PLAYING AT THE INTERSECTION OF HEALTHCARE AND THE BLOCKCHAIN

Approximately 125,000 lives in the US are lost every year due to the failure of patients to take their prescribed medications on time, correctly, or at all. (1) This is a problem known as non-adherence and it costs the U.S. healthcare system billions of dollars per year. But there's a way to counteract this dangerous trend, improve patients' lives, and reduce healthcare costs by using state-of-the-art blockchain technology that allows interaction among all the entities involved in patient care. This novel approach eliminates barriers to prescription fulfillment, rewards patients for their adherence to treatment regimens, and allows care teams to respond to patient activities in meaningful and powerful ways.

A problem of striking magnitude

The World Health Organization (WHO) characterizes poor adherence to treatment of chronic diseases as a "worldwide problem of striking magnitude." The WHO report states that adherence to long-term therapy for chronic illnesses in developed countries averages 50 percent, and concludes that poor adherence to long-term therapies results in poor health outcomes and increased health care costs. (2) Other studies corroborate these findings:

- The National Association of Chain Drug Stores (NACDS) found that "20–30 percent of medication prescriptions are never filled and approximately 50 percent of medications for chronic disease are not taken as prescribed." (3)
- A survey commissioned by the National Community Pharmacists Association (NCPA) reported that nearly 75% of patients admit to not always taking their prescription medicine as directed. (4)
- According to studies published by The New England Journal of Medicine (5) and Express Scripts, the largest pharmacy benefit management (PBM) company in the US, (6) medication non-adherence costs the U.S. healthcare system up to $313 billion dollars a year.

While adherence to a prescribed treatment regimen remains a significant problem in health care today, there is another equally problematic and related issue that appears even earlier in the patient's continuum of care: prescription abandonment. This occurs when a patient never fills a prescription. Any one of several factors can cause this, such as:

- Co-pay sensitivity. Patients feel the pain of large co-pays and may forego filling a prescription if the cost is too high. In fact, a CVS Caremark-sponsored study published in the Annals of Internal Medicine found that "patients having a co-pay of $50 are almost four times more likely to abandon a prescription at a pharmacy than those paying $10." (7)
- PA required. The requirement for a PA can add several days from the time the patient was prescribed the medication to the time he or she can pick it up that the pharmacy. Patients may need to wait even longer if their prescriber deems the PA unnecessary or troublesome. Further, the PBM may even even deny the PA request, leaving patients without the prescribed therapy.
- Out-of-stock medication. If the medication is not in stock at the pharmacy, the pharmacist will typically order it from its preferred wholesaler and tell the patient to return later that day or the next day. In fact, we know from our experience in the industry that a lot of the time the patient doesn't

return. In a best-case scenario, the patient may go to another pharmacy to fill the prescription immediately.

At any one of these points, whether the prescription gets dispensed can be unclear, and the one person who knows what really happened—the patient—is not involved in confirming what happened. This is because the current healthcare system is comprised of several disjointed and sometimes competing entities who serve the patient but do not share data specific to that patient. Consequently, the data regarding a single prescription could be incomplete or wholly inaccurate. Improving the accuracy of these data provides a means by which better healthcare and patient outcomes can be monitored and rewarded.

The impacts of medication adherence also vary by disease state. In "Adherence and health care costs," scholars from Johns Hopkins University and the Johns Hopkins College of Medicine performed a comprehensive review of dozens of studies about medication adherence and different diseases. (8) Among their findings:

- Several studies revealed lower overall medical costs for patients with cardiovascular disease who had high adherence.
- Patients with chronic obstructive pulmonary disease (COPD) who had high levels of adherence experienced fewer hospitalizations and lower Medicare expenditures.
- Medication adherence provided a savings to patients with severe asthma who had had previous hospitalizations.
- One study on diabetes patients showed that each 10% increase in adherence could be associated with as much as a 28% decrease in annual health care costs, while another study concluded that annual inpatient costs were 41% higher for non-adherent patients than for patients who took their medications as prescribed.

"Interventions that target adherence must be tailored to the particular illness-related demands experienced by the patient."

