1. EXECUTIVE SUMMARY

From our time in the clinical setting, our team observed many pain points and created an initial list of 124 needs. Based on a set of objective and subjective filtration criteria, our team decided to focus on gastric cancer and palliative care needs space.

Gastric cancer is commonly diagnosed at later stages in patients in the United States, leading to low 5-year survival rates. Current treatment options for patients with terminal gastric cancer are palliative surgery or chemotherapy to help reduce symptoms, as well as pain management options such as pharmaceuticals or heating devices. A lack of medical literacy in patients can lead to the pursuit of care options that contribute to prolonged hospital stays and side effects that reduce quality of life. We aim to create a solution that provides patients with a better understanding of their care and treatment options and facilitates more informed decision-making. The ultimate goal of our solution is to improve patient quality of life and decrease end-of-life costs for these terminal cancer patients.

We established a better understanding of the background and pathophysiology of gastric cancer, as well as determined what the current market looks like. There are a number of innovations in the market that target different areas of gastric cancer care, including traditional pain management, care planning management, and health record management. We also determined relevant stakeholders in the gastric cancer space, including insurance companies as the payers, patients, friends and family, physicians, and drug developers. We are aiming for a solution that provides a net positive value to all of these stakeholders, but most importantly to the insurance companies as the payers and patients as the users.

We determined the primary customer need criteria include a solution that can effectively reduce time in the hospital and hospitalization costs, while providing accurate data and not posing any risk beyond the current standard of care. We would also like our solution to be user-friendly and able to share data between users and family members.

Despite a decrease in both the incidence and in-hospital mortality rates of gastric cancer, the cost of care has significantly risen. Each year, approximately 26,890 new cases of stomach cancer are diagnosed in the United States. We have identified a potential cost reduction in gastric cancer care amounting to $1.43 billion, within a market size of $572 million. The economic burden of advanced gastric cancer is substantial. To ensure the effectiveness of our solution, the cost per patient must be approximately $4,390 or less, providing us with a considerable budget to develop an effective solution.

Our initial ideation process has led us to a preliminary solution of a software application that would interact with data provided by the patient and providers. This application would theoretically aggregate users’ available health data and provide actionable insights for all that interact with the software. Our next steps will be mapping out a path for execution and creating a minimum viable product. By integrating the voice of the customer, we will rapidly prototype to ensure that our outcome provides value, the population is appropriately targeted, and the problem is sufficiently addressed.

1. NEEDS FILTERING PROCESS

### 2.1 Top Ten Needs

| **Need 1: A better way to identify and diagnose urinary tract infections (UTIs) in spinal cord injury patients to prevent the need for surgical intervention.** |
| --- |

Urinary tract infections are common in spinal cord injury patients due to neurogenic bladder, or bladder dysfunction, and in severe cases may lead to surgical intervention, either to increase bladder function or as a result events such as kidney stones caused by UTIs [[[1]](#footnote-0)LINK, LINK, LINK, LINK]. Any surgical intervention comes with complications for the patient and costs to payers (either insurance or out-of-pocket). Identifying UTIs earlier could help prevent the progression and occurrence of severe infection, aiding in lowering the need for surgery.

| **Need 2: A way to diagnose endometriosis in young women early prior to symptom appearance to minimize associated complications like infertility​.** |
| --- |

Endometriosis is projected to affect between 5-10% of menstruating individuals in the United States and can only be definitively diagnosed via surgery, most commonly laparoscopy, which can take 7 years on average to occur after the onset of symptoms. Endometriosis is commonly associated with side effects such as pelvic pain, intense periods, and infertility [LINK, LINK, LINK]. A quicker definitive diagnosis can be reached the better-equipped patients and providers are to tackle these complications and comorbidities.

| **Need 3: A way to prevent errors in medical decision-making to decrease hospital costs associated with errors and improve patient outcomes** |
| --- |

Errors in medical decision-making introduce harm to patients and increase costs to our healthcare system. Errors in medical decision-making can come from a variety of reasons: This can be from incorrect reasoning by the medical professional, inaccurate information communicated, and incorrect medication doses administered. Approximately 400,000 hospitalized patients experience preventable harm due to medical decision-making errors per year, and these errors result in approximately 200,000 preventable deaths per year. Some estimate the cost of these errors to be between $20 and $40 billion dollars per year to the healthcare system [LINK]. It is apparent that medical decision-makers are in need of tools to assist with the medical decision-making process, whether this be in presenting accurate information timely or bolstering communication between teams.

