

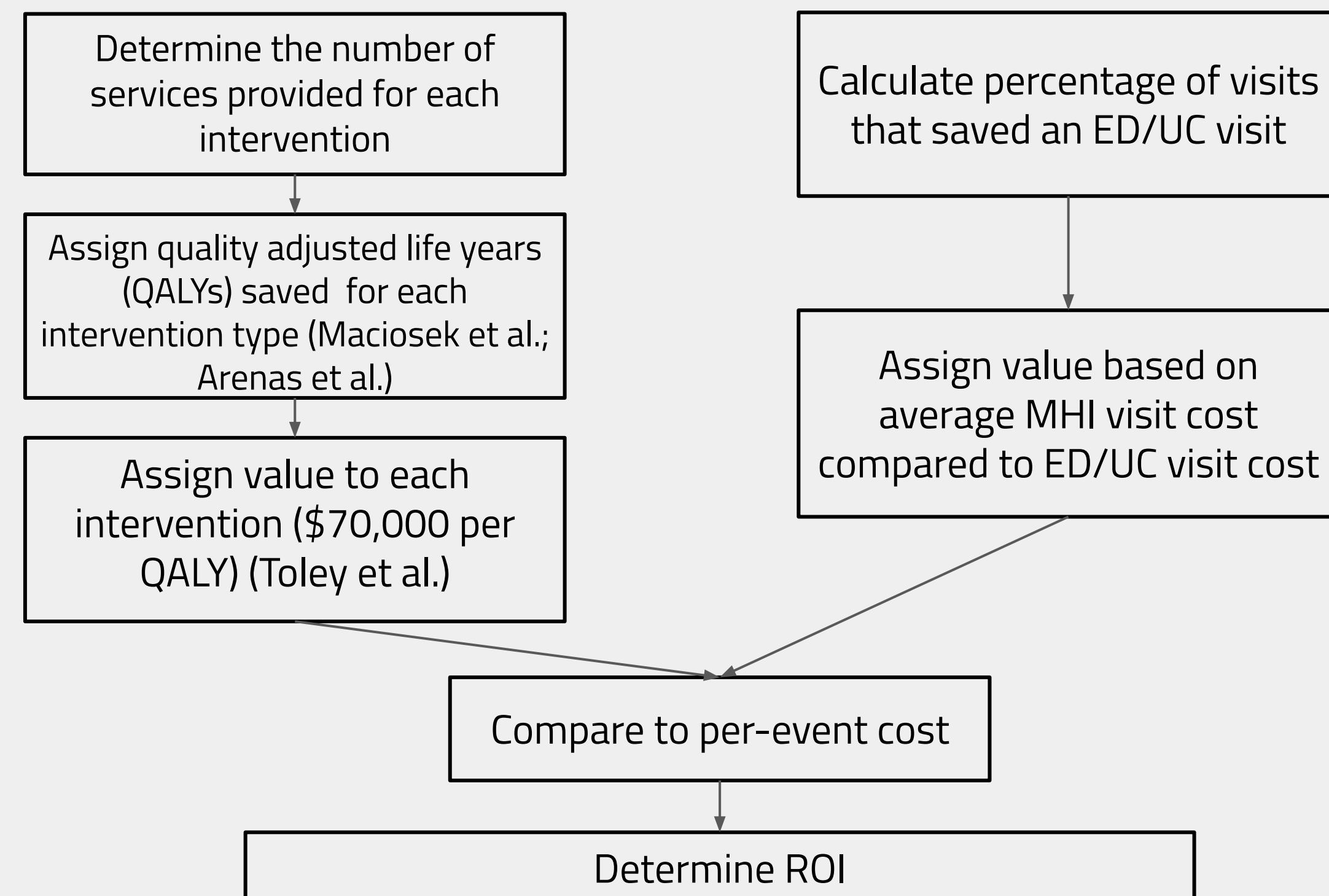
Assessing the Impact of Increased Health Access for Underserved Communities: An Analysis of the Return on Investment of the UMN Mobile Health Initiative During Program Development Amidst COVID-19

