

5 Steps to Securing Mobile Health (mHealth) Apps



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Over the past several years, there's been an exponential rise in the use of mobile devices to provide medical services to patients. Patients can now use mobile apps to track sleeping patterns, consult with doctors, check records and test results, order prescriptions, and even monitor and manage critical health parameters, such as glucose levels or heart rhythms—in real-time.

Given this increased usage, mobile health (or mHealth) apps are becoming increasingly popular targets for cybercriminals, putting both app providers and patients at risk. For providers, delivering high-performance, accurate, and easy-to-use mHealth experiences is a competitive imperative. But those mobile experiences also need to be secure to protect patients' privacy and health. To meet these requirements, providers need to pursue a five-phase approach. By progressing through these steps, teams can gain the maturity required to most effectively secure their apps and the sensitive data and back-end services these apps access.

Let's take a closer look at each phase.



STEP #1

Mitigate Coding Risks

To establish strong defenses, it is vital that teams start by understanding the risks confronting their apps, including where and how they could be attacked. Too often, however, mHealth app providers don't consider security until just before a release. For example, it may only be when code is about to be sent to production that penetration testing will be done, uncovering a significant number of vulnerabilities. Unfortunately, not only does this last-minute approach introduce risk, it is typically far more expensive and time-consuming to address vulnerabilities the later code gets in the development lifecycle.

How to Succeed

Security requirements must be considered and addressed before, during, and after code is written. By harnessing continuous testing, teams can identify issues and enable fixes throughout the development lifecycle, helping streamline processes while also improving security. In addition, by developing apps securely from the ground up, teams can reduce risk and avoid the cost, effort, and delays associated with addressing vulnerabilities later in the software lifecycle. Following are some keys to success:

Leverage automated assessments. If teams rely solely on manual penetration testing approaches, it will slow down development and compromise staff efficiency. Further, testing won't be as comprehensive as it needs to be. Teams need to harness automated capabilities that can integrate into development processes so teams can determine where risks are. Policy violations should automatically generate a ticket for developers to fix.

Beware of hybrid app development approaches and third-party components. Increasingly, teams are using languages or coding frameworks to make hybrid apps, that is, developing one codebase that works on both iOS and Android devices. However, the reality is that these types of app frameworks lack many of the security controls available in native development environments, so teams should be judicious in adopting these approaches. Similarly, third-party components, whether they're proprietary or open source, can also introduce risks. Quite often, the developers behind these components lack the required expertise and focus on security.

How Zimperium Can Help

[Zimperium's zScan](#) can help developers identify risks in their mHealth app binaries. With zScan, teams can identify privacy, security, and compliance risks before apps are released to the public. zScan's static and dynamic analysis identifies the specific risks an attacker could exploit, including in first-party code, third-party built applications, and any third-party components within your application.



STEP #2

Protect Your Code

Today, it is easy for malicious actors to download an app from an app store, reverse engineer it, find exploitable errors and vulnerabilities, and perform malicious activities, including code injection, piracy, and more. For example, criminals can reconfigure and repackage an app to use in a phishing campaign designed to steal a victim's credentials. mHealth app providers simply can't continue to leave their apps vulnerable to this kind of threat.

How to Succeed

Don't build in-house security tooling. Often, internal teams take the approach of building application shielding capabilities rather than buying proven commercial solutions. These efforts can be very expensive and time-consuming to deliver and maintain. While internal development teams may have some security experience and internal context, the reality is that they don't have the expertise and resources to manage security on their own over the lifetime of an app. In addition, security technologies and attacker techniques continue to evolve rapidly. To keep pace, it is vital to rely on experts who are solely focused on security.

