. Similarly, implementing regional dashboards within Providence Swedish Health System helped in organizing staffing and capacity in many states, providing treatment to more than 5,000 rural patients in the recent year [42]. These U.S. hospitals show how data-driven coordination can expand hospital capacity and create a more inclusive healthcare network. The access benefit depends on whether leaders use the information to change routing, scheduling, transfer approval, or outreach decisions.

Management Actions for Implementing Equitable Access to Care

For healthcare leaders, advancing equity requires administrators to consider demographic and geographic data such as wait times, transfer rates, and patient outcomes within AICCs to identify disparities and emerging trends [43]. Equity analytics platforms such as Arcadia and Veradigm can support this work by using AI-enabled predictive analytics and stratified dashboards to surface disparities in wait times, transfer patterns, and outcomes by race, language, insurance status, and geography, making inequities visible and trackable over time [44].

Leadership teams can establish unified transfer and diversion protocols that automatically direct patients from lower resourced hospitals to those with available capacity, ensuring system-wide balance [45]. Executives should conduct regular reviews of equity scorecards and communicate progress transparently to both staff and the community to promote trust and shared

responsibility in achieving equitable care.

Equity-focused expansion also requires financial planning; if an AICC increases transfers, admissions, or specialty access for underinsured or uninsured patients, the hospital may experience higher uncompensated care and not fully realize the financial benefits of the AICC. This does not weaken the ethical case for equitable access, but it does mean that leaders should monitor payer mix, uncompensated care, charity care, avoided transfers, and downstream reimbursement when evaluating AICC return on investment [46]. This is especially important because many hospitals already operate with limited margins and face pressure from labor costs, supply costs, Medicare and Medicaid underpayment, and rising uncompensated care.

Implementing and Operationalizing an AI Command Center

To utilize the CARE framework effectively, hospitals must first implement an AI Command Center (AICC). Generally, large academic or multi-hospital systems are best positioned to lead the adoption of AICCs due to the scale of data and coordination involved, as well as the significant capital investment required [9]. Medium to smaller-sized hospitals can participate by partnering with larger health system AICCs and feed their data virtually. It is important to note that an AICC is only as reliable as the source data entered by each facility. Bed status, staffing availability, discharge readiness, supply counts, and patient acuity can be delayed, incomplete, or shaped by local workflow pressures. Therefore, AICC implementation should include data governance, standardized definitions, audit checks, and leadership accountability before outputs are used for staffing, transfer, or resource decisions. This approach has been demonstrated to be effective through Oregon Health and Science University’s AICC and the state’s surrounding hospitals during the COVID-19 pandemic [35]. This type of collaborative approach ensures hospitals of all sizes benefit from AICC insights and move toward a connected data-driven healthcare network.

Although there are AI-enabled platforms discussed in this paper that support individual CARE pillars (e.g., TeleTracking, Qventus, and Palantir), GE Healthcare’s Command Center model is positioned as a comprehensive solution that integrates these pillar-specific capabilities into a single, unified AI Command Center to operationalize the CARE framework across hospital operations [47]. This comparison is presented to distinguish between pillar-specific implementations and enterprise-wide command center models rather than to endorse a specific

vendor.

Starting an AICC from the ground up will require a multidisciplinary effort involving administrators, IT specialists, executives, physicians, and nurses [9]. Early engagement of diverse staff ensures that the AICC reflects the hospital's unique operational challenges and addresses staff apprehension about AI. When clinicians and frontline teams participate in shaping the system, they develop a sense of ownership that promotes trust and confidence in technology. Likewise, involving executives and department leaders in this process creates an environment of collaboration where both clinical and administrative stakeholders are invested in the AICC's success.

Historically, the operational capabilities of AICCs are implemented in phases, with, for example, an initial focus on capacity management, then on staffing alignment, and subsequently, on other areas of operations covered under the CARE framework [48]. In the process of implementing AICCs, administrators and executives can learn from early adopters. For example, Johns Hopkins Hospital has hosted hundreds of peer visits and helped over 20 other institutions, such as Duke Health, New Haven Health, and HCA Healthcare, launch their own AICCs based on their experiences [18]. Such collaboration will accelerate adoption and help hospitals to turn data insight into system-wide improvements in operational performance.

Administrators must also plan for a significant investment; building a state-of-the-art AICC could cost roughly $10,000,000 or more [49]. Although upfront costs are significant, hospitals have reported substantial returns: Virginian Franciscan Health achieved a 12:1 ROI, Johns Hopkins generated $16 million in savings, and Tampa General and Duke Health each reported $40 million in savings [50-52, 25]. While these savings are promising, they should be interpreted cautiously. In many hospitals, command center implementation occurs alongside broader performance improvement work, process redesign, staffing changes, and leadership attention to throughput. Therefore, the impact of AICCs could be more safely interpreted as an enabling infrastructure that helps hospitals organize, accelerate, and sustain operational improvement efforts. In sum, launching an AICC is a significant investment, but the return may justify the cost when the center is paired with process redesign, reliable data, and clear decision ownership. Reported financial gains should still be attributed cautiously.

Conclusion

AI Command Centers (AICCs) can reshape how hospitals operate by creating interconnected systems that use real-time data and predictive analytics to improve patient flow, resource utilization, and overall care quality. Guided by the CARE framework, they bring structure and foresight to hospital management. When hospitals implement AICCs with reliable data, clear workflows, and human oversight, these centers can support more efficient and equitable care in an increasingly complex healthcare system.

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Abstract

What is the message? India's Ayushman Bharat Digital Mission (ABDM), launched in 2021, has built a foundational digital health infrastructure at unprecedented scale, with over 880 million unique health identifiers, 500,000+ registered facilities, and 1,000+ integrated private companies. Yet the pace of engagement has not been in line with

enrolment: active record linkage and cross-facility retrieval remain far below the thresholds needed to generate clinical value. This paper argues that moving from infrastructure to impact requires a three-pronged approach: treating insurance penetration as the binding constraint and formalizing claims through National Health Claims Exchange (NHCX), investing in education and training to convert passive registrants into active users, and restructuring incentives through a combination of performance-linked payments and national mandate frameworks that close the gap between NHA's convening role and the regulatory authority held by Insurance Regulatory and Development Authority of India (IRDAI) and the Ministry of Health and Family Welfare.

What is the evidence? Drawing on 15 primary interviews between January and March 2026 with ecosystem participants spanning government bodies, development organizations, digital health startups, and large healthcare companies, alongside government dashboard data and published literature, this paper examines adoption patterns across public and private sectors, presents case studies from multiple states illustrating diverse implementation paths, and identifies the structural incentive misalignments that constrain the transition to digitally enabled care in India.

Keywords: Digital Health, Health Policy

Timeline: Submitted May 25, 2026; accepted after review July 10, 2026.

Cite as: Alekhya Kommuru, Divyansh Agarwal. 2026. From Infrastructure to Impact: Operationalizing India's Ayushman Bharat Digital Mission. Health Management, Policy and Innovation (HMPI.org). Volume 11, Issue 2.

Introduction

India's healthcare system faces structural challenges of extraordinary scale. With a population of 1.4 billion, a doctor-to-patient ratio of approximately 1:1,000 nationally (dropping to 1:4,500 in

rural areas), and out-of-pocket expenditures historically representing nearly half of total health spending, the gap between supply and demand cannot be addressed through incremental reform (1). The government of India recognized that technology would need to function as a structural solution rather than an administrative convenience.

