Avery Dennison
Smartrac

Market Insights Report
Supply Chain

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Smarter Supply Chains
Safer Patients

How RFID delivers benefits
for pharma and healthcare

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Introduction

The transformative benefits of digital ID technologies such as Radio Frequency Identification (RFID) that are increasingly being captured in retail, manufacturing, and logistics are instructive for healthcare-related businesses as well. By endowing every item in a supply chain or inventory with its own unique digital identity, by enabling richer, one-to-one communication with patients, and by documenting and communicating the "who, what and where" of any item, RFID can dramatically enhance patient safety, brand protection, inventory management, operational efficiency, regulatory compliance, and more—particularly as healthcare systems are increasingly stressed by the COVID-19 pandemic.

A recent Avery Dennison survey of more than 700 c-suite executives and other leaders of retail, logistics, and supply chain industries around the world revealed that 63% believe COVID-19 will bring supply chain behaviors into sharper focus. At a moment when supply chain visibility, product authentication, and touchless transactions are more important than ever, RFID offers a compelling, multifaceted, and cost-effective solution.

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RFID explained

Simply put, RFID capabilities can be added to virtually any item by embedding an RFID inlay into a traditional pressure-sensitive label and applying it to the item. RFID inlays contain a microchip for storing data and an antenna for sending and receiving data via a radio signal. Signals are transmitted to a handheld or fixed RFID reader, which collects the data and relays it to a mobile application or online database, where it can be monitored and analyzed.

Tagging any item with RFID technology enables it with a unique digital ID. and a "digital twin" that can be tracked and traced online via inventory management applications or other software, providing dramatically improved visibility into supply chains and inventories by enabling users to track any item, anywhere, and "see" it in real time. RFID can also turn any object into a portal for communication with consumers—or, in the case of healthcare, patients.

Unlike bar codes, RFID tags do not require line-of-sight reading, which makes them more reliable and enables hundreds of tagged items to be logged in a single scan. RFID offers additional advantages over bar codes, including greater durability, the capacity to store and deliver more data, the ability to confirm that a product is authentic, and a higher level of security, with chips that can be password-protected, and whose data can be encrypted.

RFID technology encompasses "active" and "passive" versions, with radio frequencies varying from low to ultra-high. This white paper focuses on the application of passive, ultra-high-frequency (UHF) and near-field communications (NFC) RFID, which are the types best suited for applications in pharmaceuticals, healthcare, and most other market sectors.

RFID for the healthcare industry

Perhaps more than any industry, healthcare can benefit from the item-level visibility and other benefits that RFID provides, for one simple reason: patient health is at stake. Accuracy and speed of operations are critical. Pharmaceuticals, medical devices, instruments, blood bags, tissue samples, and more can all be better managed across their sprawling journeys from their sources through shipping to any number of pharmacies, hospitals, doctors' offices, operating rooms, labs, and patient homes.

RFID improves identification, monitoring, controlling, and documenting. It helps to prevent human errors—improving accuracy in the distribution of medications to more than 99 percent— while increasing the level of "touchless" processes so important in stemming the spread of pathogens during pandemics like COVID 19. And it helps to save lives by giving clinicians essential real-time information at a glance.

RFID for the healthcare industry (continued)

For pharmaceutical companies

RFID can provide vastly improved supply chain management and inventory control, providing anytime, any place traceability, with visibility down to the dose in the case of vaccines and other medications sold in syringes. It offers effective tools for product authentication and tamper-resistance. It can help better document and communicate regulatory compliance. It can help monitor temperature and other conditions to ensure drug quality with passive RFID sensors. And RFID gives drug makers and pharmacists more effective ways of communicating about correct product use, enabling improved patient compliance.

NFC applications, in particular, enable a range of digital services, including channels for patient feedback, recall information, and interactive instructions, all available on a patient's smartphone and triggered by the NFC inlay in product packaging.

For makers and suppliers of healthcare equipment

Tagging products with RFID enables the tracking of any individual product at any time, enabling better and faster order fulfillment. It also provides invaluable intelligence on product levels at customer sites, facilitating predictive ordering and supply.