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Introduction

- The Mobile Health Initiative (MHI) at the University of Minnesota was launched in June 2020 by the Office of Academic Clinical Affairs.
- The goal is to increase access to healthcare services and improve health outcomes for indigenous, refugee, immigrant, and migrant communities as well as those who are underserved and disproportionately impacted by social injustice and COVID-19.
- Aggregate data shows a national average of a \$14 ROI per \$1 invested in a mobile clinic based on statistical quality of life years saved as well as the prevention of emergency department visits for non-urgent care (Brown, 2013).
- This data is based on quality adjusted life years (QALYs) saved, which is defined as "a measure of the BoD (burden of disease) based on an estimate of the quality and quantity of additional years of life after a medical intervention" (Lawrence). These have been calculated and quantified for different types of screening services in past modeling studies
- QALYs saved can be assigned a financial value of \$70,000 per QALY saved (Toley et al)
- Total financial ROI is the value saved in terms of program impact, or QALYs saved, and health system impact, or the value saved from being seen at MHI vs an urgent care (the cost of MHI services vs the cost of a comparable visit to the emergency room or urgent care visit)
- Access-to-care ROI is the increase in access to care that patients receive through the services provided by the MHI and measured through usage rates and elevated lab levels
- Research Question:** With this unique focus on migrant and refugee communities and the unprecedented circumstances of developing a mobile health unit in the midst of the COVID-19 pandemic, can this form of health delivery offer a financial and access-to-care return on investment?
- Hypothesis:** The Mobile Health Initiative will deliver a positive (>1:1) financial ROI and provide services for which there is a high unmet need, even amidst the challenges of starting this program during the COVID-19 pandemic.

Methods



Paper records were transcribed into Excel and queried for A1C and blood pressure readings for individuals with and without prior medical histories and categorized. Then, the total number of each screening performed was determined and a QALY/intervention was applied to each screening type based on existing data. A value of \$70,000 was assigned to each QALY saved (Toley et al.). The number of individuals seen by the mobile clinic was discounted by a factor of 0.80 (Oriol et al.) and the cost per visit was compared to an average cost for an ED/UC visit of \$348 (Sanders et al.). Costs were determined by analyzing recorded costs, dividing into costs for event materials, materials and salary, or total cost, including the one-time cost of the van. These figures were then divided by number of events to get a per-event cost. These savings values were totaled and divided by the sum of the costs for the events in which screenings were analyzed to obtain the applicable ROI.

Results

Type of Cost	Number of QALYs	Total Value of QALYs	Total Value ED Visits Saved	Total Value of Hospitalizations Saved	Total Value Saved	Total Cost of Analyzed Events	Total ROI
A1C Screening	0.95	\$66,360	\$42,7657	-	\$109,125	\$1,527	\$71.46:\$1
BP Screening	1.39	\$97,440	\$128,047	-	\$225,486	\$1,414	\$159.51:\$1
Event Costs (Materials)	7.03	\$491,876	\$106,2555	\$13,496	\$611,627	\$16,473	\$37.13:\$1
Event Costs (Materials+Staff Salaries)	7.03	\$491,876	\$64,326	\$13,496	\$569,697	\$68,885	\$8.27:\$1
Total Costs (including mobile health van)	7.03	\$491,876	-\$5,093	\$13,496	\$500,279	\$155,658	\$3.21:\$1

Table 1. A table showing the ROI by cost estimate: materials for A1C or blood pressure screenings only, cost of event materials, cost of materials and salary figures, or the cost of materials, salary, and the cost of the van. Value of hospitalizations saved was calculated through established data on risk reduction of the COVID-19 vaccine, the likelihood of hospitalization from a COVID-19 infection and cost of hospital stay for COVID-19 (\$20,000) (Rothwell and Witters; Amin and Cox). This value was listed only for the categories in which COVID-19 immunizations were analyzed (i.e. not add-on services).