The Ayushman Bharat Digital Mission (ABDM) was launched nationally in September 2021. Building on the India Stack, which comprises Aadhaar biometric identity for 1.4 billion people, the Unified Payments Interface (UPI), which processed 117 billion transactions in 2023, and the Jan Dhan financial inclusion program, ABDM sought to do for healthcare what UPI had done for payments: create a shared, interoperable infrastructure layer that reduces friction, enables private innovation, and makes longitudinal care coordination possible at population scale. (2,3)

A prior paper examined ABDM's architecture and its foundations in India's digital public infrastructure strategy. If you are new to ABDM and its components, we strongly suggest reading it first. (4) This paper examines what has happened since: how ABDM is being operationalized on the ground, what adoption patterns have emerged across public and private sectors, and what structural changes are needed to move from infrastructure to impact.

This paper draws on 15 semi-structured interviews conducted between January and March 2026 with participants across India's public and private healthcare ecosystem. Interviewees included representatives from government bodies, development organizations, digital health startups, and large healthcare companies, spanning both frontline practitioners and central policy-level participants. Interview insights were synthesized through iterative discussion between the co-authors and reviewed by Professor Kevin Schulman, drawing on his expertise in digital health system design. These primary insights were triangulated against government dashboard data, peer-reviewed literature, and published policy documents throughout the analysis.

ABDM Architecture and Adoption

Architecture

ABDM's architecture comprises five interconnected components: ABHA (Ayushman Bharat Health Account), a unique 14-digit health identifier; the Health Professional Registry (HPR); the Health Facility Registry (HFR); a patient-controlled personal health record (PHR) application; and

the Unified Health Interface (UHI), an open protocol for healthcare transactions. Two critical gateways have since been added: NHCX (National Health Claims Exchange) for digital insurance claims processing, and the Health Information Exchange and Consent Manager (HIE-CM), which enables patients to grant and revoke consent for cross-facility data sharing. A defining architectural choice, federated rather than centralized storage, means patient data resides with facilities and is shareable with consent across the network, rather than aggregated in a central repository. (4)

As of May 2026, ABDM's enrollment figures are substantial: 880+ million ABHA accounts, 500,000+ registered health facilities, and 860,000+ enrolled healthcare professionals. However, these figures require careful interpretation (5)(6). The CoWIN vaccination platform seeded approximately 130 million initial accounts without explicit separate consent, and Pradhan Mantri Jan Arogya Yojana (PM-JAY, a health insurance scheme offered by the Indian Government) integration has been the dominant driver of ABHA creation. A re-application anomaly, in which large numbers of duplicate creations appear in dashboard data, suggests the true denominator of unique active patients is materially lower than headline counts imply. (6)

ABDM distinguishes three engagement milestones: M1 (ABHA creation), M2 (record linkage within a facility), and M3 (cross-facility record retrieval). M1 has achieved mass scale. M2 activity is anchored to workflows like QR-based appointment check-in followed by prescription delivery to a health locker. M3, the milestone that would make ABDM genuinely valuable for care coordination, remains extremely low. This is the use case where the system's full value lies: a patient presenting at a new facility can consent to share records from prior encounters, enabling a clinician to make informed decisions without redundant testing. (5) (6)

Adoption Challenges: Consent, Labs, and Pharmacies

The steepest drop-off in the ABDM adoption funnel occurs between M2 and M3. Based on research and interviews with people familiar with ground-level execution, the consent framework emerged as a persistent friction point. When a provider wishes to retrieve records from another facility, the patient must locate a notification in their PHR app, review time-bound consent parameters, and approve the request. In practice, this loop has proven difficult to close in high-volume settings: patients are frequently unaware that a notification has been sent, the interface presents a learning curve for first-time users, and in public hospitals that provide free

diagnostics, clinicians often find it more expedient to reorder tests than to navigate the retrieval workflow. A promising design direction suggested by stakeholders is to simplify consent to a QR scan plus biometric or PIN confirmation at the point of care, analogous to a UPI transaction, while preserving the privacy safeguards that make the consent architecture trustworthy. The "Scan and Share" initiative has shown meaningful progress in reducing registration wait times, though implementation teams have noted a task-shifting dynamic at high-volume facilities where congestion, rather than eliminated, is redistributed to specialist referral desks.

Three broader implementation challenges compound these ground-level friction points. First, interoperability between ABDM's open standards and the large installed base of legacy Hospital Management Information Systems remains unresolved. Many facilities run proprietary software with no ABDM-compliant API layer, and integration costs for mid-sized providers are estimated at INR 30-50 lakh. Second, provider workflow burden is a persistent barrier: ABDM's value to the patient is real, but the workflow steps required of a physician during a two-to-five-minute consultation in a high-volume public facility can add time rather than save it. Third, data governance under the 2023 Digital Personal Data Protection Act (DPDPA) introduces compliance obligations like consent artifact storage, data localization requirements, and cross-entity sharing rules, all of which create legal uncertainty for private health technology companies building on ABDM infrastructure.

In the short term, labs and pharmacies provide a great opportunity to close this gap. However, laboratory adoption has been constrained by a circular incentive gap: incumbent Laboratory Management Information System (LMIS) vendors have been slow to build ABDM-enabled versions without demand from labs, while labs have had limited incentive to request integration without patient-side pull. Breaking this dynamic would bring diagnostic results into the ecosystem. Pharmacy integration presents a similarly clear pathway: a viable digital prescription-retrieval workflow would give pharmacies a meaningful role and create a natural forcing function for broader provider and patient engagement.

Multimodal State-Level Implementation

States have been leading the charge in deeper ABDM adoption and implementation. Across the 28 states and 8 union territories, three implementation archetypes have emerged, matching policy levers to local conditions. These archetypes are not mutually exclusive and several states

show elements of more than one.

Private-Sector Engagement: Karnataka, Maharashtra, Gujarat

These states have a relatively concentrated urban private market and a vendor ecosystem that has built ABDM-compliant Hospital Management Information Systems (HMIS). Karnataka has achieved 93.9% Health Facility Registry (HFR) verification and meaningful engagement from private clinics and hospitals, supported by professional networks and targeted field engagement that generated trust signals cascading to smaller providers (7). Maharashtra's Mumbai PATH pilot, IMA partnerships, and ward-level field teams have begun to onboard small clinics, although providers report few tangible incentives once field teams withdraw. Adoption in this archetype tends to begin with appointment booking and basic registration rather than full clinical record integration, and the model's replicability is constrained by its dependence on concentrated urban markets (8).

Public-Infrastructure-Led: Tamil Nadu, Uttar Pradesh, Kerala, Rajasthan

Uttar Pradesh has rolled out Scan and Share at scale, with more than 22.7 million tokens issued, supported by IMA-UP WhatsApp peer groups and a strong state program management unit (9). Tamil Nadu has paired the Makkalai Thedi Maruthuvam (healthcare at your doorstep) community's Non-Communicable Disease (NCD) outreach program with eSanjeevani, and is thus recording one of the highest volumes nationally (10). Kerala's 'eHealth Kerala' UHID platform covers more than 600 institutions and leverages the highest level of frontline digital literacy in the country, but faces identifier friction between UHID and ABHA and uneven module adoption (11). Rajasthan's iHMS auto-enrolls ABHA at the front desk, but an ABHA-to-EHR linkage rate of below 20% illustrates what happens when enrollment-oriented incentives are not balanced by usage-oriented accountability. The shared challenge across these states is that records are produced at outreach or front-desk events but are not consistently retrieved at subsequent facility visits.