| **Need 4: A way to mitigate the effects of falls in elderly patients to maintain quality of life and decrease healthcare costs** |
| --- |

As we age, there are many physiological changes that occur that make the elderly more susceptible to falling. These changes in cognition, strength, sensation, and proprioception are a normal part of aging and compound the risk of accidents and falls. For an elderly person, a fall could cause considerable loss of function and independence and create significant healthcare costs for both an individual and their family. With the growing elderly population in the United States, There is a significant need to support this aging population so that these individuals maintain their independence and quality of life for as long as possible and decrease healthcare costs for the individual and for the healthcare system overall. Around 50 billion dollars is spent on the care of non-fatal falls in the US yearly as estimated by the CDC [LINK]

| **Need 5: A way to assist with advanced care planning for terminal gastric cancer patients in order to decrease end-of-life care costs** |
| --- |

Advanced care planning (ACP) refers to an individual making decisions about what care they will receive at the end of their life. Some components include: identifying a surrogate decision maker, assessing patient values and goals, documenting wishes, and anticipating clinical scenarios. Individuals with chronic conditions are more likely to have completed advanced care planning compared to their healthy peers. It is estimated that around two-thirds of adults have not completed ACP [[LINK](https://www.pennmedicine.org/news/news-releases/2017/july/two-out-of-three-us-adults-have-not-completed-an-advance-directive)]. There is strong evidence that suggests a significant decrease in care costs associated with the completion of ACP [[LINK](https://www.chiefhealthcareexecutive.com/view/the-untapped-value-of-advance-care-planning-viewpoint)]. It stands clear that many individuals would benefit from the completion of ACP given that the care they receive would be more in line with their wishes and the clear reduction in cost for both the individual and the healthcare system overall.

| **Need 6: A better way to track surgical tool usage in order to reduce waste in the operating room​** |
| --- |

Tracking surgical tool usage more effectively can significantly reduce waste in the operating room. Operating rooms, in addition to labor and delivery suites, account for 70% of hospital waste. [LINK] By implementing automated inventory systems and real-time tracking technologies, hospitals can ensure that only necessary tools are opened and used during procedures. This minimizes the amount of unused, sterile supplies that are discarded, leading to cost savings and improved efficiency. Additionally, accurate tracking helps maintain up-to-date surgical preference cards, reducing delays and enhancing overall surgical workflow. [LINK]

| **Need 7: A way to decrease barriers to communication between hospital staff to enable timely and effective medical decision-making** |
| --- |

Eliminating communication barriers among hospital staff is essential for timely and effective medical decision-making. Poor communication accounts for up to 70% of serious adverse events in hospitals and is the primary root cause of over 60% of sentinel events. [[LINK](https://www.gmc-uk.org/-/media/documents/a-scoping-review-of-evidence-relating-to-communication-failures-that-lead-to-patient-harm_p-80569509.pdf), [LINK](https://www.jointcommission.org/resources/news-and-multimedia/news/2023/04/the-joint-commission-releases-sentinel-event-data/)] Addressing these barriers can result in substantial cost savings and significantly enhance patient safety. [[LINK](https://www.dialoghealth.com/post/communication-barriers-in-healthcare)] Improved communication also elevates patient satisfaction, as patients who understand their care plans are more likely to adhere to treatment recommendations. [[LINK](https://www.patientprovidercommunication.org/download/library/presentations/the-impact-of-communication-barriers-on-adverse-events-in-hospitalized-patients-41.pdf)] Furthermore, better communication among staff enhances efficiency, leading to quicker decision-making and a more streamlined workflow.

| **Need 8: A better way to determine extubation and intubation intervention of ICU patients to improve patient outcomes with compassionate care** |
| --- |

Developing an improved method for determining extubation and intubation interventions in ICU patients is vital for enhancing patient outcomes with compassionate care. Intubation in the ICU is fraught with risks, leading to life-threatening complications in 20-50% of cases, including cardiovascular collapse and severe hypoxemia. [[LINK](https://annalsofintensivecare.springeropen.com/articles/10.1186/s13613-019-0483-1)] Moreover, extubation failure, which occurs in about 10% of cases, is associated with a poor prognosis. [[LINK](https://aacnjournals.org/ccnonline/article-abstract/41/3/42/31458/Readiness-Assessment-for-Extubation-Planning-in?redirectedFrom=fulltext)] By implementing readiness assessments and evidence-based protocols, we can better identify high-risk patients and ensure timely interventions. [[LINK](https://link.springer.com/article/10.1007/s00134-022-06849-0)] This approach not only bolsters patient safety but also fosters a more humane and patient-centered care environment.