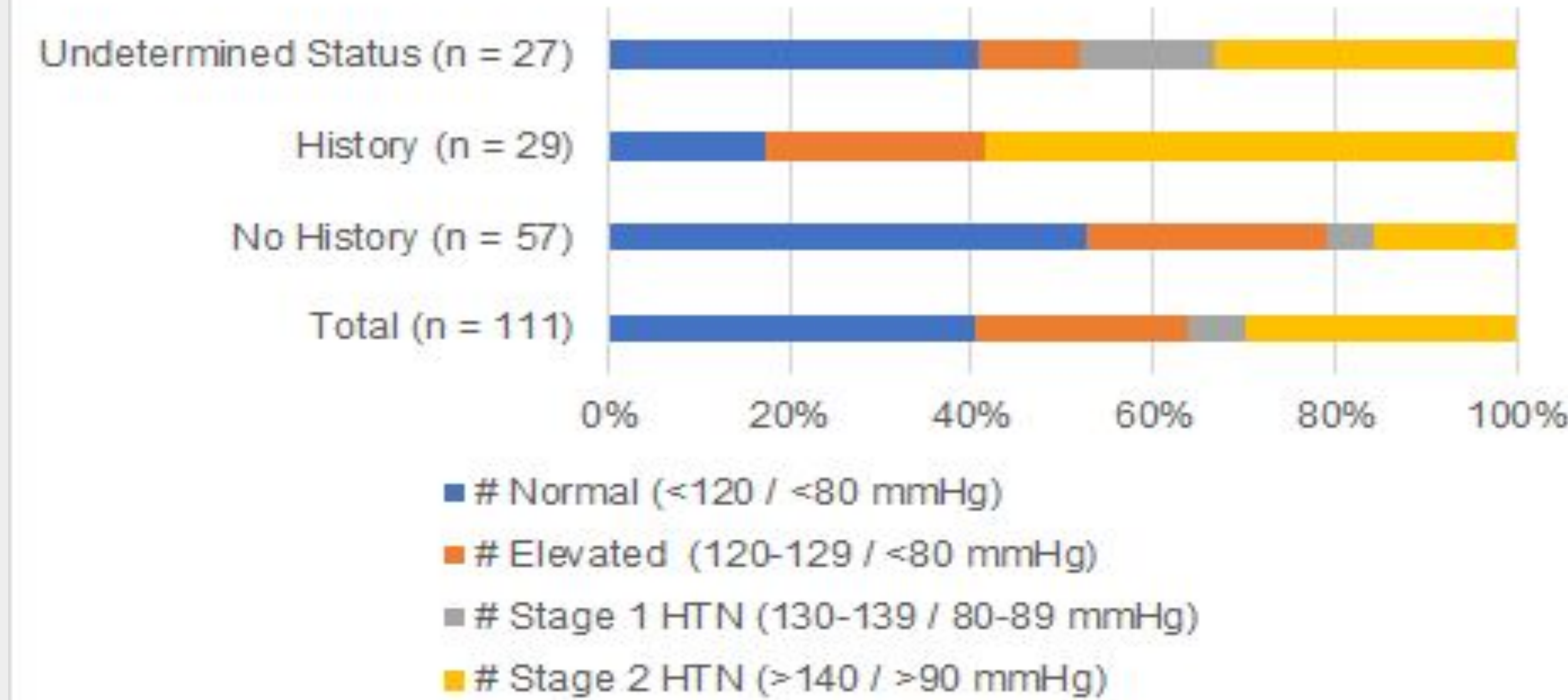


Figure 1. The relative percentages of the ranges of blood pressure levels among screened patients. Patients were classified by those that self-report as having no history of hypertension, those with a history of hypertension or those with undetermined status in which their health history was not reported or not recorded. The ranges used are according to current recommendations by the American College of Cardiology.