Telemedicine-Integrated: Andhra Pradesh, Telangana, Madhya Pradesh

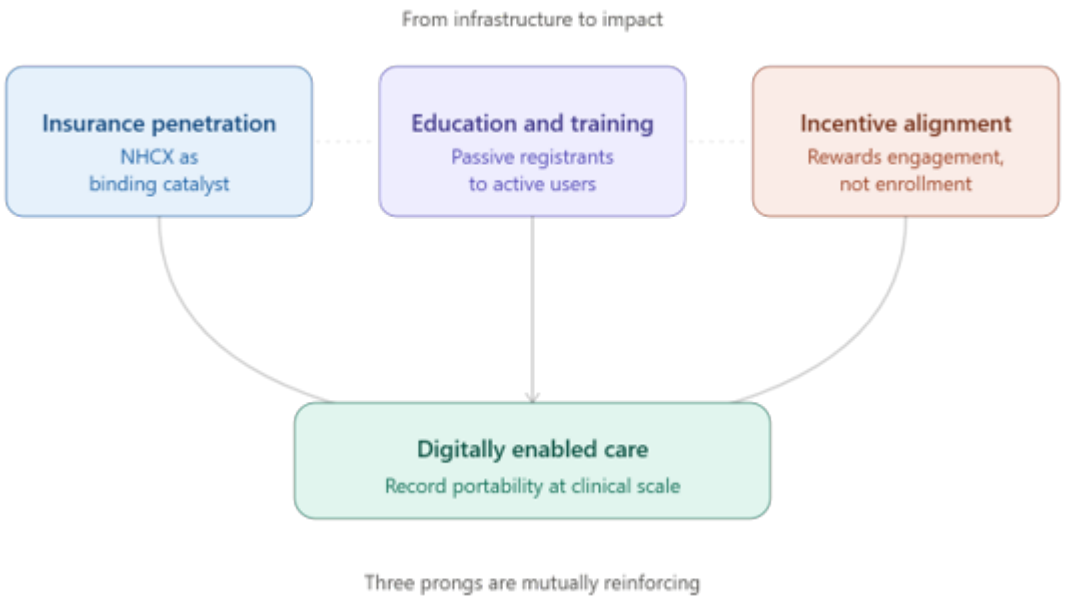
The shared anchor in this archetype is eSanjeevani teleconsultation at Ayushman Bharat Health and Wellness Centres (AB-HWC), where community health officers provide assisted consultations that generate ABHA-linked digital prescriptions. Andhra Pradesh and Telangana have built hub-

and-spoke arrangements with ABHA-linked NCD screening, and Telangana reports more than 98% AB-HWC coverage (12) (13). Madhya Pradesh ranks among the top five contributor states nationally for eSanjeevani volumes (14). The model reaches populations that no self-service digital application could serve, but its characteristic failure mode is episodic value: teleconsultations produce records that are not consistently retrieved at subsequent in-person encounters, and the continuity loop that would make ABDM clinically meaningful for chronic disease management remains largely untapped. The digital divide here is a design constraint that requires workflow solutions, not just technology solutions.

Across all active archetypes, two patterns repeat: adoption begins at registration rather than at clinical record use, and engagement plateaus once field teams withdraw unless a downstream incentive sustains it.

The Way Forward: A Three-Pronged Approach

Based on our interviews with people closer to the ground and to the central policy level, and drawing learnings from research across similar globally successful models within healthcare, we suggest a three pronged approach to move ABDM from infrastructure to impact.



1. Insurance Penetration as the Binding Constraint

A central reason ABDM's clinical value remains latent is that the underlying payment system does not yet reward digitization. India's health spending is dominated by out-of-pocket payments at the point of care, roughly 48.8% of total health expenditure, against 40.8% government spending and only 5.8% private health insurance (8). When patients pay cash and providers maintain cash-based bookkeeping, neither side gains immediate value from electronic claims, structured records, or interoperable history.

This is why NHCX matters disproportionately. As insurance penetration rises, whether through PM-JAY expansion, employer-sponsored plans, or individual cover sold under IRDAI's expanded mandates, the share of payments that must flow through a digital adjudication path grows. Each additional insurance-paid encounter is, by construction, an encounter that benefits from ABDM compliance: a digital claim, a structured discharge summary, and a verifiable record. The current cash dominance will loosen as insurance share rises, and we recommend directing policy levers at accelerating that shift.

ABDM's most persistent structural challenge on the provider side is that integration requires upfront investment with uncertain commercial return and no regulatory mandate. For payers, NHCX offers a clear commercial incentive: digital claims processing reduces fraud, accelerates the approximately 45-day average settlement cycle, and lowers administrative costs. We recommend that IRDAI require all health-insurance claims above a defined threshold to be processed through NHCX within a fixed transition window, creating an immediate mandate for insurer participation and, by extension, pressure on empaneled facilities to comply. Making NHCX integration a condition for PM-JAY empanelment would create a mandate-adjacent incentive structure that drives provider-side adoption.

2. Education and Training

A substantial share of ABDM's adoption gap is not technological but behavioral. Patients who have registered for ABHA do not understand what it does, providers who have onboarded facilities do not use digital workflows as part of the consultation, and frontline health workers who generate records through assisted channels are not trained to close

the loop with patients on record retrieval. We recommend addressing this by investing across three levels.

At the patient level, the 880+ million individuals with ABHA accounts represent a registered population that has never been systematically informed about the value of their health account. We recommend a targeted national awareness program, delivered through Aarogya Setu, PM-JAY communications, and community health workers, to convert passive registrants into active PHR users.

At the provider level, the gap between facility registration and clinical workflow adoption is a training problem as much as an incentive problem. Short structured modules integrated into continuing medical education, focused on the three most common ABDM workflows (QR check-in, prescription push, and consent-based record retrieval) would reduce the friction that currently makes paper feel faster.

At the system level, community health officers at AB-HWCs, who are already the primary interface between ABDM and rural populations, need training on closing the post-visit loop: explaining to patients that their teleconsultation has generated a digital record, how to access it, and why it matters for their next encounter.

3. Incentive Alignment: Sticks, Carrots, and Mandates

The third prong addresses the structural reality that ABDM's current incentive architecture rewards enrollment over engagement and leaves participation voluntary for actors whose involvement is necessary for the system to function. We propose action on both incentive reform and mandate mechanisms.

In terms of reforming existing incentives, one solution could be changing the INR 20 per ABHA payment structure to reward active record linkage rather than mere account creation. Performance-linked payments to facilities based on M2 and M3 transaction volumes, modeled on the incentive logic of PM-JAY empanelment payments, would shift provider behavior toward the outcomes that generate clinical value. For private health technology companies, a tiered compliance framework that provides preferential access to ABDM's digital sandbox, faster certification timelines, and API rate allowances in exchange

for demonstrated M3 transaction volumes would create a commercial reason to invest in the harder adoption problems.

Mandate mechanisms offer a complementary path and as discussed earlier, processing health insurance claims through NHCX and making ABDM compliance at M2 level a condition of PM-JAY empanelment, can be helpful levers. Besides these, the National Medical Commission, operating through state medical councils, could require HPR registration and verification as a precondition for license renewal, addressing the bottleneck that currently leaves a significant share of registered providers unverified and limiting the clinical trust that depends on a credible provider directory.

The National Health Authority is a convening and implementation body, not a regulator; it cannot, on its own authority, compel facilities or insurers to adopt the standards it publishes. Genuine adoption inflection will therefore require either NHA partnerships with regulators that already hold mandate authority, or a national-level mandate channeled through Parliament or the Cabinet. A national mandate framework that defines a minimum compliance floor while preserving state discretion over implementation is the policy architecture we propose.

Each of the above addresses a distinct failure mode in the current adoption trajectory, and the three are mutually reinforcing: progress on insurance penetration creates the financial incentive for providers to engage; education and training equips both patients and providers to use the system once the incentive exists; and incentive alignment through government policy ensures the system does not remain voluntary for actors whose participation is structurally necessary.

Lastly, two segments — labs and pharmacies — offer a near-term opportunity to accelerate this dynamic without waiting for broader mandate frameworks. We recommend targeted API support and onboarding incentives directed at LMIS vendors, combined with a viable digital prescription-retrieval workflow for pharmacies, to bring diagnostic results and medication records into the ecosystem and create natural forcing functions for both provider and patient engagement.