-WORLD HEALTH ORGANIZATION

Innovations to Improve Patient Adherence

Those same Johns Hopkins health policy scholars suggest at least three ways to improve adherence: medication reminders, care coordination, and value-based insurance designs. By leveraging technology in unique ways, ScriptDrop has created an ecosystem that fundamentally changes the adherence landscape. ScriptDrop's unique solutions tracks a patient's medication use, provides the data to the patient's care team, and rewards patients in the form of lower copays or premium reductions. ScriptDrop is the only online, comprehensive platform that can realize the strategies suggested in the Johns Hopkins study in a way that shares information securely and appropriately, and at no cost to the patient. Here's how:

Prescription Delivery Service (Patent pending). The critical and obvious first step in adherence is ensuring that the patient takes possession of the medication in a timely manner. ScriptDrop's tracked Prescription Delivery Service is currently integrated with about 350 HIPAA-compliant courier companies in 42 states. The service focuses on prescription abandonment at the point of sale. If the prescribed medication is not available at the time the patient initially goes to the pharmacy, ScriptDrop's seamless solution allows for the medication to

be delivered to the patient's home or office. Conversely, if the patient decides to fill the prescription at a different pharmacy, ScriptDrop's technology allows both pharmacies to become aware of the dispensing without any intervention from the patient.

Medication Reminders (Patent pending). The next step in patient adherence is ensuring that the patient takes the medication as prescribed. ScriptDrop's Medication Reminders initiate daily interactions with the patient without the need for specialized software or any additional effort on the part of the pharmacist or provider. There is no need for patients to tell ScriptDrop anything about their prescription, other than the time that they'd like the reminders.

Because of ScriptDrop's integration with pharmacies, we already know the drug, how it should be taken, and how long the patients should get the reminders. We even know their pharmacy and physician contact information, in the event that we need to facilitate a conversation with them. By tracking the timing of each administration of the drug, ScriptDrop's app can automatically identify if a patient is taking the medication as prescribed, and will send a message to the patient's care team if the patient is non-adherent.

This video describes the ScriptDrop medication reminder experience and introduces Mary, the patient's Medication AI Assistant. Mary reminds patients to take their medication at the appropriate time and tracks each dose.

The idea for medication reminders came from a client who challenged us to do more for patients who signed on for prescription delivery. We realized that we could develop a way for the prescription data to be transmitted from the pharmacy as a medication reminder transaction in the same way as a delivery request.

Smart Pillbox (Patent pending). ScriptDrop has also developed a smart pillbox that can have data sent directly to it, through our network. The pillbox can track the patient's adherence using two-way verbal communication and sensors. We consider the Smart Pillbox as an extension of Mary that provides another new and innovative way to impact patient care. After Smart Pillbox becomes production-ready and the patent is granted, ScriptDrop will file for FDA approval as a Class I Medical Device. With that approval, our Smart Pillbox can be billed to the patient's health plan. The support for this technology already exists, as one physician told us: "If you get this classified as a Class 1 Medical Device and (get) insurance to cover it, I'll prescribe it to every chronic patient I treat."

That's all great, but what's in it for the patients?

A client asked us, "What's in it for the patients to tell your app they've taken their prescription?" This is a legitimate question, and one we considered thoroughly when developing our apps. We learned that "Gamification boosts medication adherence, which empowers patients and presents opportunities for healthcare cost reduction." (9) ScriptDrop's leadership team immediately saw the value of implementing an incentive structure for patients to interact with our apps as if they were playing a game, so we developed platforms to reward patients for adherence. Then, we made our tools even more powerful by incentivizing other members of the healthcare team to participate too, by promoting seamless data sharing, using secure, safe and dynamic Blockchain technology.

With ScriptDrop, patients are rewarded for getting their prescription and for interacting with the apps that track their adherence. And because the individual patient's daily interactions with the apps will provide verifiable data, it can be used to provide feedback to their entire care network. Those data points will unveil trends that can help customize treatment for patients, track the efficacy of certain drugs, drill down on the timing of the onset of side effects, and provide other opportunities that can positively impact the health of patients and ultimately drive down costs.

How does the gamification work?

