PaperCut™

Building a healthy EHR printing infrastructure

How an efficient printing solution saves valuable time for healthcare professionals and improves bottom lines for healthcare organizations.

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Introduction

Our healthcare professionals have always been a valuable – and valued – asset to society. So many have willingly given their time, expertise, and caring to help the rest of us get the care we need.

As labor shortages, burnout, and the aftermath of COVID-19 begin to ease in the healthcare industry, one thing remains clear: although significant progress has been made in providing electronic health records[1] (EHRs) to healthcare providers, much work is still needed to fully integrate them into the overall patient care workflow.

> ...there is still much work to be done to ensure optimum integration into the overall patient care workflow.

It is also important to note that while EHRs make patient health records more accessible and portable in electronic format, there is still a significant need for printed materials, whether they are prescriptions, patient at-home care instructions, documents associated with billing, or documents that might accompany a patient through a medical procedure.

In this whitepaper, we discuss the state of the EHR market and the role that printing plays in the management and delivery of healthcare services across a wide variety of disciplines and institutional types. Specifically, we will focus on how the two leading EHR solutions, Epic and Oracle Health (formerly Cerner), handle printing and how that can be improved to the benefit of healthcare professionals and busy IT departments. The lessons learned here can be extrapolated to other EHR solutions as well.

- We outline the current state of the printing infrastructure in many organizations and how this infrastructure relates to EHR systems.
- We identify the shortfalls that make it more difficult and time-consuming for IT professionals within healthcare organizations to ensure secure, effective printing.
- We describe how solutions such as those from PaperCut can help make the printing infrastructure more efficient.
- PaperCut will help in tracking and controlling usage, protect sensitive patient information, and most importantly, save valuable time for overworked healthcare professionals and the IT departments that support them.

EHR solutions: state of the market

According to Grand View Research[2], the EHR market is expected to grow at a 4.43% Compound Annual Growth Rate (CAGR) from 2024 to 2030. Drivers of market growth include government initiatives to drive healthcare IT usage including expansion activities, product approvals, product launches, partnerships, and acquisitions. The report states:

> " Rising demand for centralization & streamlining of healthcare administration is also anticipated to drive the market growth. Centralization of health information management is driven by a value-based model which aims towards streamlining operations, standardizing processes, reduction of costs, and improving the quality of care that results in patient satisfaction. For instance,in March 2022, Google Health collaborated with MEDITECH with an aim to use its search & summarization capabilities within MEDITECH's Expanse EHR platform to help clinicians provide the best care via easy and quick access to information from multiple sources.
>
> **Grand View Research**[2]

As you may have already noted, mergers and acquisitions in the EHR industry are increasing, most notably with Oracle's acquisition of giant Cerner. Expect to see more acquisitions of smaller players as other players in the market look to expand market position and product portfolios.

Grand View Research also notes that cloud and web based EHR segments dominated the market with revenues share of 83.1% in 2023 and is expected to grow the fastest. We see similar trends in verticals outside of healthcare, all who have similar goals in common: decrease expenditure and maintenance of in-house servers for cloud/web based applications that offer up-front cost savings, flexibility and workflow improvements.

According to another report by KLAS, Epic was the only EHR vendor to see a net increase in acute care market share in 2023[3] and continues to pull ahead of competing providers. And despite the recent acquisition, Oracle Health saw its largest net hospital loss on record. However it is interesting to note that Oracle's key strategy to shift customer to the cloud and away from licensed purchases, which effectively means less revenue upfront but more rolling cash over time, could mean we see this segment returning to growth soon.