Employ mobile app obfuscation & app shielding. To counter the threats of code compromise, teams must employ mobile app obfuscation and app shielding. Mobile app obfuscation is one of the most critical tools available to developers and security teams. By doing advanced source code obfuscation, teams can make it difficult and time-consuming for potential attackers to determine how the code works. Teams also need to establish robust app shielding capabilities so that, if an attacker bypasses the obfuscation techniques employed, they can't tamper with or bypass business logic to gain access to sensitive data or start to modify the code.

Don't use open-source or freeware security tools. These basic tools simply don't provide sufficient resistance to thwart would-be attackers. For example, many open-source tools have protection capabilities, but often there are easily accessible countermeasures that counteract these safeguards, such as YouTube videos that offer step-by-step instructions.

Get visibility into anti-tampering activities. It's essential for teams to be able to ascertain whether anti-tampering works. Too often, however, mHealth app developers simply do checks inside the app, and if something malicious were detected, there would be a preset response delivered. For example, a request may simply fail or issue a message to the patient, indicating the app is down due to potentially suspicious activity. Unfortunately, with these approaches, app providers deliver a poor patient experience and lack visibility into whether defenses are working. Therefore, it is vital to monitor anti-tampering activities, so teams can be assured that existing mechanisms are working or take the steps necessary to respond if not.

How Zimperium Can Help

[Zimperium's zShield](#) offers advanced obfuscation and anti-tampering capabilities that enable teams to harden and protect their mHealth app code, intellectual property, and private data. Additionally, zShield provides visibility into tampering attempts.



STEP #3

Secure Your Keys

Encryption represents a vital line of defense for mHealth app providers. However, too often, cryptographic keys aren't fully secured, which can weaken or completely negate the benefits of encryption.

How to Succeed

Following are a few critical approaches and considerations for ensuring keys are sufficiently protected:

Don't rely on internally developed key protection. To expedite delivery, teams may simply run a hash over the key material to hide it—but that's not sufficient. Alternatively, teams may try to employ their own cryptography algorithms. Through these internally sourced approaches, organizations run the very real possibility of having keys exposed to malware or attackers, leaving critical data and services exposed.

Don't leverage platform-based key security. These approaches present several challenges, such as lack of support for specific cryptographic algorithms or operations, infrequent security update cycles, and fragmentation of solutions over different mobile platforms. In most cases, third-party app developers can't access the hardware-based trusted execution environments or secure enclave, as these are restricted by the smartphone vendor. Standard cryptographic APIs that are available in the mobile operating system also leave your keys vulnerable and exposed when the device is rooted or jailbroken, or simply stops receiving security updates.

Employ white-box cryptography. To establish strong, resilient, and efficient defenses around cryptographic keys, mHealth app developers need to employ white-box cryptography. This software-based technology transforms and obscures cryptographic algorithms so that keys never appear in the clear, and execution logic is unexploitable. Consequently, keys can't be extracted even if the device has been compromised.

How Zimperium Can Help

With [Zimperium's zKeyBox](#), teams can establish strong security around cryptographic keys, without being saddled by the challenges of internally sourced or hardware-based protection approaches. zKeyBox ensures keys are obscured, concealed, and never shown in plaintext, even if an attacker gains control of the execution environment.



STEP #4

Enable Run-Time Visibility

The reality is that there are nearly infinite permutations of devices that may ultimately run an mHealth app. Even the most securely architected and coded app may be exposed by vulnerable operating systems, unsecured networks, and malware.

How to Succeed

To successfully protect apps running on patient devices, teams need to leverage the following capabilities:

Enable run-time visibility. It is essential to detect and stop attacks when they're happening. This means identifying these attacks on the patient's device at run time. In effect, teams need to institute trip-wires that flag when an app is being attacked or tampered with.

Continuous threat modeling. It is vital that teams establish the visibility needed to detect the nature of the environment that a device is operating in and continuously pull that intelligence into threat modeling. This is essential in determining the optimal course of action and continuing to optimize security over the app lifecycle.