Adherence Tokens. ScriptDrop awards Adherence Tokens to patients when they receive their prescription and refills, take their medication as prescribed, interact with our apps, and refer friends and family to sign up for ScriptDrop. Each time patients interact with our apps, their activity is tracked. Then, each month, ScriptDrop performs a reconciliation on each patient's account using a proprietary distribution algorithm that determines the number of Adherence Tokens to award. The algorithm is dynamic enough to vary from drug to drug or even patient to patient and can award bonus allotments of tokens for perfect adherence (i.e., filling the prescription on time, taking the medication as prescribed, and refilling on time).

"Improving adherence requires a continuous and dynamic process."

-WORLD HEALTH ORGANIZATION

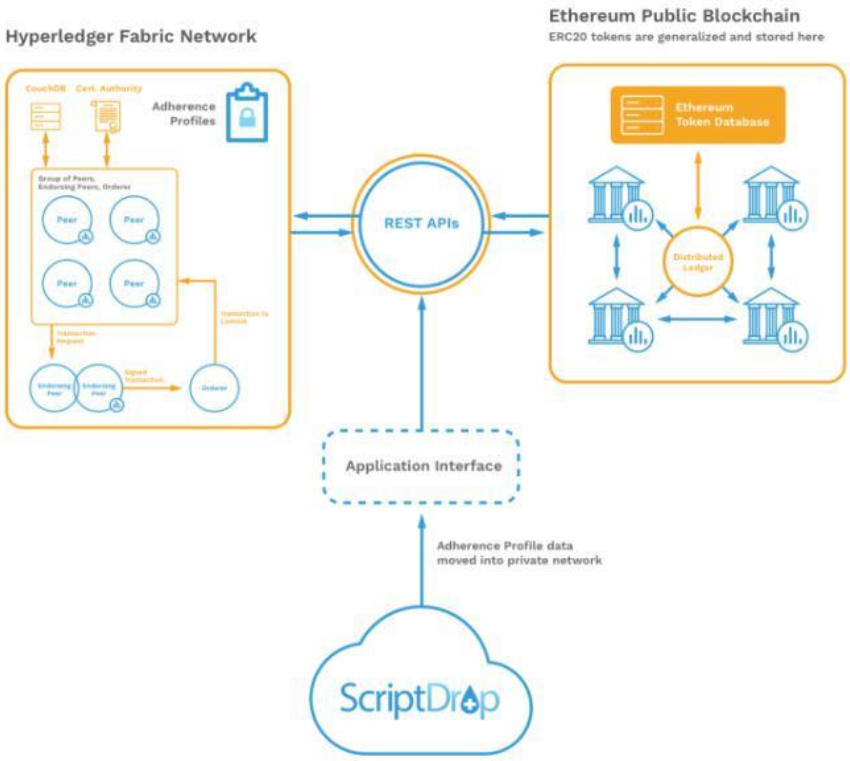
The patient's adherence profile and awarded tokens are posted to the patient's account on the blockchain. Then, the awarded tokens can be used to buy down medication co-pays, provide cheaper health insurance premiums, or even be converted to cash.

Not all Blockchains are created equal

Much of blockchain technology's power and usefulness can be attributed to its transparency and the ability to independently verify the data it holds. Obviously this can pose concerns about privacy, specifically with respect to Protected Health Information (PHI). To accomplish the sharing of information and the provision of incentives to participants, ScriptDrop will use a REST API to connect two concurrent blockchains, one that is public, and one that has provisioned access. A blockchain with provisioned access requires an entity—in this case the patient—to grant permission for certain other entities to view the contents. A blockchain with provisioned access will allow patients and their care teams who are granted access to view the adherence profiles. The public blockchain will allow visibility into and verification of the amount of tokens that are awarded.

Hyperledger (private). ScriptDrop will utilize the Hyperledger framework to store patient-specific healthcare data, which requires privacy. This framework is the most suitable for tracking and monitoring patient adherence because, like at a doctor's office, patients have to specifically grant access to their data. This framework does not require every peer in the chain to verify every transaction, which would be unwieldy if not impossible for all members of the patient's care team to do. (You can find more info on Hyperledger and the framework here.)