Top 10 inpatient hospital EHR vendors by market share

Top EHR vendors ranked by U.S. market share as of January 2024
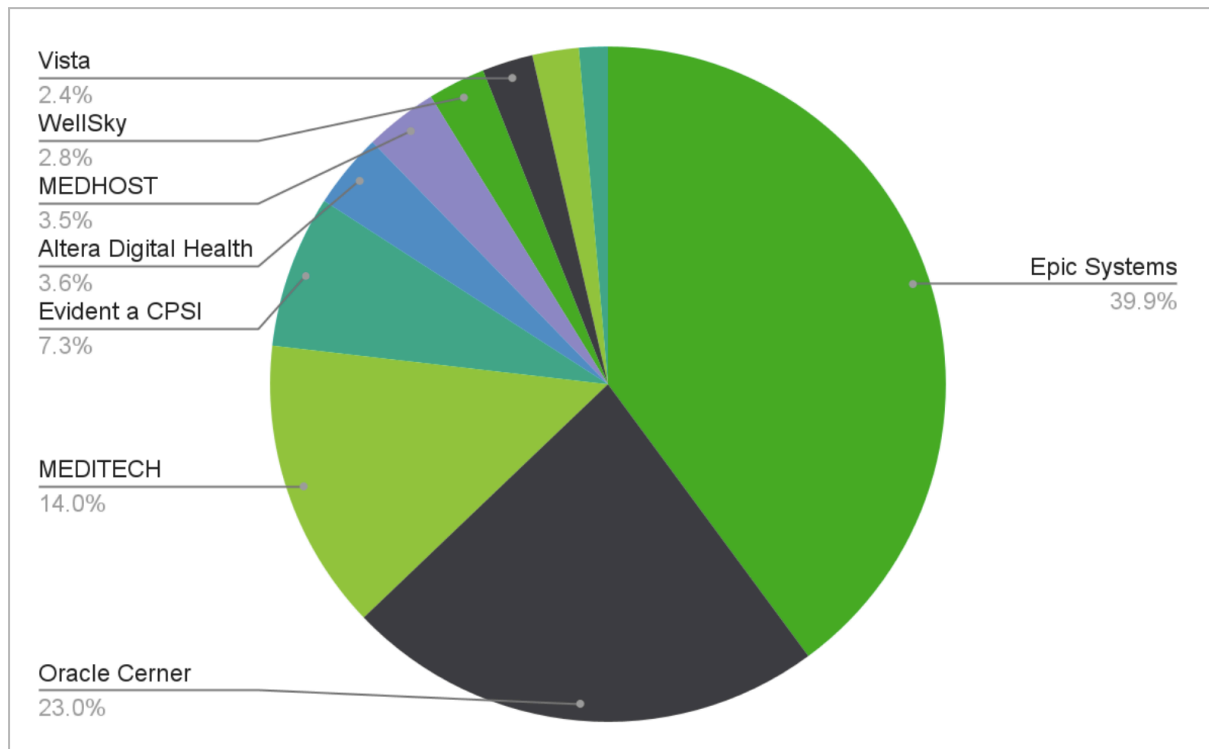
Global revenue market share shows Epic at 37.7% market share with Oracle Health dropping to 21.7% | Source: [Definitive Healthcare](#)[4]

KLAS also notes that the largest trend driving the EHR market was the shift away from smaller hospitals driving demand like we saw last year, and more of the major health systems making some strategic moves. Some of those moves include new generative AI capabilities and a general recognition to do better in keeping clients happy.

It's also important to note that 2023 saw some significant customer migrations, namely larger or longtime Cerner/Oracle Health clients moving to Epic in efforts to unify or consolidate systems. Oracle health wasn't the only major player to lose clients, Veradigm (formerly Allscripts) also saw the loss of Northwell Health who announced last year they were moving to Epic[5].

"Acute care EHR purchasing remained high throughout 2023," said KLAS researchers in the report[3]. "While market energy in 2022 was mostly driven by small organizations, the majority of 2023 purchases were the result of large multispecialty and specialty organizations making go-forward decisions.

"Of the 319 hospitals impacted by go-forward decisions (including migrations and specialty hospital wins), 79% were part of health systems while the remainder were standalone hospitals," they added. "Key decision drivers were acquisition activity and the need to streamline IT departments and improve clinical usability."