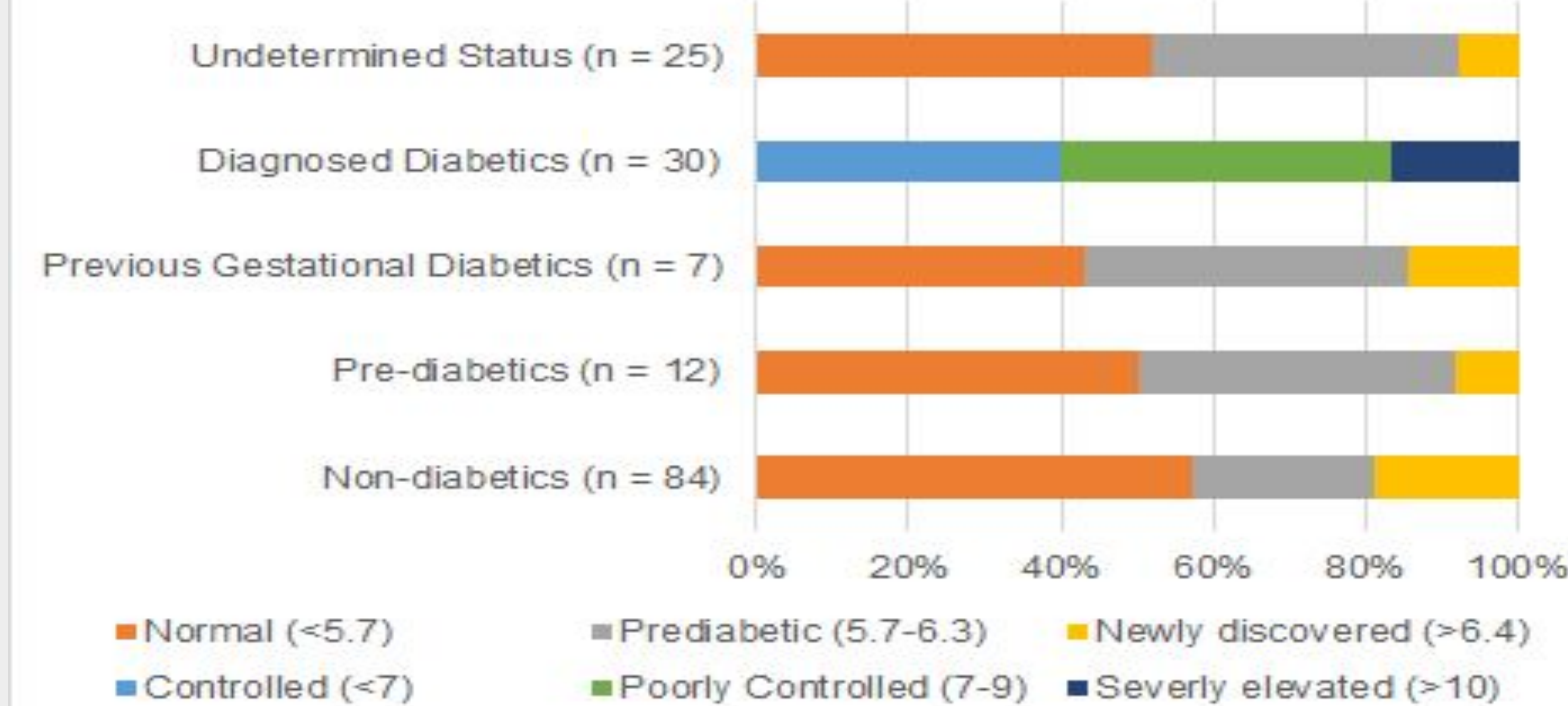


Figure 2. The relative percentages of the ranges of hemoglobin A1C values among screened patients. Patients were classified by those that self-report as diabetic, with previous gestational diabetes, with pre-diabetes, with no history, or those with undetermined status in which their health history was not reported or not recorded. Due to the differences in expected A1C levels among diabetics, a different A1C scale was used according to the Diabetes Council.

Results Continued

Screening Type	Number of Screenings	Number of Events	QALY/intervention	QALYs	Value of QALYs (\$70,000 per QALY)
Diabetes	158	11	0.0060	0.95	66360.00
Hypertension	464	11	0.0030	1.39	97440.00
COVID-19 Immunization	440	15	0.0610	4.68	327431.63
Flu Immunization	23	1	0.0213	0.01	644.00
Vision	108	4	0.0004	0.01	562.50
Physical Exams	190	11	-	-	-
Dental	73	3	-	-	-
Masks Given	491	9	-	-	-
PPE Kits Given	241	6	-	-	-
Total patients seen	771	40	-	-	-
Total				7.03	491875.63

Table 2. A table indicating the types of screening services offered, the number of screenings and events as well as the previously-established QALY/intervention data (Maciosek et al.; Arenas et al.), amount of QALYs for the summed screenings, and their value. QALYs and values were not given for some screenings for which there is limited data about the QALYs for these interventions. Each QALY saved was assigned a value of \$70,000 (Toley et al.). COVID-19 interventions were calculated through a risk-ratio of unvaccinated vs. vaccinated to calculate infections averted and a QALY/infection averted assigned (Basu, et al.; Accorsi et al.)

Conclusion

Financial ROI (Total financial value saved/total cost of analyzed events)

- The data did support our hypothesis that there was a positive per-event return on investment from this program.
- There is a significant range of ROI, from \$159.5:\$1 to \$3.21:\$1 depending on how these services are characterized — as an add-on to existing services or as all costs including one-time purchases such as the mobile health van.
- Blood pressure screenings as an add-on service led to the largest ROI due to its low cost, while COVID-19 vaccinations led to the most QALYs saved by a large margin.

Access-to-Care ROI (Ratio of elevated lab values and number of patients utilizing the services)

- The data did support our hypothesis that there was a high unmet need for these services indicated by the high percentage of elevated lab results and high number of patients seen for these services.
- This data shows not only that the identification of conditions for those without any history of the disease is frequent, but also that those with a history of both diabetes or hypertension have high rates of unmanaged care.

Limitations

- Many of these conditions, such as HTN or diabetes, are chronic and require ongoing management. Without tracking referrals or starting medications, the ED/UC cost savings may be overreported.
- HTN screenings are a one-time screening, so they may be influenced by phenomena such as "white-coat hypertension" or other artificially-inflating factors for blood pressure.
- Since there is limited QALY data for some screening types, not all events were analyzed and therefore not all costs were compared, potentially resulting in an overestimate of ROI if non-analyzed services had a lower QALYs saved/intervention.

Future Directions

- To further improve this financial ROI, additional high-return screenings could be considered such as childhood immunization series, tobacco use counseling, healthy diet and physical activity counseling, and obesity screenings, which are all rated among the highest scoring ranges for QALYs/intervention by the National Commission on Prevention Priorities (NCPPI) (Maciosek et al.)
- A more robust system of referrals and outcome tracking post-intervention is needed to fully quantify the access-to-care ROI
- A streamlined data collection process is being developed through REDCap for more accurate and continual assessment of this program

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