Conclusion

ABDM represents a genuine architectural achievement. In five years, India has built the infrastructure for a federated digital health ecosystem at a scale no comparable country has achieved. The central challenge is now the transition from infrastructure to impact, a transition that requires behavioral change among all ecosystem stakeholders, each operating under different incentive structures. The history of digital health implementation globally, from HITECH in the United States to NHS Digital in the United Kingdom, suggests that infrastructure build-out is the easier part. Adoption is harder, and clinical impact is hardest of all.

The three-pronged approach outlined above addresses each of the structural failure modes that currently prevent ABDM from delivering clinical value at scale. None of these interventions is technically complex; all of them require political will and cross-institutional coordination. It's also important to mention here that ABDM is ultimately intended to address the provider shortage in India through the development of a platform for digital services for patients. M2/M3 data exchange should be seen as the prerequisite building blocks of these high-quality services, not as the destination for the program. India's extraordinary physician shortage means the value of longitudinal records, which enable a stretched clinical workforce to deliver more effective care in shorter encounters, is higher here than almost anywhere. The architecture exists. The task now is activation.

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Acknowledgements

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The authors conducted over 15 interviews for this research across India's public and private healthcare ecosystem, from frontline practitioners to state and central policy makers, from start founders to large health system executives. We thank all our interviewees for their time and candid feedback. We also have deep gratitude to Professor Kevin Schulman (Stanford University) for this support, insights and guidance throughout this journey. Interviews were conducted between January and March 2026. No specific funding was received for this work.

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Abstract

What is the message? Using artificial intelligence (AI)-enabled clinical decision-support systems without changing workflows, decision authority, and governance structures can raise cognitive and administrative workload. Evidence shows that when AI is added to existing processes instead of being integrated into redesigned workflows, the burden on clinicians and the risk of burnout increase.

What is the evidence? Health management and health informatics research, including multi-hospital studies of AI-enhanced electronic health record systems and systematic reviews, show associations between AI implementation, increased cognitive burden, and higher burnout risk when AI is added to existing processes rather than integrated through thoughtful management redesign. [1-9] This article argues that AI-enabled clinical decision support should be viewed primarily as an organizational design challenge rather than a technology challenge. AI alters workflows, decision authority, and incentives, and these changes often lead to increased burnout risk when not accompanied by redesign. Finally, the article outlines practical leadership actions to connect AI implementation with workforce sustainability and patient care.

Keywords: Artificial Intelligence, Administrative Burden, Clinical Decision Support

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Systems, Organizational Design

Timeline: Submitted May 11, 2026; accepted after review July 2, 2026.

Cite as: Kalgi Modi. 2026. When AI Becomes Extra Work: Redesigning Clinical Decision Support Without Clinician Burnout. Health Management, Policy and Innovation (HMPI.org). Volume 11, Issue 2.

The Problem AI Was Supposed to Solve

In many hospitals today, clinicians interact with screens much more than they review schedules or patient histories before a visit. AI-enabled clinical decision-support systems introduce continuous prompts, alerts, and recommendations that interrupt patient encounters and disrupt the flow of care. Rather than quietly supporting clinical reasoning, these systems now compete for attention, shaping how clinicians focus, patients experience care during clinical encounters, and leaders interpret performance.

AI-enabled clinical decision-support systems (AI-CDSS) were created to address major challenges in clinical practice. In this article, AI-CDSS refers to clinical decision-support tools that healthcare institutions approve; these tools are integrated into healthcare workflows and include systems for risk prediction, supporting triage, assisting with clinical documentation, generating alerts, offering imaging help, and recommending treatments. AI-CDSS does not refer to fully autonomous clinical AI systems, consumer health chatbots, or experimental generative AI tools that operate outside of formal care delivery settings.

Clinical practice challenges include increasing documentation demands, more complex patients, limited time during consultations, and the need to follow more clinical guidelines. AI-CDSS promised to help ease these pressures by assisting with tasks like flagging abnormal lab results, identifying patients at risk of deterioration, recommending evidence-based treatments, and prioritizing clinical tasks under time constraints. Early research appeared to support many of

these expectations: evaluations of AI-supported triage and risk-stratification systems reported improved throughput, better prioritization of high-risk patients, and earlier identification of clinical deterioration. [2][10]

However, real-world use has shown a different set of challenges. In practice, many AI-CDSS implementations have introduced new layers of interaction rather than replacing existing work.[5][13] Clinicians must verify algorithm-generated risk scores, acknowledge alerts even when they are obvious, and explain any deviations from AI recommendations. In inpatient and intensive care settings, this can lead to dozens of alerts per shift, many of which require documentation regardless of their importance. What was intended to reduce cognitive burden often redistributes it into new, less visible forms of work.

These effects worsen when multiple AI tools, often created by different vendors and yet part of the same electronic health record (EHS) system, run simultaneously without coordination. Separate systems can create overlapping alerts, conflicting recommendations, or redundant documentation obligations. Instead of acting as a unified support system, uncoordinated AI tools divide attention and slow down decision-making, creating more challenges than any single tool used on its own.

Importantly, the AI-CDSS discussed here are not experimental or unregulated technologies. They are institutionally approved, regulator-compliant systems deployed within controlled electronic health record environments. Yet even within these mature settings, health systems face growing incentives to adopt AI, including competitive pressures, policy expectations, and organizational goals related to innovation. This can create pressure to implement systems before workflows are fully redesigned. The continuing challenges in these regulated settings therefore suggest that the integration of approved AI systems into clinical processes, not gaps in regulation or underdeveloped technology, are the core issue.

The shift from rule-based alerts to AI-enabled clinical decision support has increased the volume and complexity of interactions between clinicians and systems. [1][13] If workflows and decision-making authority are not redesigned, these systems may lead to more monitoring and verification work instead of a decrease in tasks. Reducing workload relies not just on better algorithms but also on rethinking workflows and decision-making structures.

These challenges mainly reflect leadership decisions regarding workflow design, task distribution, and governance. Research on successful health information technology implementation consistently highlights the importance of multidisciplinary pre-deployment workflow reviews that include clinicians, nurses, and IT teams.[6][15] When organizations introduce AI without adjusting the workflow, they may add verification and documentation tasks instead of reducing them. Some increase in workload is expected during technological transitions. The key challenge for leadership is to stop temporary complexity from becoming permanent.

From Support to Surveillance: How AI Changes Clinical Work

Before examining burnout as a design outcome, it is important to understand how AI-enabled clinical decision support systems change everyday clinical work. This essay takes a socio-technical view to explore these changes. Socio-technical theory focuses on how work outcomes result from the interaction among people, tasks, technologies, and organizational structures, rather than from technology alone. In clinical settings, this means that AI changes not just the availability of information, but also responsibility, coordination, and professional judgment.

One consequence of these changes is the creation of new forms of work that often remain invisible in traditional productivity measures. One of the most significant changes brought about by AI-CDSS is the increase in verification work. Verification work involves the extra mental and administrative effort needed to confirm, acknowledge, or reject AI-generated recommendations before taking clinical action. For instance, when an AI-CDSS flags a patient as “high risk” for deterioration, clinicians often must check the underlying data, acknowledge the alert, and record whether they agree or disagree with the recommendation even when the clinical assessment is already clear. What used to be internal clinical judgment is now an external task shaped by system prompts, documentation requirements, and organizational expectations. Similar findings have been reported in studies of EHR-based clinical decision support, where clinicians spent additional time reviewing alerts and documenting responses even when patient management did not change. [5][13]

Verification work fragments clinical attention during patient interactions where communication, reassurance, and trust are critical. Increased focus on alerts and documentation can lower eye

contact, disrupt communication, and impact the perceived quality of care and patient satisfaction. In high-acuity settings, constant alarms and interruptions can raise anxiety for patients and families. These signals often indicate possible instability, even if the alerts do not require immediate clinical response. [14] While AI-CDSS aims to improve safety, poorly integrated systems can unintentionally divert attention from the patient. However, when designed effectively, these systems can lessen documentation demands and create more room for meaningful human interaction. The design of AI-CDSS affects not only clinician workload, but also patient experience and trust.