Ethereum (public). The second part of the ScriptDrop ecosystem functions within the Ethereum Public Blockchain. This blockchain uses the ERC20 token, a type of cryptocurrency. The Adherence Token, the ERC20 token specific to ScriptDrop, will be stored within the Ethereum Token Database and will be independently verified through its distributed ledgers. The tokens can be used for patient co-pay buy downs and premium reductions via transactions sent through the ScriptDrop network.



"Blockchain technology enables trusted transactions between participants without involving an intermediary, … increasing interoperability and transparency while reducing transaction time, fees and fraud." (10)

-BRUCE BROUSSARD, CEO OF HUMANA

To date, a lot of great ideas for healthcare innovation on the blockchain have emerged but no healthcare entity has been properly incentivized to post data to a new blockchain. At ScriptDrop, we incentivize everyone involved in the patient's healthcare—even the patient—to post events (called "transactions") to a shared and secure blockchain. In this way, at any given moment, any entity entitled to do so will have access to real-time data about the patient's status.

Consider our earlier scenario of the patient who went to one pharmacy to fill a prescription for a drug that wasn't in stock, and instead of waiting for it to be filled there, decided to fill it at a different pharmacy. The entity who knows best what happened in this scenario is the patient, but the patient has no incentive to notify the first pharmacy of the change. The first pharmacy, then, has no way to know that the patient will not return to pick up and pay for the medication the pharmacy ordered. But with ScriptDrop's technology, the two pharmacies would have access to and be informed by the information

posted to the blockchain about the prescription. In this case, the first pharmacy would discover that the patient filled the prescription elsewhere and should not expect the patient to return for the medication.

HIPAA considerations

Compliance with the Health Insurance Portability and Accountability Act of 1996, or HIPAA, is essential to any company in the health care industry. HIPAA, through its implementing Privacy Rule and Security Rule, mandates that the confidentiality, integrity, and availability of patient protected health information ("PHI") be protected, that PHI be used only for legitimate health care purposes, and that health care companies maintain privacy and security standards sufficient to ensure these protections.

ScriptDrop has the expertise and experience to ensure that its products and services remain HIPAA compliant. It enters into a formal relationship as a business associate (BA), or service vendor to health care providers, with the other parties in its ecosystem (such as pharmacies and health care providers, attesting to them that it will abide by HIPAA standards and best practices to safeguard their patients' PHI. Its software systems and business procedures are designed from the ground up to fully comply with Security Rule requirements, and it maintains a vendor management program to supervise its own downstream business associates for compliance.

In addition, ScriptDrop's technology permits it to offer innovative new services to patients while still satisfying privacy and security regulations. By receiving and maintaining patient consent for direct communication, and maintaining a secure end-to-end communication channel through HIPAA-compliant cloud storage and data processing infrastructure through its own business associate, Amazon Web Services, ScriptDrop is able to securely transmit and receive PHI via in-home voice communications with patients, and pass it on to its health care provider partners. Its control over the entire communication channel ensures for its partners that ScriptDrop's services are a secure, scalable, and compliant way to directly improve patient adherence.

Sign me up, ScriptDrop!

ScriptDrop provides seamless entry into our innovative ecosystem for patients, providers and others concerned with patient adherence. By minimizing barriers to entry, we can achieve our goals of improving patient adherence and health quickly and effectively.

Patient entry. At this time, there are two opportunities for patients to easily enter the ScriptDrop ecosystem.

1. Pharmacists can offer the Medication Reminder service to patients when filling a prescription. If the patient decides to participate, the pharmacist sends the prescription information to ScriptDrop using a simple click of a button.
2. Patients can opt-in for Medication Reminders when using ScriptDrop's medication delivery service.This occurs when the patient signs for the prescription at the point of delivery.

Whichever point of entry the patient uses, it is important to note that the the initial contact with ScriptDrop must originate from an integrated pharmacy. This ensures not only the integrity of the prescription data (including drug, quantity dispensed, days' supply, and sig.), but also that the patient has given the pharmacist a verbal acceptance to participate in the system.

To confirm the patient's participation, ScriptDrop will send a confirmation text to the patient's cell phone.