For healthcare organizations

RFID-enabled equipment and supplies dramatically reduce the time and labor necessary to track inventories, manage expiry, and ensure that the right supplies are on hand. It can also add an extra level of security by helping to regulate who has access to supplies, and by indicating tampering. And because every tagged item has a unique digital identity, RFID can play a critical role in reducing human error, allowing every item to be accounted for by tracking its unique ID.

We describe some of the most important benefits of RFID below. Taken together, they add up to the most important benefit of all, and the primary aim of healthcare itself: improved patient safety and well-being.

Good medicine: The benefits of RFID

Improved supply chain management

Our recent research showed that 55 percent of c-suite executives and other leaders we surveyed believe that digital technologies can solve their big supply chain issues. Their confidence is hardly surprising: By giving every item a unique digital identity, RFID enables users to track and trace thousands of products down to the individual unit or dose in real time, across complex supply chains, and in inventories anywhere on the globe, providing reliable information that is both immediately actionable and also informative for future planning.

More efficient inventory management

For makers of pharmaceuticals and medical supplies, RFID improves centralized inventory management by revealing, at a glance, product levels at any location. For pharmacies and healthcare organizations, RFID transforms the chore of taking inventory from a time-and-labor intensive manual process into one that can be performed in a fraction of the time. Having greater insight into product stock levels allows pharmacies and healthcare organizations to better ensure a ready supply of critical medications, devices, and equipment, while allowing suppliers to better anticipate customer needs.

Expiry management

According to Kit Check, a provider of RFID-based, automated solutions to the pharmaceutical and healthcare industries, 10 to 20 percent of medications in a typical hospital pharmacy kit is incorrect or expired. RFID can enable automatic monitoring of expiration dates for medication and supplies, as well as automated alerts about items nearing their shelf lives. Deployed in the “smart cabinet” developed by IdentifyRFID, Avery Dennison RFID tags are helping to remove guesswork, waste, and risk for medical supply companies and hospitals throughout Thailand.

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Good medicine: The benefits of RFID (continued)

Product authentication

Counterfeit drugs account for the largest fraudulent market in the world. The World Health Organization estimates revenues from counterfeit medicines at about $200 billion—10 to 15 percent of value of the pharmaceutical market worldwide. And roughly one million people die annually from taking counterfeit drugs. RFID can help meet increasing demands from regulators and patients for assurance of product authenticity and integrity. A simple scan with an RFID reader or mobile phone can tell a user at once whether a product is authentic and safe to use. Combined with blockchain records, RFID tagging can provide brands and patients with a complete, secure, and, easily accessible proof of a product's provenance, and a map of its entire supply chain journey.

Tamper-proofing

Certain RFID inlay designs provide an additional circuit that can be looped around the closure of a medication container or medical device, which sends a signal when the closure is opened. Makers and users can easily see if a package has been opened prior to legitimate use. Smartrac's CIRCUS™ Tamper Loop signals when a package is opened or closed, enabling a package's tamper-detection status to be checked at any point in the value chain with the tap of a smartphone.

Protection against product diversion

RFID lets users identify products discovered in gray markets and pinpoint where in the supply chain diversion happened.

Good medicine: The benefits of RFID (continued)

Faster, more precise recalls

Recalls of medications and medical devices are time-consuming and costly and usually involve wholesale removal of a product in order to isolate the relatively small number that are potentially harmful. Most hospitals have to deal with an average of four significant recalls a year, which can cost up to $12,000 in staff time, including unscheduled overtime. By providing visibility across the entire supply chain, RFID makes recalls faster and more precise, allowing users to immediately locate and remove only affected items. RFID also enables companies to quickly identify counterfeit drugs and drug packaging that has been tampered with.

Temperature and quality monitoring

Medications, medical devices, and biological components like plasma, organs, and tissue are sensitive to temperature, humidity, and other environmental factors, yet must often endure fluctuating conditions across the supply chain. An analysis by the International Air Transport Association's Center of Excellence for Independent Validators in Pharmaceutical Logistics estimates losses from vaccines exposed to temperatures outside the recommended range at $34.1 billion annually, including product cost, the cost of replacement, and wasted logistics outlay. Regulators, meanwhile, increasingly require proof that temperature-sensitive medical cargo is transported and stored in the proper conditions. Passive RFID sensors enable reliable, efficient temperature-sensing and logging across manufacture, transport, and storage, to insure product integrity.