Alert volume intensifies this burden. AI-CDSS often generate alerts more frequently than earlier rule-based models because they continuously update risk predictions. McDonald et al. found that clinicians exposed to higher alert frequencies reported significantly higher perceived workload and emotional exhaustion, even with improved alert accuracy. In other words, better predictions did not lead to a better work experience when alert volume increased. The study showed that the cumulative effect of frequent alerts, not their individual usefulness, was strongly linked to burnout symptoms.[4]

As organizations work to ensure proper use of AI-CDSS, monitoring grows alongside decision support. They track override rates, review compliance dashboards, and monitor deviations from AI recommendations, which may lead to additional documentation requirements. In some organizations, clinicians feel that they need to explain more when they ignore AI guidance than when they follow it, especially if overrides are monitored or checked.[9][18]

These dynamics suggest that AI implementation can shift portions of clinical work from interpersonal coordination toward system monitoring and compliance activities. Tasks that were once handled through team discussions or professional judgment are now managed through individual interactions with automated systems. Studies on social and technical factors reveal that when technology alters relationships among people, tasks, and tools without changing workflows, coordination declines and cognitive demand increases.[3]

Empirical studies support this pattern. Research on AI-enabled documentation and decision-support tools found higher burnout scores after implementation, even with small efficiency gains. For instance, while the time spent on documentation per note decreased, clinicians reported greater mental fatigue due to the sustained need to interact with and monitor the

system.[4][9] These analyses suggest that improvements in organizational performance and clinician experience do not always go hand in hand. This is especially true when new tasks are added without removing existing responsibilities for an already constrained workforce.

Clinician resistance to AI should not be seen as irrational or technophobic. Often, skepticism comes from valid concerns about workflow disruption, accountability, and professional autonomy. When AI adds more verification, monitoring, and documentation without easing other demands, resistance is a reasonable reaction to poorly designed systems.

Burnout as a Design Outcome, Not a Personal Failure

Burnout related to AI-enabled clinical decision-support systems should not be seen as a personal failure to adjust to technology. Studies on health information technology, including AI-enabled clinical decision support in electronic health records, consistently show that dissatisfaction comes more from the design, implementation, and management of these systems in clinical work than from the technology itself. Here, “health IT” specifically refers to officially approved digital systems, including AI-CDSS, that influence clinical decision-making, documentation, and care coordination. [13]

Across studies of AI-enabled clinical decision support and broader health information technology implementations, the sources of dissatisfaction are remarkably consistent despite differences in technologies, clinical settings, and implementation strategies. Three repeated issues stand out: misaligned workflows, unclear decision authority, and misaligned incentives. For instance, when AI-CDSS generates alerts but does not eliminate existing documentation obligations, clinicians experience workflow misalignment, with tasks piling up rather than being replaced. When it is unclear who is responsible for decisions, whether responsibility lies with the clinician, the organization, or the algorithm, clinicians may respond by increasing documentation or relying more heavily on AI recommendations to reduce perceived accountability risk. When efficiency gains benefit the organization without visible reinvestment in staffing or reducing workloads, the incentives continue to diverge between leadership priorities and frontline experiences. Similar implementation challenges have been reported in various health information technology projects. When technology was adopted without changing workflows, users felt less satisfied and believed their workload increased. [13][15]

When organizations do not measure these effects, burnout is often misattributed to individual resilience rather than system design. Without metrics to capture cognitive demand, alert volume, or workflow fragmentation, organizational performance reviews often focus on algorithm accuracy, adoption, and utilization metrics. Meanwhile, the human impact stays mostly unseen.

Cognitive demand theory helps explain why these design choices matter in clinical settings. Cognitive strain increases when work involves frequent task switching, sustained attention to multiple information streams, and quick decision-making in the face of uncertainty. In AI-supported clinical contexts, such as inpatient monitoring, risk stratification, and triage, AI-CDSS can intensify all three conditions simultaneously, particularly when alerts, recommendations, and documentation requirements are layered onto existing workflows.

Table 1 uses the socio-technical model of health information technology. This model views clinical work as a mix of people, tasks, technologies, and organization. Instead of requiring readers to infer this system from previous studies, the table shows how misalignment in these areas manifests in AI-CDSS implementations. When technology doesn’t fit well with the workflow, when management policies focus more on compliance than on judgment, and when feedback loops center only on technical performance, burnout becomes a predictable organizational risk when these sources of cognitive demand persist over time.

Table 1. Socio-technical domains of AI-CDSS and related burnout drivers

Socio-technical Dimension	How AI-CDSS shapes work across this domain	Burnout / Cognitive Load Implications
Hardware & Software	Embedded AI models, alerts, dashboards within EHR systems	Increased interruptions, alert fatigue, task switching
Clinical Content	Risk scores, predictions, recommendations without context tailoring	Verification burden; reduced sense of professional judgment
Human-Computer Interface	Pop-ups, mandatory acknowledgements, override prompts	Fragmented attention; cognitive overload
People	Clinicians expected to adapt to AI outputs with minimal training	Stress, reduced autonomy, erosion of psychological safety
Workflow & Communication	AI layered onto existing workflows without task removal	Work intensification; longer task completion times
Internal Organizational Policies	Monitoring of compliance, override tracking, performance dashboards	Surveillance anxiety; defensive reliance on AI
External Rules & Regulations	Regulatory pressure to document adherence to guidelines	Increased documentation load; risk-averse behavior
Measurement & Monitoring	Focus on accuracy and utilization metrics	Burnout remains invisible and unmanaged

Adapted from the socio-technical framework suggested by Sittig and Singh (2015).

The persistence of burnout, despite ongoing technical improvements, highlights this. Even as algorithms improve, dissatisfaction may persist even as technical performance improves when workflows remain unchanged. This reflects the broader “health IT paradox,” in which adoption rates increase while end-user satisfaction declines. [14] Technology alone can’t fix the structural and cultural problems rooted in clinical work.

Decision Authority, Trust, and Automation Bias

Trust in AI-based clinical decision support involves more than just clinician faith in algorithms. Trust in healthcare decisions is shaped by confidence in clinicians, institutions, regulators, and, increasingly, digital technologies. In some cases, AI can increase skepticism by raising worries about surveillance, opacity, or loss of professional autonomy. In others, it may increase confidence by improving consistency and supporting decisions under pressure. These tensions apply to both highly interpretable ("glass-box") systems and more opaque ("black-box") models. While explainable AI may improve transparency and clinician understanding in some settings, both types of systems can still increase verification work, documentation burden, and override pressure when implementation outpaces workflow redesign. The challenge for leaders not only is to build trust in AI, but also to understand how trust is shared among clinicians, organizations, patients, and technology.

When it's unclear who holds responsibility, whether it's the clinician, the organization, or the AI system, clinicians may change their behavior out of caution. For instance, if moving away from AI guidance requires extra documentation or review, following the recommendation might seem safer than using one's own judgment. In these situations, relying on AI may reflect institutional accountability pressure as much as confidence in algorithm performance. Research on automation bias suggests that diagnostic errors can increase when clinicians rely heavily on AI recommendations under time pressure or uncertainty. [18]

These dynamics also impact patients and families. Some patients may see AI-supported decisions as more objective or based on data. Others might find them impersonal or hard to question. Trust thus becomes about relationships instead of just technical aspects. It is influenced by how clinicians explain their recommendations and how organizations convey the role of AI in care delivery.

As AI becomes embedded in routine workflows, skepticism may gradually shift toward greater reliance. [13] Without well-defined guidelines for questioning and overriding AI recommendations, sustained reliance may gradually increase the risk of automation bias and reduce independent review of recommendations.