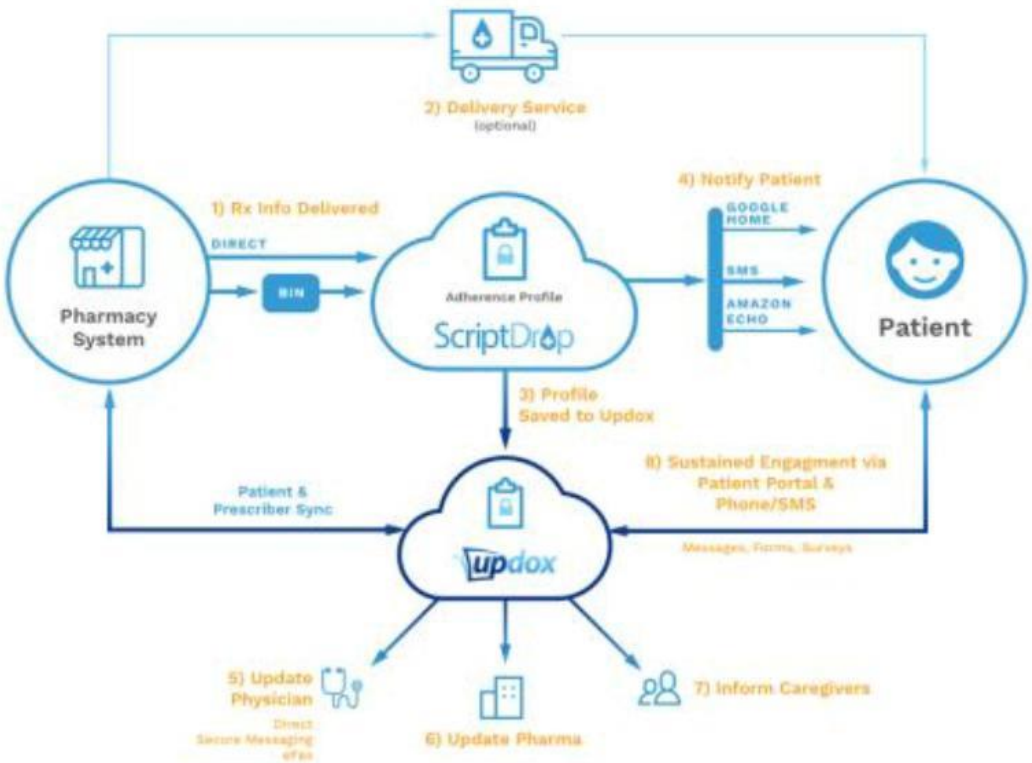
Patients need to either sign or type their name in response and indicate the method by which

they want to receive their reminders: text, robocall, Google Home, Amazon Echo (Alexa). After successful completion of these simple steps, patients begin receiving daily medication reminders.

Pharmacy entry. ScriptDrop's service and software are compatible with every pharmacy in the United States because the apps are based on the specifications of the National Council for Prescription Drug Programs (NCPDP) protocol for pharmacy transactions. This format allows quick integrations with pharmacy claims and most e-prescribing systems with little to no modifications. Most importantly, ScriptDrop apps do not require downloading. The ease of entry into the ScriptDrop ecosystem has rapidly driven demand for our services across the US and both the ScriptDrop Delivery Service and Medication Reminders are already live in a number of pharmacies in the U.S.

ScriptDrop's integration allows the pharmacy to send a prescription transaction simultaneously to the patient's health plan or PBM and to ScriptDrop, so there's no additional effort or time expended on this process. When a patient has a balance of adherence tokens, ScriptDrop will know from the claims transaction the co-pay that is due for the prescription, and will use that token balance to buy it down.

Updox Users. ScriptDrop recognizes the need for the patient's care team to communicate in a way that protects PHI. ScriptDrop's partnership with Updox provides a way to communicate patient non-adherence seamlessly and securely back to the patient's care team over its robust network of electronic health record systems that are used by more than 250,000 physicians. If the patient goes off therapy, fails to fill a prescription, or self-identifies as skipping a dose, ScriptDrop will use the Updox Pharmacy Connect solution to notify the pharmacy. In turn, the pharmacy can confidentially communicate with the physician or patient caregivers via Updox Direct Secure messaging. Please read this press release to learn more.