| **Need 9: A better way to manage EHR and patient data between different companies and medical devices so that any data or history from a patient needed can be brought up on the spot** |
| --- |

Efficiently managing Electronic Health Records (EHR) and patient data across different companies and medical devices is essential for providing timely and effective care. In 2021, 71% of U.S. physicians reported feeling overwhelmed by the sheer volume of patient data. [[LINK](https://www.qualityforum.org/News_And_Resources/Press_Releases/2022/NQF_Report_Makes_Five_Recommendations_to_Leverage_Electronic_Health_Records_%28EHRs%29_to_Measure,_Improve_Care_Coordination.aspx)] Moreover, less than half of nonfederal hospitals could electronically query patient health information from other organizations. [[LINK](https://bmcmedinformdecismak.biomedcentral.com/articles/10.1186/s12911-024-02789-5)] Seamless EHR integration allows healthcare providers to access a patient's complete medical history in real-time, significantly enhancing decision-making and patient outcomes. [[LINK](https://jamanetwork.com/journals/jama-health-forum/fullarticle/2777782)]

| **Need 10: A better way to track patient outcomes after intervention to improve understanding of patient QoL and contribute to clinical research** |
| --- |

Advances in clinical medicine are contingent upon understanding how certain interventions impact the patient. Patient-reported outcome measures (PROMs) have been shown to improve patient-related outcomes in 43% of cases when feedback is provided to patients or healthcare providers. [[LINK](https://hqlo.biomedcentral.com/articles/10.1186/s12955-024-02312-4)] Additionally, utilizing PROMs to monitor disease symptoms and linking these to care pathways has resulted in improvements in 68% of studies. [[LINK](https://jamanetwork.com/journals/jama-health-forum/fullarticle/2777782)] Implementing these measures can enhance clinical decision-making, ensure treatment effectiveness, and support patient-centered care. [[LINK](https://jamanetwork.com/journals/jama-health-forum/fullarticle/2790756)]

### 2.2 Filtration Process

Initial clinical observations resulted in 124 needs across the team. Four levels of filtration were required to narrow down the 124 needs to a final need. This filtration process took place over several weeks at several clinical sites across Austin, Texas. All of our observations were collected in the inpatient setting. We were able to glean insight from patients, physicians, nurses, advance care practitioners,

The first level of filtration brought the number of needs from 124 to 22. It included both subjective factors of personal interest and objective factors of patient impact, provider impact, treatment landscape, and estimated population size. Personal interest was ranked on a scale of 0 to 2, with 0 indicating no personal interest, 1 indicating topical interest, and 2 indicating high interest. Each team member was limited to five 2 responses. The objective factors were each ranked on a scale of 1 to 4, with criteria included in **Appendix A Table A.1**. The personal interest factor was scaled up to be equal in weight to the objective factors.

The second level of filtration resulted in 5 needs. The second filter was built on further research on existing markets and populations, and initial interviews. Further background research than what was established in the first filter was performed for each need to provide a better understanding of the available market and scope of the population. Notes from observations and initial informal interviews with various providers were collected and discussed in order to further the team's understanding of the healthcare perspective of the needs space.

The third level of filtration further narrowed down the needs to 3 contenders. This level of filtration consisted of dedicated validation and stakeholder interviews with various providers and administrators to develop a still better understanding of the market and areas for development.

The final level of filtration resulted in the final need the team is pursuing. This level of filtration consisted of initial ideation and needs analysis for each of the final 3 needs. This allowed for a better team understanding of how to proceed in each needs space and triggered informed discussions of the most viable need to continue with.

1. TOP NEED

**A better way to facilitate care delivery for terminal gastric cancer patients to improve quality of life and decrease end-of-life care costs**

### 3.1 Introduction

After filtering, validating, refining, and initial ideation for each of our top needs, we found that all of our top needs would have a great impact on patients, providers, and the healthcare system. The problem of the original needs statement was adjusted to capture a larger solution space while still maintaining a focus on a targeted population with meaningful outcomes. By maintaining our target population of terminal gastric cancer patients, we are able to work on a solution that can be tailored to one disease state. Validating a solution for this population could indicate that the solution could later be adapted for other pathologies or situations.