Leadership is fundamental in changing this direction. Clarifying decision authority involves

clearly stating when AI provides advice, when clinicians have the final say, and how overrides are assessed and safeguarded. Governance structures that create this balance foster measured trust, avoiding both underuse and over-reliance. [12]

Incentives, Organizational Outcomes, and the Burnout Gap

AI investments in healthcare are often backed by expected benefits like improved throughput, lower costs, better prioritization of high-risk patients, and operational efficiencies. However, evidence about actual system-level benefits is mixed and heavily depends on the implementation context, workflow integration, and organizational readiness. [2][10]

Economic evaluations of AI-enabled triage and prioritization tools suggest that organizational benefits and frontline workload do not always move in the same direction. [10] Patients may also experience these tradeoffs indirectly when implementation priorities emphasize operational metrics without equal attention to communication, continuity of care, and clinical capacity. When operational improvements are not accompanied by staffing support or workflow redesign, frontline clinicians may perceive AI implementation as increasing organizational demands without providing meaningful relief.

Several studies have found that organizational performance indicators and clinician experience may differ during implementation. Reported improvements in throughput or operational performance may occur alongside an increased cognitive burden when new responsibilities are added without taking away existing work. [4][10][16]

This gap between organizational incentives and frontline experience drives burnout risk. At the board level, this means viewing AI-CDSS investments not just as capital expenses for efficiency. They should also be viewed as investments in organizational redesign. This may require additional investments in staffing support, changes in workflow, training, and governance capacity. Over time, AI-CDSS might change how organizations measure performance. It could focus more on compliance metrics than on adaptive clinical judgment. This shift may influence which activities organizations reward, measure, and prioritize in clinical practice.

The REDESIGN Framework for AI-Enabled Decision Support

The operational challenges described earlier, such as verification burden, alert fatigue, unclear decision authority, and misaligned incentives, are not isolated issues. They result from introducing AI into clinical workflows without changing how work is organized and managed. Each element directly addresses a breakdown identified earlier, connecting diagnosis to intervention instead of offering a general set of recommendations. The REDESIGN framework translates these failures into seven leadership actions that address workflow, authority, governance, measurement, incentives, and professional judgment. [7]

Many redesign actions can be tested within current operational limits. This can be done through phased implementation, specific governance changes, and workflow review instead of needing significant technology investment. In 3 to 6 months, organizations can test targeted redesign efforts, assess their impact, and expand successful changes.

1. **Redesign workflows before deployment:** AI-CDSS should replace low-value work instead of adding new verification layers. Before implementation, leaders should map workflows, standardize documentation when possible, and pinpoint tasks that can be simplified, automated, or eliminated.
2. **Establish clear decision authority:** Leaders should clearly define who is responsible when AI recommendations are involved and when these fail. Governance structures should allow clinicians to easily override AI recommendations without adding unnecessary administrative work.
3. **Govern AI throughout its lifecycle:** AI governance should continue after deployment. Organizations should regularly check performance, unintended consequences, and changes in clinician experience over time. [12]
4. **Evaluate human impact alongside performance:** AI evaluation should go beyond accuracy and usage metrics. Leaders should watch alert burden, mental load, clinician fatigue, patient experience, workforce well-being, and operational outcomes. [17]
5. **Reinvest operational improvements into staffing and wellness:** When organizations observe operational improvements associated with AI implementation, leaders should consider reinvesting some of those gains into staffing, training, workflow redesign, or clinician well-being efforts. [16
6. **Normalize questioning and overrides:** Organizations should encourage questioning and proper overrides of AI recommendations. Creating psychological safety helps guard

against automation bias and maintains independent clinical judgment. [13]

7. **Establish data readiness before scaling AI:** AI systems depend on reliable, interoperable, and consistently structured data. Before expanding AI-CDSS across departments, organizations should evaluate data quality, integration standards, and governance processes to ensure recommendations remain accurate and comparable across settings.

The goal of redesign is not to remove oversight, but to make sure it is appropriate, meaningful, and matches clinical judgment instead of being redundant or too much.

A Phased “When” Roadmap

A phased implementation approach is more manageable when deployment, evaluation, and scale-up occur sequentially rather than simultaneously.

- **Pre-deployment:** Create governance structures with input from clinicians, nurses, IT teams, and operational leaders. Involving stakeholders early helps to improve workflows, incentives, and documentation practices before deployment.
- **Pilot phase:** Use factors like alert frequency, clinician feedback, override patterns, and perceived cognitive workload to spot unintended consequences early during implementation. [6]
- **Scale-up:** Connect demonstrated operational improvements to workforce support, workflow redesign, and ongoing governance review. [17]

Policy and Global Implications

The challenges discussed in this paper go beyond individual hospitals. Global digital health strategies focus more on governance, interoperability, workforce readiness, and human-centered implementation as essential for responsible AI use. The World Health Organization’s Global Strategy on Digital Health 2020-2025 highlights many of these priorities, such as leadership capacity, digital governance, and workforce engagement. [19] These priorities reinforce the central argument of this paper: successful AI implementation depends not only on technological capability, but also on organizational design, governance, and human factors.

Conclusion

AI-CDSS should be viewed as an organizational change rather than merely a technology upgrade. Its impact depends less on model performance and more on how leaders redesign workflows, clarify decision-making authority, govern implementation, and evaluate human consequences. Similar to the transition from paper records to electronic systems, AI adoption may initially introduce complexity before longer-term benefits emerge. The challenge for leaders is to prevent temporary implementation burdens from turning into permanent features of clinical work. Organizations most likely to benefit from AI will not necessarily be those with the most advanced algorithms, but those most willing to rethink how clinical work is supported, governed, and experienced.

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Abstract

What is the message? Payer-provider contracting remains largely manual and document-based, creating inefficiencies and limiting transparency across the healthcare system. Modernizing contracting with standardized, structured, and more digital approaches could reduce administrative burden and better support value-based care.

What is the evidence? Findings are based on data from the 2025 CAQH Index survey,

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which includes health payers representing 63 percent of covered lives and over 600 provider organizations. DataSpring, powered by CAQH, collaborated with Stanford Medicine to better understand lags in contracting advancements and how the industry can push advancement.

Keywords: Payer-Provider Contracting, Administrative Burden, Digital Transformation, Value-Based Care

Timeline: Submitted May 4, 2026; accepted after review June 15, 2026.

Cite as: Brooke Shearon, Kristine Burnaska, Erin Weber, Brooke Istvan, Kevin Schulman. 2026. The State of Payer and Provider Contracting: Challenges and Opportunities. Health Management, Policy and Innovation (HMPI.org). Volume 11, Issue 2.

Prior Dissemination: *This article was published on the DataSpring, powered by CAQH, website on Friday, March 6, 2026. It was promoted on DataSpring, powered by CAQH, LinkedIn, on Monday, April 13, 2026.*

Introduction

Contracting between payers and providers quietly shapes how care is financed, how networks are built, and how organizations work together to move healthcare forward.[1] By defining the services providers deliver and how payers reimburse them, contracting ensures patients can access the care they need.[2] Yet new findings from the 2025 CAQH Index [3] show that this critical process still relies on various manual methods. Drawing on the industry's most comprehensive view of administrative transactions and contracting practices, DataSpring, powered by CAQH, partnered with Stanford Medicine to understand why contracting has not advanced at the same pace as other technological developments in the healthcare industry and what payers, providers, consultants, and policymakers can do to drive modernization.

The 2025 CAQH Index reveals a contracting environment that remains manual, fragmented, and misaligned with the industry's shift toward more connected, data-driven systems.[4] As other administrative workflows modernize,[3] contracting continues to rely on manual tools and individualized practices that create inconsistency across the industry that drives up costs for all.