Printing workflow in an EHR environment

Historically, many electronic communications systems are brought to market that fail to address the need for print. In fact, print is often an afterthought when the focus is on digitization. This seems to be true of most EHR systems as well. But the truth is, print is still a critical workflow element, and systems that lack the ability to adequately track, monitor, and securely manage print bring with them a significant productivity and cost shortfall.

The good news is that companies like PaperCut have stepped in to fill the gap in executing, measuring, and monitoring printing activity from EHR systems. These companies have a deep knowledge and understanding of how to manage networked fleets of printers, and deliver integrations with existing systems to make printing a natural, secure and effective function for users and for the IT staff who are responsible for managing these systems.

Let's take a look at how printing works in Epic and Cerner EHR solutions, which comprise the bulk of systems installed in the U.S. We'll start with the native systems and then explain how integrating a print-specific add-on can bring significant benefits across the organization.

Printing with Epic Systems

Epic Systems provides a robust and highly functional EHR system. They understand that there are many unique requirements from organization to organization and have not tried to be a one-stop-shop for everything. To make integration of third-party applications easier, the company has established Epic Showroom, a developer program that PaperCut's Epic integration has taken advantage of.

> One organization that has taken advantage of PaperCut's Epic integration is a University Medical Sciences Department in Arkansas, which has 19,500 users and has acquired 248 embedded PaperCut licenses to monitor Windows printing.

Epic Systems' printing technology is well understood by PaperCut. At the heart of Epic printing is a service known as the Epic Print Server(EPS). When a user generates a print job within Epic either by selecting 'print' or as part of a predefined workflow, a print job request is sent to the EPS. EPS then builds and renders the job into a PDF document, a text file, or an XPS document. EPS then sends that document to the selected Windows print queue in the EPS server.

While this effectively gets print jobs to printers, what it does not do is provide an adequate level of security and traceability. In other words, it makes it difficult for the IT organizations that manage printing fleets to understand who is printing what and how much is being printed by each user. It also risks the security of confidential patient healthcare information (PHI) when printed material is left

unattended at a printer. This can result in HIPAA (Health Insurance Portability and Accountability Act) violations and an inability to control printing costs.

There are two potential implementations of Epic EHR; Hosted by Epic or Hosted by the Customer either in the cloud or on-premise.

For either implementation, PaperCut can be implemented to improve print security and reduce waste. It will track usernames, enabling SysAdmins to trace the individual users for security, auditing and costing purposes. And it will also tie a print job to a specific user name to enable secure print release – that is, enable the user to log in at the printer, release the print job, and immediately retrieve printed documents. That means those documents are not left lying around unattended on a printer, risking the security of confidential PHI and potential HIPAA violations. It also reduces waste from printing that is never picked up – which happens more than you might think in a busy environment!

This decision tree will help you decide the best way to implement PaperCut within your Epic installation, whether you need the Epic connector from PaperCut or you can just install a secondary PaperCut server in the EPS.