Enable over-the-air (OTA) updates. mHealth app developers need a solution that offers the ability to update their security posture in real-time to keep up with evolving threats and zero-day attacks. However, without that capability, teams have to recompile the application and make their patients constantly reinstall or update their apps, which can be time-consuming and inconvenient.

How Zimperium Can Help

[Zimperium's zDefend](#) provides continuous monitoring and protection and delivers effective threat modeling capabilities. With the solution, teams can gain the run-time visibility they need to spot and stop threats before it's too late.



STEP #5

Establish Self-Protecting Apps

To reach the ultimate stage of maturity, teams must establish self-protecting apps. At a high level, the goal is to address two potential threats:

- **The theft of data on the mobile device.** In most mHealth app providers today, fraud detection systems are based on monitoring events to spot suspicious activities. These approaches are largely reactive in nature, raising alerts after an attack has occurred. Through self-protection, teams take a more proactive approach, which means they can avoid the high cost of breaches and the resulting clean-up required.
- **The leakage of data.** Often, application logic or constructs can be exploited by malware and other attacks. For example, a cybercriminal may be eavesdropping on a network or employ phishing links. Application self-protection enables these potential risks to be addressed before data is exposed.

How to Succeed

In making their mHealth apps self-aware, teams need to ensure they avoid the following potential obstacles:

- **Relying solely on anti-malware defenses.** For many security teams today, protecting mHealth apps against malware is a major focus area. Establishing strong anti-malware defenses is a great start, but it isn't enough. The exploitation of mHealth apps can happen in many other ways. With anti-malware capabilities alone, teams may, in effect, protect the front gate while leaving the back door open.
- **Counting on signature-based defenses.** Given all the different malware variants being detected and how quickly they evolve, teams can't afford to rely on signature-based approaches. These tools offer static mechanisms that simply can't offer the level of security required. Further, these approaches tend to add significant processing requirements to apps, which can degrade performance and the patient experience. Also, signature-based tools often rely on constant cloud-based lookups, which can further degrade performance.

To ensure mHealth apps can be self-protecting, teams must complete the steps above in order to establish true defense-in-depth capabilities. To be successful, it is essential to stop on-device exploitation in untrusted environments. In addition, teams must understand the sequence of events required to put the app and data in danger. It is also important to understand the threats in the environment so teams can take informed actions on what to do inside apps.

To establish the continuous intelligence today's dynamic environments require, a vast amount of data needs to be tracked and analyzed. To gain timely and actionable intelligence, teams must harness machine learning. An effective solution must be capable of analyzing an enormous number of events and prioritizing them based on their criticality. Through machine learning, security teams can reduce false positives and streamline their efforts. As a result, teams can improve detection capabilities and make better decisions about how to respond.

How Zimperium Can Help

Developers can now detect and mitigate risks more efficiently with [Zimperium's zDefend](#). zDefend is an SDK embedded in the mobile application that enables the host application to attest the device, detect threats, and proactively protect itself. zDefend leverages z9, Zimperium's patented machine-learning-based threat detection engine, to deliver advanced protection to mHealth apps.

Conclusion

By taking the five steps described above, teams can holistically and continuously secure their mHealth apps. By mitigating coding risks, safeguarding code and keys, gaining run-time visibility, and establishing self-protection capabilities, teams can realize comprehensive app security. Consequently, mHealth app providers can effectively secure their apps, patient data, and overall business.

Fortunately, Zimperium offers solutions that can help customers progress through these five steps and do so with maximum speed and efficiency. Zimperium's [Mobile Application Protection Suite \(MAPS\)](#) offers the comprehensive capabilities that teams need to boost the security of their apps. The suite combines comprehensive in-app protection with centralized threat visibility. MAPS includes capabilities for automated application scanning, white box cryptography, anti-tampering and code-hardening capabilities, and advanced, machine-learning based threat detection, attestation, and monitoring.

[Contact us today](#) to learn more about how Zimperium can effectively and efficiently secure your mHealth application.

MAPS™