These inconsistencies reflect differences in organizational capacity, resources, and priorities, which shape how teams approach contracting and influence an organization's willingness to change its processes. On the provider side, larger practices often approach contracting with more tools and support, while smaller practices face constraints that limit their ability to change. Payers and providers also prioritize different outcomes, making it harder to move toward shared processes or standardized formats.

This article examines why current variation exists in contracting and possible opportunities for improvement. By addressing fragmented payment arrangements, standardizing contracts, and simplifying payment processes, the industry can begin reducing the billing and insurance-related burden consuming a substantial share of United States healthcare spending without wholesale reform of coverage.[5],[6],[7],[8]

The Document-Driven Approach to Healthcare Contracting

Contracting across payers and providers, particularly agreements governing network participation, reimbursement terms, and associated administrative requirements, continues to rely on manual, document-based workflows that have changed little over time.

Exhibit 1: Tools Currently Used in Payer/Provider Contracting Strategies, Medical and Dental, 2025 CAQH Index

Response Option	Medical Payers (n=9)	Dental Payers (n=3)	Medical Providers (n=324)	Dental Providers (n=219)
Contract Management Software (e.g., Conga, Icertis, DocuSign CLM)	44.4%	N/A	15.4%	25.1%
Manual Spreadsheets (e.g., Excel, Google Sheets)	66.7%	100%	28.1%	26.9%
E-signature Platforms (e.g., DocuSign, Adobe Sign)	44.4%	33.3%	46.6%	40.2%
Provider Network Management Systems	78.7%	100%	18.8%	20.1%
CRM or Sales Tools (e.g., Salesforce, HubSpot)	33.3%	66.7%	2.8%	5.0%
Contract Analytics or AI Review Tools (e.g., Kira, ThoughtTrace)	22.2%	N/A	3.4%	5.9%
Payer/Provider Portals or Contract Submission Platforms	44.4%	66.7%	32.7%	32.0%
Homegrown or Custom-Built Contracting Solutions	55.6%	66.7%	4.3%	5.5%
Policy and Regulatory Compliance Tools	22.2%	66.7%	8.3%	11.0%
External vendors	56.5%	100%	14.5%	11.4%
Lawyers	66.7%	100%	7.1%	7.3%
Other (please specify)	N/A	N/A	2.2%	0.5%
We did not use any formal tools	N/A	N/A	13.0%	18.3%
Unsure	11.1%	N/A	17.0%	11.9%

This question was multi-select, and users were instructed to select all that apply. Percentages may add up to more than 100%, as respondents could select more than one response.

N/A = 0 respondents selected this option.

Two-thirds of medical payers and all dental payers report using spreadsheets and lawyers as primary tools for their contracting processes. Providers similarly report use of manual tools, with more than one quarter of medical and dental organizations using spreadsheets for core contracting tasks and more than 30 percent utilizing payer/provider portals.

Reliance on unstructured documents or external relationships makes it challenging to maintain consistent records, understand contract changes over time, or align contract terms with downstream administrative processes. Tools like spreadsheets do not capture reimbursement methodologies or structured regulatory language in ways that support automation, an important factor in reducing operational burden and lowering administrative costs.[9], [10]

Digital tools, such as contract execution through e-signature platforms, are being used to perform specific tasks, with over 40% of medical payers, medical providers, and dental providers reporting use. However, these systems do not transform the underlying content into structured data. Contracts largely remain as PDFs or static files that cannot be easily analyzed or integrated with claims or provider data systems, leaving contracting disconnected from other administrative workflows.[11],[12] Additionally, managing numerous health payer contracts, each with its own platform, format, and timeline, can create a nearly constant stream of administrative work for provider practices.[13], [14]

While more advanced solutions, such as provider network management software, contract management software, and contract submission platforms, are available to everyone, they tend to be used by larger organizations with more resources. As shown in Exhibit 2, 42% of hospitals and 31% of large generalists (practices with five or more providers) rely on contract management software compared to 14% of small generalists.

Differences Across Stakeholders and Drivers of Variation

Despite the overarching use of manual tools across the industry, approaches to contracting differ across organizations, shaped by variation in size, staffing, and administrative capacity.

Providers

Larger provider practices tend to approach contracting with more infrastructure behind them.

On average, they are about ten percentage points more likely to involve legal review, adopt digital tools such as e-signature platforms, and maintain contract management software than smaller practices across specialties. Larger practices also show higher willingness to adopt new contracting formats (on average, about 14 percentage points more than smaller practices), suggesting that scale and available resources may influence how organizations evaluate potential changes.

Smaller practices operate under different conditions. With fewer administrative resources, they often rely more heavily on external vendor support and portals to manage contracting tasks than larger practices (on average, about three percentage points more). These constraints also affect how they view modernization. Findings show that smaller practices report lower willingness to change their contracting format, particularly if a new approach would introduce additional burden for their teams.

Exhibit 2: Tools Currently Used in Payer/Provider Contracting Strategies by Medical Provider Specialty and Size, 2025 CAQH Index

Response Option	Generalists (n=100)		Specialists (n=99)		Behavioralists (n=113)		Hospitals (n=12)
Number of Physicians in Practice	<5 (n=71)	5+ (n=29)	<5 (n=74)	5+ (n=25)	<5 (n=97)	5+ (n=16)	
Contract Management Software (e.g., Conga, Icertis, DocuSign CLM)	14.1%	31%	13.5%	20%	9.3%	12.5%	41.7%
Manual Spreadsheets (e.g., Excel, Google Sheets)	22.5%	31%	28.4%	44%	18.6%	68.8%	41.7%
E-signature Platforms (e.g., DocuSign, Adobe Sign)	49.3%	58.6%	44.6%	48%	38.1%	62.5%	58.3%
Provider Network Management Systems	18.3%	17.2%	21.2%	24%	16.5%	31.3%	N/A
CRM or Sales Tools (e.g., Salesforce, HubSpot)	1.4%	3.4%	4.1%	8%	N/A	6.3%	8.3%
Contract Analytics or AI Review Tools (e.g., Kira, ThoughtTrace)	1.4%	10.3%	2.7%	8%	N/A	12.5%	8.3%
Payer/Provider Portals or Contract Submission Platforms	35.2%	31%	37.8%	32%	28.9%	43.8%	8.3%
Homegrown or Custom-Built Contracting Solutions	N/A	10.3%	5.4%	8%	1%	18.8%	8.3%
Policy and Regulatory Compliance Tools	5.6%	13.8%	9.5%	12%	3.1%	25%	16.7%
External vendors	16.9%	13.8%	14.9%	12%	15.5%	12.5%	N/A
Lawyers	7%	13.8%	1.4%	16%	5.2%	12.5%	16.7%
Other (please specify)	1.4%	N/A	4.1%	4%	2.1%	N/A	N/A
We did not use any formal tools	14.1%	N/A	14.9%	N/A	19.6%	N/A	16.7%
Unsure	22.5%	27.6%	16.2%	16%	12.4%	6.3 %	16.7%

This question was multi-select, and users were instructed to select all that apply. Percentages may add up to more than 100%, as respondents could select more than one response.

N/A = 0 respondents selected this option.