### 3.2 Disease State Fundamentals

Gastric cancer is the fifth most common cancer worldwide and the fourth leading cause of cancer-related death. Its incidence is significantly higher in some Asian countries, including Japan, South Korea, and Mongolia, compared to the United States. This difference is thought to be influenced by dietary factors, such as diets high in salt and nitrates. In the U.S., where the incidence is relatively low, there are no specific screening guidelines for gastric cancer. Key risk factors include Helicobacter pylori infection, gastroesophageal reflux disease (GERD), genetic mutations, familial gastric cancer, heavy alcohol use, and tobacco use. Symptoms, such as weight loss, abdominal pain, nausea, vomiting, early satiety, and peptic ulcers, are often vague and nonspecific, leading to delays in diagnosis. As a result, gastric cancer has a relatively poor prognosis, with a 5-year survival rate of approximately 37%, meaning about one-third of individuals survive five years after diagnosis [LINK]. Gastric cancers that have metastasis beyond locoregional have poor outcomes and care for these patients will be palliative in nature rather than curative. We find terminal to be synonymous with palliative in defining the patient population who will no longer be receiving curative treatment. [LINK]

Gastric cancer originates in the stomach, a hollow organ located in the upper abdomen. The stomach has several layers, including the mucosa (the innermost layer where most gastric cancers arise), submucosa, muscularis propria, and serosa. It plays a key role in digestion by secreting gastric acid and enzymes to break down food and by churning food into chyme, a semi-liquid mixture of partially digested food and digestive secretions, for passage to the small intestine. Gastric cancer disrupts this normal physiology by causing ulceration, obstruction, or perforation, impairing the stomach’s ability to process and transport nutrients. Tumor growth can spread to nearby structures like the esophagus, small intestine, or lymph nodes, reflecting the complex interplay of the stomach’s anatomy with its surroundings [LINK].

Gastric cancer primarily consists of adenocarcinomas, which arise from the glandular cells of the stomach lining and account for over 90% of cases. Adenocarcinomas are further categorized into intestinal type, associated with well-formed glands and linked to environmental factors, and diffuse type, characterized by poorly cohesive cells that infiltrate the stomach wall, often related to genetic mutations like CDH1. Less common types of gastric cancer include gastrointestinal stromal tumors (GISTs), lymphomas, and neuroendocrine tumors, each originating from different cell types within the stomach. These subtypes differ in their pathology, prognosis, and treatment approaches, making accurate diagnosis essential [LINK].

Gastric cancer staging is based on the TNM system, which evaluates the Tumor (T) size and depth of invasion, Node (N) involvement of regional lymph nodes, and Metastasis (M) to distant organs. Early-stage gastric cancer (Stage I) is confined to the mucosa or submucosa with limited or no lymph node involvement. Advanced stages involve deeper invasion into the muscularis propria or serosa (Stage II-III) and may include extensive lymph node involvement. Stage IV gastric cancer indicates distant metastases, commonly to the liver, peritoneum, or lungs. Accurate staging is critical for prognosis and guides treatment strategies, often involving imaging studies, endoscopic ultrasound, and diagnostic laparoscopy. Gastric cancer imposes significant financial burdens on individuals, families, and healthcare systems due to the costs of diagnosis, treatment, palliative care, pain management, and long-term care. Patients often face substantial out-of-pocket expenses for surgeries, chemotherapy, radiation, and palliative care, which can lead to financial strain or debt. Families may experience indirect costs such as lost income from caregiving responsibilities or reduced work capacity of the patient. In the United States, the economic burden is exacerbated by the lack of routine screening programs, leading to late-stage diagnoses that require more intensive and costly treatments, increasing the strain on both personal finances and healthcare resources. The mean total gastric cancer-related cost per patient over the entire post-index follow-up period was United States dollar (USD) 70,808 ± 56,620 [LINK]

The discrepancy between patient preferences and the actual place of death underscores the complex challenges in end-of-life care delivery. The Kaiser Family Foundation (KFF) found that around seventy percent of adults polled expressed a preference to pass away in their homes. [LINK] The New England Journal of Medicine has published research showing an increasing trend of home deaths, this number is closer to thirty percent (**Appendix A** **Figure A.1)**. Reality often diverges due to factors such as caregiver burden, symptom management difficulties, and healthcare system constraints. This gap emphasizes the importance of ongoing communication about end-of-life preferences and the need for healthcare resources that better support patients’ wishes for place of death [LINK]

