

Prevention of Medication Loss through a Marketplace and Blockchain

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Abstract

Brazil is one of the largest countries in the world in terms of population and economy. Like any other large country, it still has internal problems that affects the quality of life. Although it's a country with a huge potential in many areas, health system remains one of the biggest problems. The lack of medicines in health's services affects life of millions of people on a daily basis that needs medication for medical treatments. Research has shown that this problem has been going on for years and only public healthcare loses about R\$7 billion a year on medication that have expired. There are also many cases where there is inconsistency in medication storage records and the actual medication present, contributing to the problem and opening doors for public fund misuse and corruption. Beyond the waste and social problems, there is incineration costs for the disposal of the medicines and environmental contamination resulting from the process. From this point on, we developed a platform that uses the concepts of a marketplace to prevent the loss of medications that are close to expiring.

Aim

N2Med hopes to reduce the social impact of medicine's lack by preventing medication and health supplies waste. We also hope to reduce incineration costs and environmental damage with security and transparency.

Methods

The solution was developed using a Java, Typescript and NodeJS platform for the consumers to interact with the marketplace using Hyperledger Fabric Blockchain framework

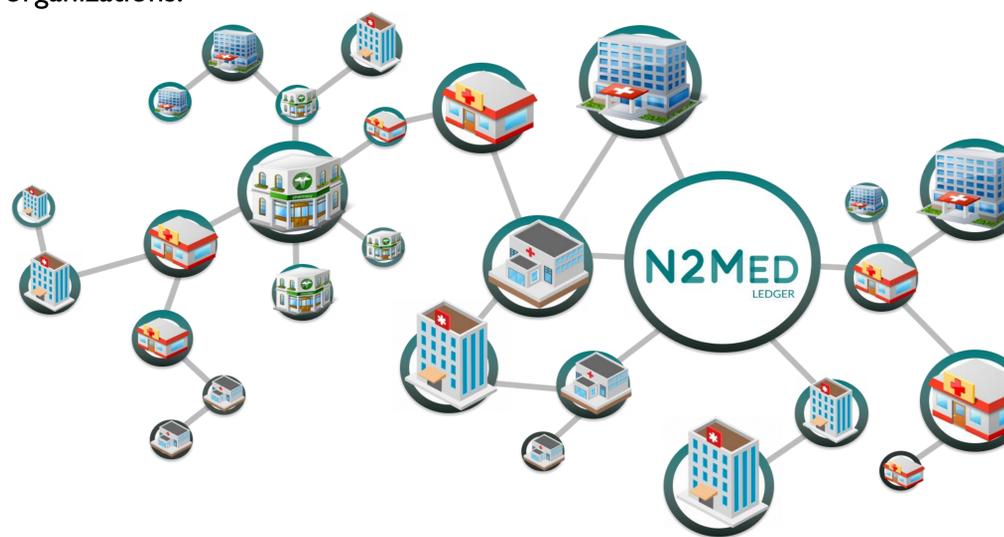
Discussion and Results

After a person is able to get medical attention, there's still a medication barrier novice to the public health and constant medication being wasted because of expiration. This problem requires a solution because it affects the lives of millions of people on a daily basis that needs medication for medical treatments. The main causes of medication waste in Brazil are inadequate storage and expiration. Research has shown that this problem has been going on for years and public healthcare waste about R\$7 billion due to bad distribution and medication expiration. For example, between 2014-2015, the Controladoria Geral da União (CGU)[4], a government agency reported that 11 of the 26 states in Brazil had to incinerate medication due to expiration. In 2013, Rio de Janeiro had to destroy more than 214 tons of medication and Bahia about 200 thousand expired pills that were supposed to be used towards the treatment of schizophrenia[5]. In addition to the financial cost, there are environmental and health damages due to incineration.



From this point on, this paper will present an architecture that will in theory solve these many issues in the logistics behind medication management in hospitals and pharmacies using Blockchain with the goal of preventing medication and health supplies waste. There are four main types of operations we focused on: donation, loan, exchange and sales.

The system called N2Med Ledger uses the concept of a marketplace where interested parties are able to offer medications on the Blockchain that are close to expiring or overstocked, thus eliminating its waste. It's also possible to request medication before buying from the usual distributors or labs. Each transaction for donation, loan, trades and sales will be recorded in a Blockchain for a transparent and secure way to prevent fraud and increase traceability of the medications that are circulating within the associates. The N2Med system will achieve sustainability by reducing medication waste providing a tool for better management and distribution of such supplies. The target users of the system are pharmacies, hospitals, labs and social organizations.



Conclusions

N2Med hopes to end medication loss due to failed distribution logistics and management. The decentralized nature of the network will allow for a low operational cost to motivate pharmacies and hospitals to use it to manage their medication stocks and prevent loss and incineration costs.

The web application is designed to facilitate user experience, especially for non-tech savvy people like pharmacists. They will be able to easily join the network and create transactions to loan, donate or trade the medication they have in abundance or about to expire.

The blockchain dApp will guarantee security, transparency and data integrity when members interact with each other. The N2Med dApp gateway's flexibility will also permit users to integrate it with their own systems in case they want to.

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