Pharmaceutical manufacturers. It's also easy for pharmaceutical manufactures to participate in the ScriptDrop ecosystem. ScriptDrop recognized a unique opportunity to integrate the multi-billion dollar voucher program business (11) into our ecosystem. ScriptDrop partners with pharmaceutical manufacturers to define and build ideal patient profiles and then uses those to award tokens to patients with high adherence. The manufacturers purchase Adherence Tokens to be used in the same way vouchers are used currently: to buy-down or eliminate patient co-pays. Further, ScriptDrop's daily interactions with patients provide great insight into the factors affecting patient adherence that manufacturers need to know, such as intolerance, timing of the onset of side effects, or high cost. Using this information, the manufacturers can update their medical guidance or modify their strategies for how to award their tokens.

The strengths of ScriptDrop

Industry knowledge and strategic partnerships. ScriptDrop was originally founded to solve the prescription delivery problem that plagued the pharmacy and pharmaceutical industries. With experience developed over decades of work in the industry, we have been able to build a valuable solution for pharmacies while recognizing other opportunities and developing innovative technology to improve patient adherence and save lives.

Data. Our data allows us to report trends to everyone in the ScriptDrop ecosystem as we interact with the patient. Our dynamic platforms customize the patient's experience and help lower the cost of healthcare by making everyone from patients to pharmacies more efficient, and ultimately guide patients toward better medication adherence. This will save lives and improve healthcare quality. Here are just some ways we see the role of ScriptDrop's data in shaping health in the future:

- Research studies. With verifiable and independently vetted data in the ScriptDrop ecosystem, researchers will have insight into the efficacy of treatment regimens, barriers to patient adherence, and other impediments to patient care.
- Epidemiology. ScriptDrop's data can be filtered and sorted by disease state, ZIP code, or even prescriber specialty. This can help identify disease outbreaks, spread, and potential preventative interventions or suggestions for stockpiling medications (e.g., notifying pharmacies and public health officials about the spread of flu virus).
- Monitoring abuse of controlled substances. The aggregation of nationwide prescription data will allow for analysis of trends in the distribution of controlled substances, such as opioids, based on geography or prescriber (not patient).
- Adherence scores for non-patients. The data on the ScriptDrop ecosystem will provide insight into the role of prescribers, pharmacies, and health plans in the overall patient adherence picture. These actors can also receive scores for ensuring patient adherence that can be rewarded or incentivized.

Our core team. ScriptDrop's core team hails from CoverMyMeds—the largest PA solution in the U.S. —which was purchased by McKesson in 2017 for $1.1 billion. The team understands the intricacies of healthcare, specifically the patient's journey and obstacles encountered when acquiring and taking their medications as directed. The team's extensive network with other leaders in the healthcare technology industry allows us to bring together the right people to drive change in healthcare. Our founding team actively participates in NCPDP workgroups in order to guide changes in the pharmacy tech industry.

- Nick Potts, CEO

  Nick previously led the charge to integrate a Healthcare IT Pharmacy API into more than 30 different pharmacy systems in the U.S. He possesses a deep understanding of the pharmacist's workflow in pharmacy billing and has extensive contacts throughout the

pharmacy industry. His leadership has already resulted in ScriptDrop's working with some of the largest pharmacies and pharmacy systems. Nick has actively participated on multiple NCPDP workgroups focusing on the technical aspects of pharmacy transactions. Nick is a graduate of Middle Tennessee State University.