### 3.3 Existing Solutions

There are multiple different avenues for solutions in this space. There are several standard management options for terminal gastric cancer patients. Many patients undergo palliative surgery or chemotherapy in order to reduce pain and symptoms and improve their quality of life at the end of their life [LINK]. Pain management tools, such as pharmaceuticals, are also often used to improve patient quality of life. Beyond standard treatment options, there are multiple solutions that target the aspect of managing patient care. Among these solutions are apps that provide patients with care options. Outcomes4Me is a promising application offering FDA-approved treatment guidance for cancer patients. The application combines NCCN Clinical Practice Guidelines with Artificial Intelligence to provide patients with a better understanding of their medical records and treatment options. [LINK] Another application that allows patients to track their treatment and symptoms is Stomach Cancer Manager by @Point of Care. This application allows patients to understand the full scope of their health during treatment and has the ability to link up with Apple Health as well as send data to healthcare providers. [LINK] There are also other, more general, applications that exist in order to provide patients with a comprehensive overview of their medical health records. Apple Health is aiming to work with healthcare providers and EHR companies to provide patients access to data within the Health app and to allow patients to share data between providers. [LINK] Epic’s EHR system has a feature called Care Everywhere that allows healthcare providers who use other EHRs to share and access patient information between providers. [LINK] Epic also has an app called MyChart that allows patients to access all of their healthcare information in one place and communicate that information with friends and family, as well as contact care providers. [LINK]

### 3.4 Stakeholder Analysis

There are multiple stakeholders that a solution in this space would directly affect. The primary stakeholders in this solution space would be insurance companies, which are the target payers for this solution. While a solution would provide a direct immediate cost to payers, the ultimate goal of the solution would be to lower overall healthcare expenditures by allowing for more effective medical decision-making and reducing unnecessary interventions and hospital stays. This makes a solution appealing to the payer as a way to reduce overall spending.

The solution is also beneficial to patients. While a solution could aim to reduce out-of-pocket costs for patients (which goes hand-in-hand with the overall reduction of healthcare costs), the true benefit for the patient would be empowerment in medical decision-making. By providing patients with accurate and personalized information about their health and personal status and treatment options, patients can make more informed decisions and be more confident with their healthcare choices. A solution would aim to make healthcare information more accessible to patients, but would also exist on a new platform, which could potentially lead to some obstacles with patients adopting a proposed solution if they are resistant to new technology.

Patients would also be able to share this information with their friends and family, who are indirect stakeholders in this process. This allows loved ones to be more informed about the care patients are receiving, and be aware of the patients' decisions concerning treatment plans and timelines.

Physicians play a crucial role as stakeholders, bearing the responsibility of accurately informing patients about their diagnoses and treatment options. Implementing a solution to assist with this task would enable physicians to engage in more effective and meaningful conversations with their patients. Although current standards dictate the use of established note-taking and care systems, it is not uncommon for physician notes to be inaccurate or incomplete. A dedicated solution would enhance the accuracy and ownership of medical note-taking. Consequently, while such a solution would offer a net positive impact on healthcare providers, there may be some initial resistance from providers to adopting the new system.

A final stakeholder we considered is drug developers. A secondary benefit of our solution would be the consolidation of patient data across different localities into one platform. This could easily turn into a platform that would match patients to potential clinical trials across the nation, removing some barriers for those running these trials. While the full extent of this hasn’t been explored and is an item of future consideration, it is still beneficial to note that a solution could have a positive impact on this category of stakeholder, and be appealing to them as a potential future secondary payer.

### 3.5 Market Value Analysis

There are an estimated **26,890 new cases of stomach cancer each year** in the United States. [LINK] Stomach cancer currently has a 36.4% 5-year relative survival rate; as of 2021, there were an estimated **130,263 people who were living with stomach cancer in the US**. [LINK] Despite global declines in incidence, gastric cancer globally still accounts for 1.089 million new cancer cases, which represents 5.6% of all new cancer cases. [LINK] In the United States, the **average per patient annualized cancer-attributable costs for gastric cancer medical services is $122k**. [LINK] In a study of Medicare-enrolled elderly patients with advanced-stage gastric cancer, **45% of per-patient cancer-attributable costs were dedicated to supportive care and hospitalizations**, and 55% were related to gastric cancer-related treatments such as chemotherapy and radiation therapy. [LINK] In a 2019 study of the inpatient burden of gastric cancer in the US, the average cost of care per hospitalization increased from $21,710 in 2001 to $24,706 in 2011. This trend has continued to the present; although the incidence and in-hospital mortality in patients with the diagnosis of gastric cancer has decreased, there is a significant rise in the cost of care. [LINK] In another 2018 study of costs associated with gastric cancer in the US, it was noted that though the mean length of stay for gastric cancer decreased by 17% between 2003 and 2014 from 10.9 days to 8.95 days, the mean hospital charges increased significantly by 21% from $75,341 per patient in 2003 to $91,385 per patient in 2014. The aggregate charges nationally for gastric cancer increased significantly from $1.79 billion to $1.96 billion despite a decrease in hospitalization in that time. [LINK]

