# 2016 FDA Naloxone Challenge – Team Aeso, LLC

## YouTube Video

<https://youtu.be/MeYoKI1v-M8>

## Entrant Background

My name is Mike Buss and I am the sole team member for team Aeso, LLC. During the day, I write medical software for the Cleveland Clinic Foundation, the second highest ranked hospital in the U.S. per the U.S. News & World Report. I write mobile applications to help provide objective, quantitative data to medical professionals and have a strong background in creating mission-critical, HIPAA-compliant software. I have written applications to help aid researchers studying multiple sclerosis, Parkinson’s disease, COPD, ALS, and Alzheimer’s. My work has been featured on the front page of [Apple.com](http://mikebuss.com/2014/03/24/featured-apple/), [Fast Company](https://www.fastcompany.com/3059372/most-innovative-companies/apples-first-carekit-apps-are-here/6), and [Med City News](http://medcitynews.com/2014/03/cleveland-clinics-concussion-app-hits-big-time-apple-promo/).

In my free time, I run a small software company called Aeso, LLC, which is behind this submission.

## App Concept

For my entry to the Naloxone Challenge I created an app called Nally. Nally is a mobile application that seeks to connect the life-saving drug Naloxone with those who need it most. Using the latest technology, Nally can provide the following features for those in need of Naloxone:

* Provide information on how to identify and respond to an overdose
* Find nearby pharmacies like Walgreens, Duane Reade, and CVS using a database of over 17,000 locations
* Display nearby pharmacies on a map and in a list view, sorted by distance to the user’s current location
* Notify nearby users of Nally that have indicated they have Naloxone and are willing to provide it to those in need
* Provide directions to nearby pharmacies with a single button tap
* Request an Uber to a pharmacy with a single button tap
* Request a Lyft to a pharmacy with a single button tap
* Allow for calling 911 from within the app

The app also provides features for carriers of Naloxone who want to provide the drug to those in need, including:

* Allows the user to register as a carrier of Naloxone
* Allows the user to receive notifications when someone nearby requests they need Naloxone
* Allows the user to unregister as a carrier of Naloxone, removing their information from the system

To allow Nally to be used without an internet connection, the app comes preloaded with over 17,000 pharmacy locations, including every Walgreens and CVS Pharmacy in the United States. Many of these locations were downloaded from a website called AggData which specializes in aggregating accurate, up-to-date, and complete data sets. When the user is connected to the internet, the app will download new locations from the website in the background. Having an internet connection will also allow the user to connect with other users of the app in the event they need Naloxone.

Upon first opening the app, the user is presented with a brief tutorial on how to identify an overdose and find nearby carriers of Naloxone. When they complete the tutorial, they are presented with a list of pharmacies and other locations in the form of an annotated map. They are also given the option to view the locations in a list that is sorted by distance from their current location. The user’s current location is retrieved using the GPS on their device.

In addition to the pharmacies that are loaded with the app, new locations may be added through the Nally website. The website will consist of a simple form that allows community centers, government groups, and other organizations to add locations that provide Naloxone to the Nally system. These locations will then be added instantly to the Nally mobile application when it is connected to the internet.

To connect users who need Naloxone with users who possess the drug, a simple registration form was created. Users with Naloxone may fill out this form to indicate they are willing to share the drug with nearby users in need. Their location and device identifier is then added to the database on the server, allowing them to be notified if a nearby user needs Naloxone.

Great steps were taken to protect the privacy of the users of Nally. When a carrier of Naloxone registers in the app, their information is stored securely and never shared with other users. Users are not given the ability to see a list of nearby Naloxone carriers. In the event a user needs Naloxone, a notification is sent giving the nearby carriers an option to respond without revealing their name or location.

## Proposed Technical Design

Many of the features in Nally have already been implemented using the Swift programming language for the iPhone. The iPhone app was created as a native application to take full advantage of the speed and functionality of the iPhone, including getting the current location with GPS and sending/receiving push notifications.

The backend server was written in a way that allows for Android apps to communicate with the database, and an Android Nally app has been started in the Java programming language. Currently, the Android app has only a small subset of the features the iPhone app has – this is due to time constraints, not technical constraints.

The backend server was written in the Elixir programming language, which is a superset of the Erlang language. The Erlang language was specifically chosen for this project for its distributed, fault-tolerant, high availability capabilities. In addition to being able to handle extreme loads, Erlang is also performant, which makes it extremely cost-effective.

When opened, the mobile applications will open a socket, or constant line of communication, with the backend server. This server is responsible for storing the list of locations and users in possession of Naloxone. When a user indicates they need Naloxone, the mobile app sends the user’s GPS coordinates to the backend server, which then searches the database for nearby carriers of Naloxone. If one is found, the Naloxone carrier will be sent a push notification saying someone near their location needs the drug. If they can respond, they are given the option of calling the user in need to coordinate the delivery and administration of Naloxone.

Both mobile applications were built to run on extremely old software. Nally will work as well on the latest iPhone 7 as it will on a 5 year-old Android device. The Android app targets API 15, which means, according to Google, it will run on approximately 97.4% of all Android devices that are active on the Google Play Store.

Data security is extremely important for Nally, and was given very careful thought throughout the process. Any sensitive data stored on the mobile devices will be encrypted. When in transit, the data will be encrypted using the Secure Sockets Layer protocol, or SSL. On the backend server, the information will be encrypted when at rest in the database.

In addition to providing users with Naloxone, the goal of Nally is also to provide rich data to researchers. When a user downloads Nally they will be given the option of supplying anonymous usage information to the backend server. As part of an effort to place Naloxone in areas of the greatest need, the Nally backend will supply this anonymous information, including location data, to those in charge of distributing Naloxone throughout the country. Access to this data will be restricted, and will require a thorough vetting process before any information is released.

The goal of Nally is to connect users with Naloxone in situations where it was previously difficult or impossible. With the ability to connect a user to nearby carriers of Naloxone, and with data being provided to researchers who can help put Naloxone in the right areas, I hope to help get this life-saving drug where it is needed most.

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## Code Repositories

iOS: <https://github.com/mikebuss/Nally-iOS>

Android: <https://github.com/mikebuss/Nally-Android>

Web/API: <https://github.com/mikebuss/Nally-Web>