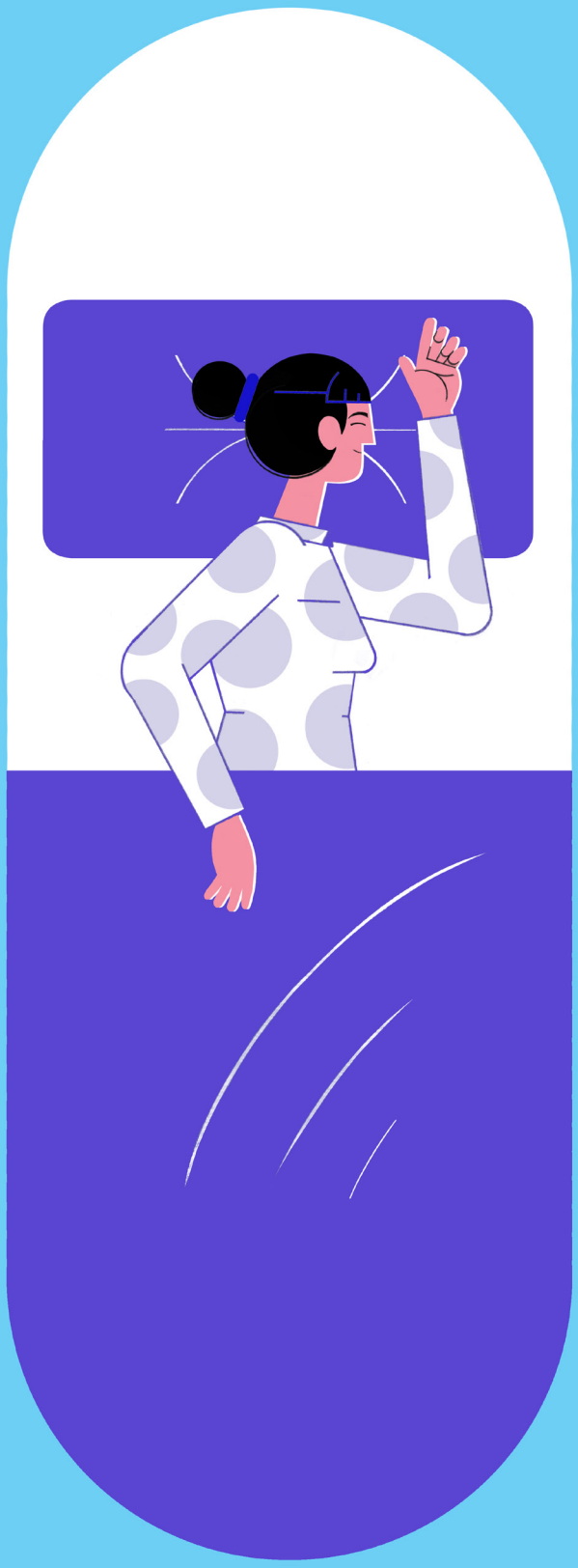
Good medicine: The benefits of RFID (continued)

Regulatory compliance

By documenting product custody, product temperature, and more, RFID makes it easier to capture data required by regulators and to ensure regulatory adherence throughout a product's lifecycle.

Higher rates of patient compliance and a better patient experience

Despite the printed instructions that accompany medications and devices, patient compliance is estimated at somewhere around 50 percent, according to 2018 information from the United States' National Center for Biotechnology Information. Using RFID NFC technology, makers of medications and devices can provide richer instructions (e.g. video), and ongoing two-way communications with patients to ensure they're using their medicine or device correctly, leading to improved outcomes.



The cost of RFID inlays

When RFID was introduced as a business solution several decades ago, tags were relatively expensive because of the low volumes produced at the time, and because of a lack of international standards for the technology. Today's RFID tags typically meet cost requirements for most business cases by combining innovations from chip manufacturers as well Avery Dennison's proprietary process technology and design capabilities. Innovations from disruptors like PragmatIC are expected to introduce new alternative solutions enabling tags that can be affixed to virtually any object under any condition, and that provide the same host of benefits at a much lower cost. As innovations evolve, and as RFID adoption grows, costs are likely to come down even further, opening new growth opportunities for the technology. Software and hardware required for system integration continue to gradually become more competitive and integrated as well.