The economic burden of advanced gastric cancer is undeniably significant. In alignment with our primary goal and our team's mission to reduce end-of-life care expenses for terminal gastric cancer patients, it is prudent for our market value analysis to focus on supportive care and hospitalization costs, rather than treatment costs. While the average annual cancer-attributable cost per gastric cancer patient is $122,000, it can be assumed that 45% of these expenses are related to hospitalization and supportive care. This translates to an **annual expenditure of $54,900 on supportive care and hospitalization** that can be reduced with the implementation of a care optimization-centric solution. By developing our solution to address this critical need, we aim to achieve at least a **20% reduction in end-of-life care costs**. The average value will be 20% of the $54,900 spent on supportive care and hospitalization, which is $10,980. Utilizing conventional need value calculations, we can estimate our market volume in the United States to encompass the **130,263 individuals who were living with stomach cancer as of 2021**. This need encompasses the entire population of stomach cancer patients, who are significant users of care planning services. By multiplying the size of this population by the average value, we derive a **need value of $1.43 billion**. To determine our market size, we multiply the need value by our market visibility, with the goal of capturing at least 40% of the market. This calculation yields a **market size of $572 million**. Building on our market size analysis and considering the estimated cost of our solution, we conclude that the **price per patient must be approximately $4,390 or less to ensure its effectiveness**. Please note that these analyses of need value and market size are specifically conducted within the context of reducing care costs for gastric cancer patients in the United States alone.

To illustrate the immense value of addressing this need, we can look at the global prevalence of gastric cancer. According to GLOBOCAN 2020 estimates, gastric cancer was responsible for 800,000 deaths, accounting for 7.7% of all cancer-related fatalities. Additionally, 1.1 million new cases of stomach cancer were diagnosed in 2020, not including those who had been living with the disease prior to that year. [LINK] Although supportive care and hospitalization costs vary worldwide (and are generally lower outside the US), applying the same average value of $10,980 per patient annually results in a **global need value of ~$12.1 billion**. While our primary focus within this program is on reducing gastric cancer care costs, we believe that concentrating our efforts on this specific population and problem space will serve as an excellent test case and minimum viable product. This approach aims to develop a solution that can effectively reduce care costs across various populations and indications, including other cancer types and neurodegenerative diseases, which incur significant end-of-life care expenses.

### 3.6 Need Criteria

The need criteria were determined based on the primary needs of the patients, payers, and our team. The need must have value for both the patient and the payer, and so the required needs for cost and intensive care reduction were established. Since the solution would aid in care planning, it must also provide accurate data for the patient. And in order to meet as little resistance as possible from patients and payers, there needs to be no potential for harm beyond the current standard of care. Nice-to-haves based on patient access and interface, support system access, and team skills were also developed and established in order to best facilitate an effective solution.

| **Must Haves** | **Nice-to-Haves** |
| --- | --- |
| Reduces time in intensive care for patients | 3rd Grade Reading Level   * Information is accessible and digestible |
| Reduces cost of care in the last year of life | Can be accessible by patient support systems   * Family, friends, 3rd party caretakers, etc. |
| Provides accurate and actionable data | Technical feasibility   * Feasible within the realm of team knowledge/skill |
| Low-risk/potential for harm   * No direct physical risk for the patient * Does not worsen patient quality of life |  |

**Table 3.6.1**: The need criteria developed to solve the problem.

### 3.7 Proposed Business Plan

The population that will be utilizing our product will be gastric cancer patients, healthcare providers, and caregivers. We’d like to empower gastric cancer patients with personalized, data-driven insights to make informed decisions about their end-of-life care, ultimately reducing costs and improving quality of life. For our first-line financial plan, we plan to have a revenue model that revolves around **subscription fees, licensing fees for healthcare providers, and potential grants or funding from healthcare organizations and stakeholder groups**.

Insurance companies are likely to fund a software solution that reduces end-of-life care costs for gastric cancer patients, as it aligns with their goal of managing expenses while providing quality care. They may offer reimbursement for the software if it demonstrates cost savings and improved patient outcomes, or partner with our company to integrate the software into existing care management programs, potentially through shared savings agreements. [LINK] On another note, taking on a clinical trial enrollment output that allows gastric cancer patients to be connected to clinical trial options may be seen as valuable by pharmaceutical companies, especially if clinical trial enrollment data is available. [LINK] By incorporating clinical trial options, our solution enables pharmaceutical companies to identify and recruit suitable candidates with greater efficiency, thereby accelerating the trial process and reducing recruitment costs. Furthermore, the comprehensive patient data and treatment outcomes generated by our software provide invaluable insights for their research and development initiatives. Pharmaceutical companies may also sponsor the development and implementation of our software in exchange for access to anonymized data, which can significantly enhance their clinical trials and drug development strategies.