- Larry Scott, CTO
  Larry began building software at a very young age and to date has built features that thousands of physicians and pharmacists use every day to submit PA requests. He quickly figured out that he and Nick worked well together, and they formed a partnership to develop several projects. His shared interest with Nick in cryptocurrencies resulted in the creation of an app that utilizes crypto tokens to gamify charitable acts. Here's an article that mentions the app. ScriptDrop was a logical extension of that app into the world of patient adherence.
- Amanda Way, VP of Pharma Sales and Business Development
  Amanda was one of the first employees at CoverMyMeds, where she was fundamental to the company's growth and success during her eight-year tenure. Amanda possesses a vast knowledge of the pharmaceutical industry and has expedited ScriptDrop's pharma growth and influx of new business since joining the team in early 2017. Amanda is a graduate of Ohio University and holds an MBA from Franklin University in Columbus, OH.
- Matt Brennessel, VP of Pharmacy Solutions
  Matt is responsible for implementing innovative and impactful solutions for ScriptDrop's growing pharmacy network. Prior to joining ScriptDrop, Matt led a team responsible for managing the use and implementation of an industry-leading online solution in many of the nation's retail, long-term care and specialty pharmacies. He has worked directly with the nation's largest pharmacy chains, providing customized solutions and innovative product implementations that struck down barriers to excellent patient care. Matt is an active member of NCPDP and an adamant supporter of enhancing pharmacy, patient and provider experiences through innovation in health care. Matt is a graduate of The Ohio State University.
- Derek Schneider, Senior Software Developer
  Derek holds a BS in Computer Science and Engineering from The Ohio State University and has several years of experience in the Healthcare IT industry. Derek's industry-specific knowledge provides the framework needed to build robust applications that meet the stringent requirements of the industry. Before starting with ScriptDrop in mid-2017, he worked with Nick, Larry, and Amanda at another Healthcare IT company, building out solutions which thousands of pharmacists and prescribers use on a daily basis.
- Graham Conzett, Senior Software Developer
  Graham brings to the team many years of experience in software development, several of them in the healthcare industry. His breadth of exposure to different industries, languages, and tech stacks allows him to take a pragmatic approach to product and technical architecture. Graham's many years in early-stage tech startups and as an engineering manager provide the guidance and leadership needed to create agility and speed on the team while recognizing and capitalizing on opportunities to scale the company. Graham has a BS in Industrial Design.

Our team of advisors. ScriptDrop benefits from a diverse team of advisors who share their experience in both the blockchain and healthcare industries. Our list of advisors grows as interest in using the blockchain for healthcare increases. For the most updated list, please review our advisors link at https://www.scriptdrop.io/team.html

Conclusion

We firmly believe that blockchain technology will drive improvement and change in healthcare, and we have an unwavering commitment to discovering innovative ways to save the 125,000 lives lost to prescription abandonment and non-adherence using that technology. We recognize that adherence can be improved using dynamic processes that employ medication reminders, care coordination, and value-based insurance designs, so our apps and infrastructure address all three strategies. We are confident that our team of knowledgeable and committed healthcare tech leaders will change the face of healthcare, provide for new partnerships across patient care teams, and save lives.

If you have questions for us, please email us at: tokensale@scriptdrop.io

Discord: Join Here

Sources

1. Brody, Jane E. "The Cost of Not Taking Your Medicine" The New York Times: April 17, 2017.
2. World Health Organization. Adherence to Long-term Therapies: Evidence for Action.
3. Boylan, Lisa. "The Cost of Medication Non-Adherence" National Association of Chain Drug Stores.
4. National Council on Patient Information and Education. "Enhancing Prescription Medicine Adherence: A National Action Plan" August 2007.
5. Rosenbaum M.D., Lisa, and William H. Shrank, M.D. "Taking Our Medicine – Improving Adherence in the Accountability Era". The New England Journal of Medicine: August 22, 2013.
6. Express Scripts Case Study: "The High Price of Low Adherence to Medication". July 21, 2015.
7. Alexander, Antoinette. "CVS Caremark study addresses correlation between out-of-pocket co-pay, Rx abandonment Drug Store News: Nov. 15, 2010.
8. Iuga, Aurel O., and McGuire, Maura J. "Adherence and health care costs" Risk Manag Health Policy: 2014; 7: 35–44
9. "Boosting patient empowerment and motivational pull: Achieving the next level in a gamified health environment" Monitor Deloitte white paper, February 2016.
10. Broussard, Bruce. "Blockchain: Transformational Technology for Health Care" LinkedIn post. Aug. 8, 2016.
11. Eric Sagonowsky. Pharma's copay coupons, a key marketing tool, face new limits in California. FiercePharma: Feb. 6, 2017.