Epic and PaperCut: An updated decision tree
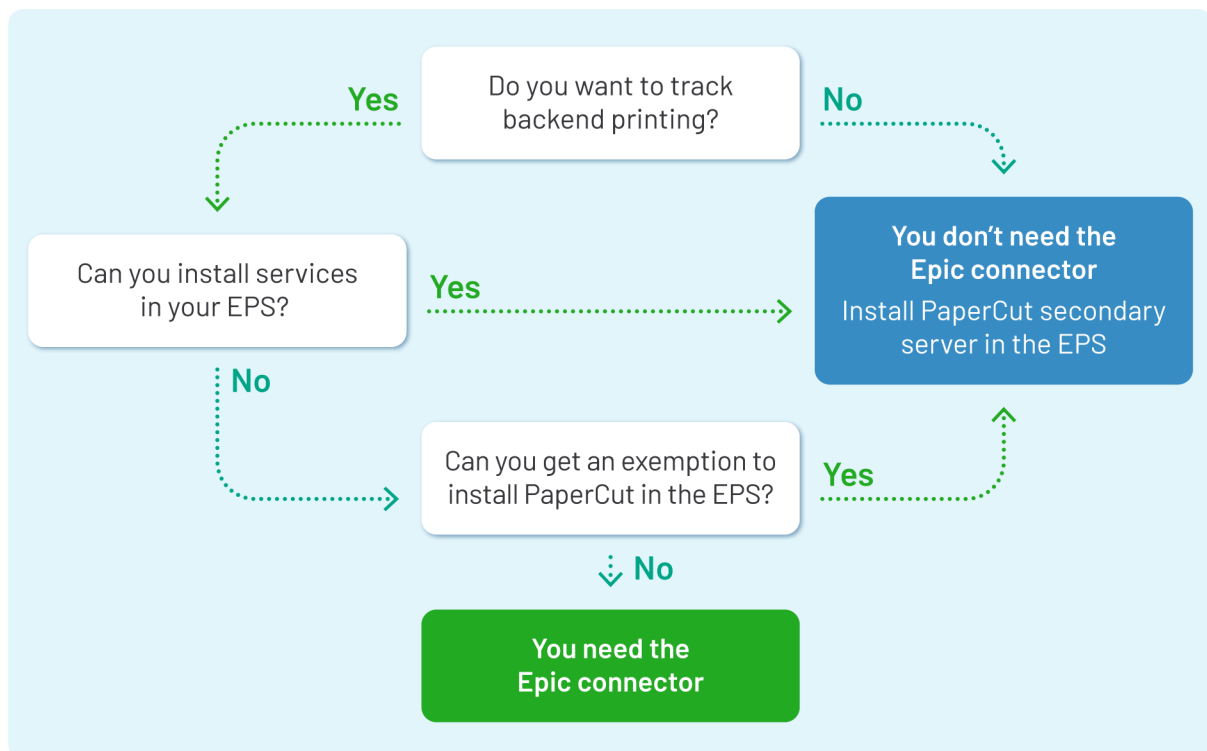
Either way, adding the PaperCut integration to Epic Systems EHR systems not only offers more secure printing, it also enables IT administrators to more quickly and accurately track printing activity across the organization – this can be a huge factor in cost control. But perhaps even more importantly, PaperCut enables IT administrators who are managing printing fleets to assess the most effective printer configurations to install and the most convenient locations for those installations. It also enables them to monitor user behavior.

For example:

- Are there some users who print larger volumes than normal? Perhaps there are ways to print less and still operate efficiently.
- Are some users unnecessarily printing in color? That behavior can be modified as well.
- Are users taking full advantage of double-sided printing to reduce paper usage? Two-sided printing can be set as the default.
- Watermarks and digital signatures can be applied to documents to ensure sensitive printed documents are identified, verified, and tracked.

Finally, reducing waste is always a big benefit, and with adequate monitoring of printing activity, waste can be significantly reduced.

For example, in a large medical practice or hospital, as physicians are delivering patient care in exam rooms, they are likely to need several printed documents. These could include authorizations for care in another location where the patient may carry a printed document with them. They could also include printed instructions for post-release at-home care and prescriptions.

An analysis of the amount of this type of printing, together with the time the physician, nurse, or physician's assistant spends walking back and forth to printers to retrieve these documents might reveal:

- it would be beneficial to place smaller printers in the exam rooms or in the hallway outside to save valuable healthcare professional time
- better placement of larger multifunctional devices (MFDs) would increase convenience and reduce printing cost per copy.

Especially in light of the increased patient load as a result of the pandemic, conserving even a few minutes of professional time with each patient can add up to a significant easing of workload over days, weeks, and months

Printing with Oracle Health (formerly Cerner) EHR

Native printing with Oracle Health EHR has similar challenges as compared to Epic Systems. PaperCut has successfully implemented secure print release and full traceability of print jobs at several large hospital systems even while working with Oracle Health- trained hospital staff rather than with Oracle Health themselves.