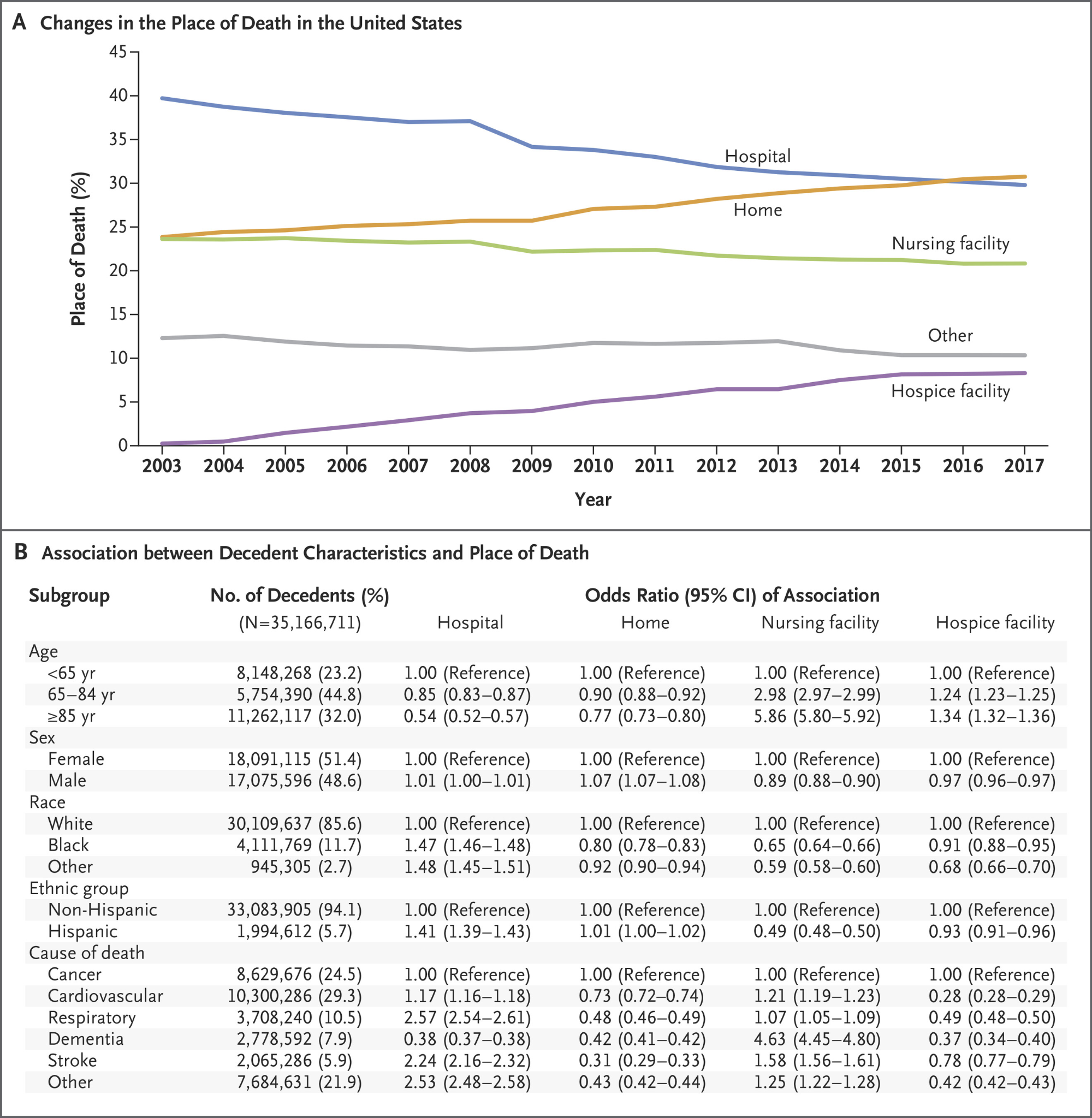
To diversify our revenue streams, we can explore subscription fees from healthcare providers and insurers, licensing fees from pharmaceutical companies, and grants from healthcare organizations and research institutions focused on innovative end-of-life care solutions. By aligning the interests of insurance and pharmaceutical companies with our solution's objectives, we can establish a sustainable business model that benefits all stakeholders. This approach ensures that patients remain our top priority, reducing their care costs while enhancing their quality of life during critical times.