Use cases: RFID at work in the healthcare industry

Hanmi Pharmaceutical

One of South Korea's largest pharmaceutical companies, Hanmi employs RFID to increase efficiency, monitor product movement, and carry out government-regulated quality management. The company uses RAIN (UHF) RFID tags to track 60 million product units annually, from packaging to picking and shipping, enabling an automated process from order receipt to the shipment of packed cartons to wholesalers. Hanmi and Avery Dennison teamed up in 2010 to develop and market RFID tags and inlays for pharmaceutical companies worldwide.

Kit Check

In partnership with Avery Dennison, Kit Check is working with drug manufacturers in the U.S. worldwide to apply RFID tags to medication packaging and aiming to expand to other regions. The partnership provides a complete solution for manufacturers and contract manufacturing organizations that want to implement RFID tagging in high-speed packaging facilities, and align with the U.S. Food and Drug Administration's Current Good Manufacturing Practices. It also enables end-to-end inventory tracking for hospitals. The solution provides downstream visibility for manufacturers, giving them the ability to track a particular drug from production to the point of use, and upstream visibility for hospital pharmacies, enabling them to know that the right drug is in the right place at the right time for the right patient. Hospital pharmacies can also see where the drug originated. Kit Check's solution eliminates the need for cost- and labor-intensive in-house medication tagging.

Blockchain-based authentication

Avery Dennison has joined with blockchain developer SUKU to produce an NFC-based digital verification solution for authenticating COVID-19 testing kits and personal protective equipment (PPE).

The test-kit solution will enable scanning of NFC tags attached to kits to verify that the kits are FDA-approved and come from a legitimate source. The solution also allows organizations to access real-time data from test results to inform allocation of doctors and resources. The solution will also open a direct communication channel between patients and health authorities, who can provide guidance on appropriate next steps in case of a positive test result. A separate solution under development uses NFC tags to enable the authentication of test strips used in rapid, point-of-care COVID-19 testing.

The solution being developed for PPE involves NFC tags affixed to cartons of PPE that contain information on the product's provenance and pricing. Because the information is based in blockchain, it can't be manipulated by counterfeiters or gray-market vendors. With the PPE solution, as with the test kit solution, users can view authentication data by simply tapping their smartphones close to the tag—no additional software or system integration necessary.

Avery Dennison and RFID

Avery Dennison and RFID

As the world's largest UHF RFID partner, we've helped bring the transformative power of RFID to the apparel and retail industry with expansion happening in beauty, food, and grocery as well. Now we're helping the pharmaceutical and healthcare industries conjure new possibilities with RFID, too. Companies who work with us get a partner with a deep, industry-specific understanding of what it takes to make every RFID application successful. They also get access to endlessly curious, enthusiastically helpful engineering and technical experts; advanced research and testing capabilities; and, most importantly, reliable, field-proven inlay products. Our partnerships with leading innovators put us at the forward edge of where digital identification technologies like RFID are going.

Ultimately, deployment of RFID that transforms systems and delivers ROI requires dependably excellent technology, the right solutions for integrating digital intelligence in any item, and a knowledgeable, capable, committed partner. At Avery Dennison, we deliver all three.

Find out more

Our team is ready to talk about the opportunities for transforming your business with RFID.

Contact us at rfid.averydennison.com/en/home/contact.html, or visit rfid.averydennison.com.

“The revolution is upon us”

Read Avery Dennison’s Supply Chain Market Insights Report

Avery Dennison recently commissioned an extensive survey with more than 700 c-suite executives and other leaders from retail, logistics, and supply chain industries across the UK, US, Central Europe, China, and Japan. Consensus: COVID-19 and other pressures are driving greater supply chain visibility and efficiency, and deploying digital technologies like RFID can help solve perennial challenges like brand safety, trust, transparency, product authenticity and ensuring the integrity of ingredients. Download the report here.

Additional resources

- RFID Journal
- RFID RAIN Alliance
- IoT and the Imminent Supply Chain Revolution Market Insight Report
- GS1
- NFC Forum