One example is a large Florida healthcare provider with more than 12,500 users across 44 locations, including 6 hospitals. PaperCut is used throughout the organization with over 600 MFDs managing 1,200 document printers and more than 1,000 label printers.

With the exception of label printing, all Oracle Health print jobs benefit from secure print release – the user who initiated the print job is required to log in (or swipe in with their hospital ID) to initiate the actual print process. PaperCut also ensures traceability of print with digital signatures, providing a means of accountability with patient information.

Extensive EHR partnerships ensure broad reach

While Epic and Oracle Health are the two largest providers, they are not in use everywhere. As mentioned earlier, there is a wide range of smaller – and no less important – EHR solutions. PaperCut

has worked hard to partner with many of them, including Veradigm (formerly Allscripts), Telstra Health, and Trakcare just to name a few.

Adding to the points above, integrations with systems like SchoolDoc are particularly important with the increasing requirement for compliance for medical records within schools.

Additional PaperCut functionality in healthcare printing

While cost control, convenience, and security are key benefits to using PaperCut in conjunction with EHR systems, there is even more functionality that benefits healthcare organizations.

PaperCut's Find-Me printing feature enables users to send print jobs to a single print queue from their computer or mobile device and then release the print jobs from whichever printer they are closest to.

This makes it easier for users to access their printed documents in the most convenient manner possible without worrying about which printer has their print job. They simply walk up to the printer, swipe their identification card, and their print jobs will find them.

Another shortfall of many EHR systems is the inability to print from mobile devices. This is especially important considering the wide range of devices we all use, along with the increase in BYOD (Bring Your Own Device) and the expectation that we can use those devices, securely and efficiently, within the organization. We live in a multi-OS, multi-device world, and it's no longer effective to depend on a Windows-only environment. Yet, printing in a BYOD environment can place undue pressure on IT help desks if users have print-related issues they can't solve themselves.

Let's consider the exam room scenario. The physician is more likely to bring her iPhone with her than to lug a laptop. She should be able to perform all of the necessary functions from that device, including printing, to make the most efficient use of her – and her patient's – time.

PaperCut Mobility Print provides a driverless, native print experience on all major print platforms. Users can get up and running in minutes without needing to understand the complexities of installing printers on their device or having to take up the time of the IT help desk.

Plus, PaperCut Mobility Print doesn't require BYOD devices to join a network domain, making it easier for healthcare professionals to move about the organization across multiple facilities and still have access to an efficient, authorized printing capability when they need it. BYOD users can continue to use secure print release and Find-Me Printing via PaperCut Mobility Print regardless of where they are. Printing becomes as easy as finding the menu option for print on the device, or installing a single PaperCut App from the Google Play Store for Android or simply selecting the Mobility Printer on your IOS device. Plus, guest printing can optionally be enabled for visitors without the need for them to access your wireless network.

VDI support - VDI continues to gain a significant foothold in large HealthCare organizations mainly due to centralized security postures, standard Desktop and Application deployment and overall economic benefits. One area that causes strife in VDI environments is print queue deployment and management. PaperCut solves for this by supporting many VDI Solutions such as Citrix and VMWare for print queue management within the VDI Infrastructure itself. These results are significant. Reduction in queue management and delivery to ThinOS Terminals such as Workstations on Wheels, Fixed Terminals, Tablets, and standard Operating Systems means your users will have the right print queues, when and where they need them. A by-product of our VDI Solution also means the reduction of potentially costly mistakes where users may have chosen the wrong printer in the past, thereby reducing the likelihood of HIPAA violations.

High Availability - PaperCut has built-in support for High Availability implementations. Many organizations, especially in HealthCare see the need for print to be resilient and reliable. PaperCuts support for both Layer 4 and 7 failover ensures your HealthCare workers never lose the ability to print and release print jobs. We support many implementations with Load Balancing Solutions such as Citrix NetScaler, Load Balancer, F5, Kemp, and many others.

Advantages for the IT organization

The integration of PaperCut and EHR systems offers even more than the many advantages already outlined above..