### 3.8 Concept Selection Process

Our preliminary solution is a software-focused product that serves as an interface between the patient and the provider whose main purpose is to collect and share key clinical information with the care team. The software will interface with the patient and collect key information about preferences for medical treatments based on religion, family history, and personal preferences. The software interfaces with the providers to collect information about the patient’s medical condition and treatment options. With this data, the program will communicate key healthcare information to the patient and their caretakers with data that is provided by medical providers or the electronic medical record, compile treatment options that align with the patient's preferences, and suggest options that most align with the patient’s preferences. While this is a blue-sky goal, this solution could be broken down into many component parts and executed. The next steps for our final concept generation will be speaking with stakeholders: patients, providers, and payers, to collect the voice of the customer and build our understanding of which parts should be prioritized. We are anticipating many challenges with the software development aspect of this solution space as none of our team members have explicit experience in this space. Despite this, the nature of software has advantages over more traditional biomedical devices in its speed of development and iterative design after collecting user feedback. In the next six months, we hope to capitalize on these quick feedback loops, execute our ideas, and provide value to patients, providers, and the healthcare system.

REFERENCES

APPENDIX A



**Figure A.1**: Graph showing trends in place of death across time. [LINK]

### 

### INITIAL FILTRATION CRITERIA

| **Scale** | **Patient Impact** | **Provider Impact** | **Treatment Landscape** | **Estimated Population Size** |
| --- | --- | --- | --- | --- |
| **1** | Addressing the need would not have a significant impact on patients | Addressing the need has no significant impact on the provider or the clinical setting | Treatments exist to address the needs that are generally well accepted by the target user population and address the needs well | Need directly affects fewer than 1,000 people |
| **2** | Addressing the need would not have an impact on morbidity, but would positively affect quality of life by eliminating undesirable symptoms of the disease | Addressing the need increases the quality of life within the clinical setting for providers | Treatments exist to address the need but have minor deficiencies that must be overcome | Need directly affects 10,000 to 100,000 people |
| **3** | Addressing the need would reduce morbidity and/or eliminate the risk of serious complications | Addressing the need clearly affects the quality of care given by the provider | Treatments exist to address the need but have serious deficiencies that must be overcome | Need directly affects 100,000 to 1 million people |
| **4** | Addressing the need would be life-saving for patients | Addressing the need clearly impacts the provider outside of the operating room | There are no existing treatments | Need directly affects more than 1 million people |

**Table A.1:** An overview of the objective criteria used in the first level of needs filtration

### 

### STAKEHOLDER ANALYSIS

| **Stakeholders** | **Role** | **Primary Benefits** | **Primary Costs** | **Assessment of Net Impact** |
| --- | --- | --- | --- | --- |
| Insurance Companies (Payer) | Decision Maker | More informed decision-making in patients should lead to a decrease in unnecessary healthcare expenditures | The immediate cost of the solution | Positive: While the solution would cost payers, the overall benefit would be to reduce healthcare costs as a whole, providing a net decrease in costs to payers |
| Patients | Influencer | Patients have access to their own health data in one standard location and are able to gain a better understanding of their health and treatment options using strategic data summarization and modeling | Learning of new technology | Positive: Patients can plan for treatment better and increase their confidence in their healthcare decision-making |
| Physicians | Influencer | Patients have a better understanding of the data relayed during visits, allowing for more informed decisions with healthcare providers | No difference in standard practice | Positive: Patients have a better understanding of treatment options, allowing for smoother conversations with providers |
| Friends and Family | Indirect Stakeholder | Patients are able to send health records and summaries to friends easily, making information accessible | Learning of new technology | Positive: Patients would easily be able to send information and health records to members of their support system, promoting a better understanding of loved ones’ status |
| Drug Developers | Indirect Potential Stakeholder | The consolidation of patient data into a universal platform could provide access to patients that clinical trials typically wouldn’t have access to | At this stage, there would potentially be a pay-in for researchers and pharmaceutical companies to access this data | Positive: Drug developers could have an easier time matching patients to clinical trials, allowing for more efficient trials |

**Table A.2:** A comprehensive analysis of the stakeholders relevant to this need space organized by role, benefits, costs, and net impact.

1. [↑](#footnote-ref-0)