These patterns align with national research indicating that administrative burden falls disproportionately on smaller practices, who often face higher relative administrative costs and have fewer resources to dedicate to modernization efforts.[15], [16], [17] These dynamics make it harder to adopt new systems or participate in standardization efforts. They also contribute to the economic pressures pushing physicians into employed arrangements.[18]

Exhibit 3: Willingness to Change Payer/Provider Contracting Format, by Medical Provider Specialty and Size, 2025 CAQH Index

Response Option	Generalists (n=100)		Specialists (n=99)		Behavioralists (n=113)		Hospitals (n=12)
Number of Physicians in Practice	<5 (n=71)	5+ (n=29)	<5 (n=74)	5+ (n=25)	<5 (n=97)	5+ (n=16)	
5 – High, our contract structure is burdensome	26.8% (19)	37.9% (11)	27% (20)	40% (10)	14.4% (14)	31.3% (5)	33.3% (4)
4							
3	38.0% (27)	31.0% (9)	47.3% (35)	40% (10)	49.4% (48)	62.5% (10)	33.3% (4)
2							
1 – Low, we will not change even with positive return-on-investment (ROI)	35.2% (25)	31.0% (9)	25.7% (19)	20% (5)	36.1% (35)	6.3% (1)	33.3% (4)

In addition to size, contracting priorities vary by specialty. As shown in Exhibit 4, while hospital-based respondents and generalists cited value-based care or alternative payment models as key influences on their contracting strategies, other specialties placed greater emphasis on quality improvement and outcomes-based care. Additionally, generalists and specialties ranked cost containment and financial performance higher than behavioralists and hospitalists. However, behavioralists and hospitalists were more likely to express interest in changing their organizational or contracting structure, which may indicate that some specialties focus on improving financial performance within existing contracts while others are more inclined to pursue broader structural changes.

These findings indicate that smaller practices need modernization options that reduce net

workload without adding additional burden. Larger organizations can use contract management tools to model terms and downstream impacts, but they still depend on payers to simplify reimbursement structures and align contract language with systems.

Exhibit 4: Factors Influencing Payer/Provider Contracting Strategies by Medical Provider Specialty and Size, 2025 CAQH Index

Response Option	Average Rank of Generalists (n=100)		Average Rank of Specialists (n=99)		Average Rank of Behavioralists (n=113)		Average Rank of Hospitals (n=12)
Number of Physicians in Practice	<5 (n=71)	5+ (n=29)	<5 (n=74)	5+ (n=25)	<5 (n=97)	5+ (n=16)	
Cost containment and financial performance	1.92	1.83	1.72	1.75	1.88	2	2.17
Network adequacy and access requirements	2.05	2.33	1.95	2	2.36	2	2.25
Quality improvement and outcomes-based care	1.92	1.38	2	1.4	1.71	1.86	2.13
Regulatory and compliance requirements	2.05	2.38	2	2	1.96	2	1
Value-based care or alternative payment model alignment	1.84	2	1.94	2.5	2.11	2	1
Market competitiveness and differentiation	2.09	2.75	2.38	1.67	1.82	2.13	1.75
Provider/payer relationship management and collaboration	2.19	1.58	1.74	2.25	2.05	1.33	2.2
Member/patient satisfaction and experience	2	1.9	2.27	2.38	1.91	2.6	2.5
Data-driven insights and performance analytics	2.2	2	2	2	2.33	1.67	2
Other (please specify)	1.8	N/A	N/A	2.33	1.83	N/A	N/A
I am unsure of my organization's payer/provider contracting strategy.	1.27	1	1.50	1	1.25	1	1

Due to the small sample size, payer data cannot be reported for this table.

Users were instructed to rank their top 3 factors, with "1" being their organization's top priority.

N/A = 0 respondents selected this option

Payers

Payers approach contracting through a different operational lens, influenced by the scale and complexity of their systems. Most medical and dental payers involve their legal teams throughout the contracting process. More than half of medical payers emphasize maintaining alignment between contracting and operational functions such as claims, payments, and provider data. This reflects the scale and complexity of payer operations but may not align directly with smaller provider needs.[19]

Payers recognize a clear connection between contracting complexity and administrative performance. More than half of medical payers (56%) and one third of dental payers said they would change their contracting format to improve operational efficiency. This highlights a clear opportunity to simplify workflows and reduce administrative burden. Payers are also motivated to pursue contracting changes if those investments lead to better negotiated terms or reimbursement rates (one third of medical and dental payers).

By contrast, medical and dental providers were primarily concerned with reducing the burden on their contract negotiation (46% and 53%, respectively) and showed substantially less interest in negotiated terms (3% of medical providers and 2% of dental providers). Overall, these findings suggest that payers view contracting as a strategic lever to improve both administrative efficiency and financial performance, rather than solely as a transactional process.

Exhibit 5: Biggest Incentive to Change Contracting Format, Medical and Dental, 2025 CAQH Index

Response Option	Medical Payers* (n=9)	Dental Payers (n=3)	Medical Providers (n=324)	Dental Providers (n=219)
Less burden on our contract negotiations team	11.1% (1)	N/A	46.3% (150)	53.4% (117)
Better negotiated terms or reimbursement rates	33.3% (3)	33.3% (1)	2.5% (8)	1.8% (4)
Opportunity for improved efficiency of back-end processes (e.g., claims, payments, provider data)	55.6% (5)	33.3% (1)	6.2% (20)	3.2% (7)
Improved compliance with regulatory or accreditation requirements	11.1% (1)	N/A	4.3% (14)	2.3% (5)
Faster contract turnaround time	11.1% (1)	33.3% (1)	3.1% (10)	2.3% (5)
Enhanced visibility and tracking across contract lifecycle	11.1% (1)	N/A	8.0% (26)	6.8% (15)
Greater alignment with value-based care models or alternative payment	N/A	N/A	10.8% (35)	11.9% (26)
Other (please specify)	N/A	N/A	1.5% (5)	1.8% (4)
Unsure	22.2% (2)	N/A	17.3% (56)	15.5% (34)

* Due to plans mistakenly erroneously responding to more than one response option, the total percentage exceeds 100.

N/A = 0 respondents selected this option

Based on the findings, payers recognize the link between contract complexity and administrative performance. To move the industry forward, contracts should be designed as structured, computable data that can flow through claims, provider data, and payment integrity systems over the life of the provider relationship, not just as PDFs.

Lessons Learned and Next Steps

Overall, contracting can become more consistent, predictable, and easier to navigate. Through

stakeholder collaboration and element standardization, the industry can align and address underlying sources of variation and reduce administrative burden. Industry workgroups can help define technical guidance to facilitate the use of structured data and workflows. Greater consistency in areas like reimbursement methods, renewal terms, and data-sharing expectations would create a more uniform foundation to work from.[20] Workgroups can also serve as a forum to discuss implementation considerations, including how modernization investments are prioritized and operationalized across stakeholders with varying needs and capabilities. Developing computable contracts could offer a pathway to improved efficiency for health payers and providers across the healthcare system.[21]

To ensure that improvements are effective, efforts should reflect differences across provider types, including primary care, specialty care, and hospital-based organizations. Given the varying contracting needs and capacities across stakeholders, a single, standardized approach may not provide meaningful outcomes, especially for smaller practices. These organizations often face a disproportionate administrative load on already burdened staff, and tools that simplify documents or offer ready-made templates could help modernize the contracting process, making it more feasible. Larger organizations may also benefit from clearer structures, making it easier to align contracting with downstream systems and reducing the time spent reconciling contract terms with operational processes.[22]

For consultants and government agencies, these findings point to a need for end-to-end contracting transformation, not only better rate negotiations. While negotiated outcomes are driven by market dynamics, investments in contracting capabilities can support greater standardization, improved data quality, and more efficient contracting processes. For policymakers in particular, standardizing core contracting elements such as reimbursement methodologies, renewal terms, and data sharing expectations can help advance policy goals related to network adequacy, payment integrity, and provider directory accuracy.

Driving meaningful change requires stakeholders to prioritize modernization efforts, invest in tools and processes that reduce administrative complexity, and collaborate to create a more consistent, data-driven contracting environment. Stronger alignment between payers and providers can reduce administrative steps, increase predictability, and clarify expectations across organizations, regardless of size or stakeholder. By understanding the costs tied to manual processes, organizations can prioritize changes with meaningful impact and become

better positioned to support the industry's shift toward more connected and data-driven systems.[3], [23]

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