Quick print queue and printer driver installation

> Not only can IT organizations benefit from efficient configuration and management of printing fleets, but also from using PaperCut Print Deploy to quickly install print queues and printer drivers.

In fact, with this fully automated service, users can easily find and choose print queues to install for themselves and have their printing simply work – less work for the IT department and fewer calls to the IT help desk for printing-related issues; a real boon for a busy healthcare IT department.

Improved user printing behavior

PaperCut also lets SysAdmins configure print queues to encourage appropriate user behaviors such as saving paper with double-sided printing, reducing the unnecessary use of color printing, and more. The encouragement can work in two ways, depending on organizational policies:

- Provide users with a warning – which can be overridden – when inappropriate behaviors are selected, yet still provide them with the necessary flexibility.
- Prohibit those behaviors altogether.

In-depth reporting

With PaperCut's automated reporting, audit trails, and traceability function, individual users can be counseled directly if needed. In addition, easy-to-understand automated reporting can move much of this monitoring and cost control responsibility to department heads, further helping to balance workload in busy IT departments.

Added security

Even more exciting, PaperCut can automatically add watermarks and Digital Signatures even to black & white documents, adding even more strength to its security, audit trail, and traceability features. With watermarking, documents can be automatically printed with background text across the page to indicate the sensitivity of information it contains. Digital SIgnatures provides a way to validate the authenticity and integrity of printed documents by printing a cryptographic hash on the document that is traceable back to its owner from the PaperCut Job Log.

PaperCut architecture for EHR back-end printing

And now for a few technical details that explain how the IT department easily configures and deploys PaperCut across the organization. A few components require one-time setup, including:

- **PaperCut Secondary Server:** responsible for accepting print jobs from an EHR and optionally updating job status. The job transfer protocol is dictated by the EHR system – that is either Epic HTTP POST requests or Oracle Health LPD (Line Printer Daemon) protocol.
- **PaperCut Print Provider:** is the service of the PaperCut Secondary Server that works in tandem with the OS print spooler to pause, analyze, and manage print jobs passing through the server.
- **PaperCut Application Server:** receives details about print jobs and decides how to handle them. Actions include print, cancel, and reroute.

Here's how it works:

First, the PaperCut Secondary Server is installed on an existing EHR Print Server. Upon receiving a print job, the PaperCut Print Provider examines the job's metadata.

The PaperCut Print Provider analyzes the print job to find out the job details and reports them to the PaperCut Application Server.

The PaperCut Application Server, based on the job details, then makes a decision on what action to take and sends that action back to the PaperCut Print Provider. The Print Provider then performs the action on the print job.

And with a one-time setup, it all happens in the blink of an eye without the need to engage valuable IT resources.

Need a different architecture? No problem. PaperCut experts will consult with you to suggest the most appropriate architecture based on in-depth experience with configurations in other organizations using leading EHR solutions, including Epic and Oracle Health.

Taking the next steps

If you would like to provide more secure and convenient EHR printing for your organization while controlling costs and reducing waste, PaperCut is here to help.

For more information about the EHR-related products and services from PaperCut, visit papercut.com. We'll connect you to the nearest representative and help you quickly get started down this path. Less printing-related headaches. More efficiency for the IT organization and the users it supports. We guarantee it.

Works cited

[1]Various organizations refer to medical records in different ways. In fact Epic Systems calls their application an EMR, while Oracle Health (previously Cerner) refers to their application as an EHR. We see them as the same; to simplify, we'll use EHR for our purposes in this whitepaper.

[2]https://www.grandviewresearch.com/industry-analysis/electronic-health-records-ehr-market

[3]https://klasresearch.com/report/us-acute-care-ehr-market-share-2024-large-organizations-drive-market-energy/3333

[4]https://www.definitivehc.com/blog/most-common-inpatient-ehr-systems

[5]https://www.healthcarefinancenews.com/news/northwell-selects-epic-integrates-its-electronic-health-records

Thank you

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