Electronic Medical Record Algorithm to Identify Undiagnosed (Pre)Diabetes: A Case Study from Hawai'i

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Background

- About 1/4 of United States' older adults (≥65 years) have diabetes (DM) while 1/2 have prediabetes (PreDM).[1]

- Timely diagnosis can prevent disease progression, but **significant proportions of PreDM/DM are undiagnosed.**

- 1/3 of diabetes cases and 2/3 of prediabetes cases in Hawai'i are estimated to be undiagnosed.[2]

- Automated algorithms integrated into population health management (PHM) tools and electronic health records (EHRs) are powerful means of collecting and aggregating data on patients regarding risk factors for chronic disease.

- **Automated algorithms may improve care by identifying probable undiagnosed cases in patient panels using clinical/laboratory measures.**

Objective

Describe and evaluate an automated algorithm developed by the Hawai'i Department of Health that identified individuals overdue for screening or with Pre/DM based on clinical and laboratory values recorded in their EHR.

Method

As part of proof-of-concept efforts, we analyzed 2016-18 data from the Queen's Clinically Integrated Physician Network's (QCIPN) that were extracted by the automated algorithm in the Network's PHM, pulling records from QCIPN's proprietary version of Epic, a common EHR system.

The clinical data pulled by the algorithm represented patients that were:

- (1) late for screening, or
- (2) had prediabetes/diabetes (see table)

Table : Defining Undiagnosed Prediabetes/Diabetes

		A1c Value	
		<5.7% HbA1c	≥5.7% HbA1c
Condition List	"Null" (no diagnosis)	No diabetes	Undiagnosed
	Prediabetes/Diabetes Diagnosis	Diagnosed, Controlled	Diagnosed

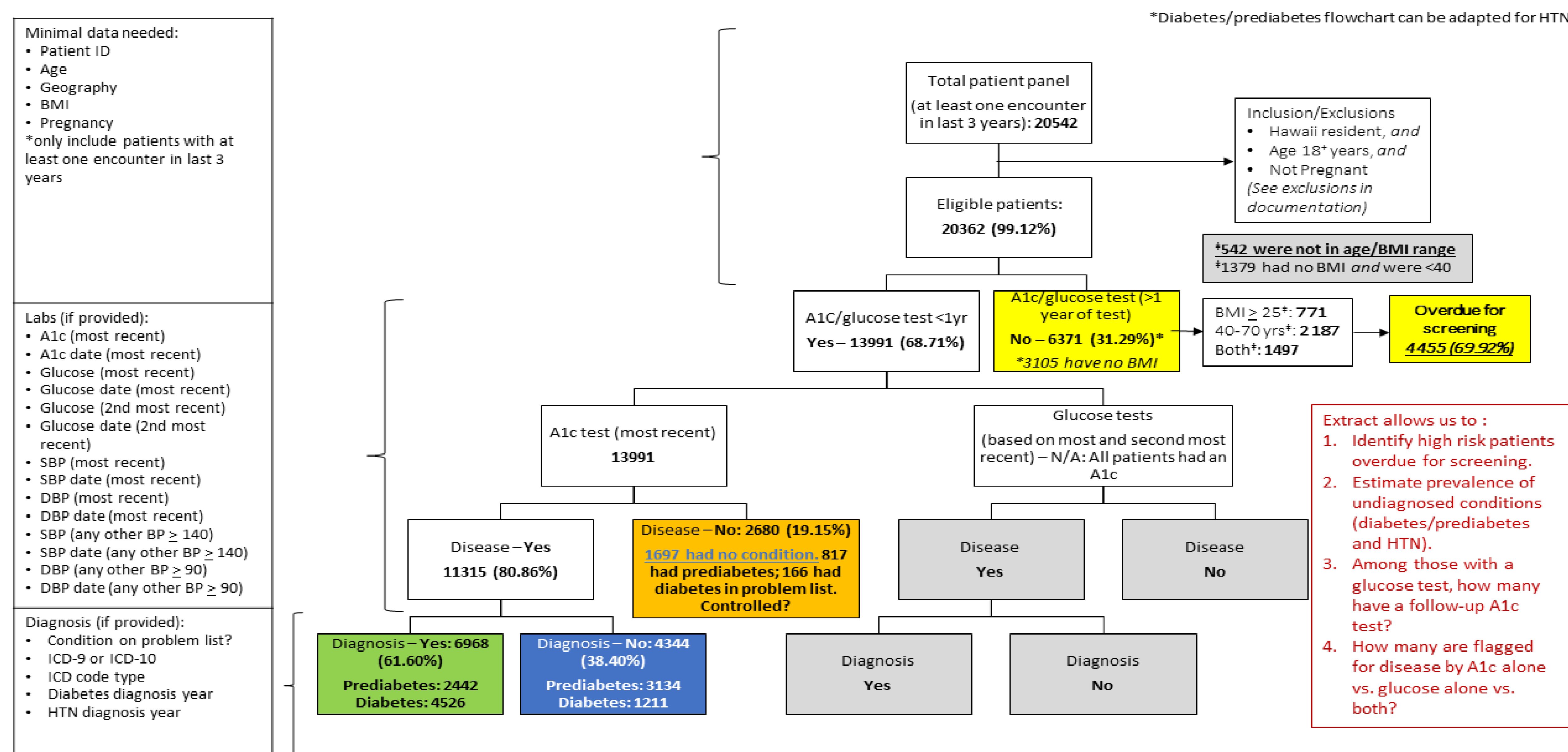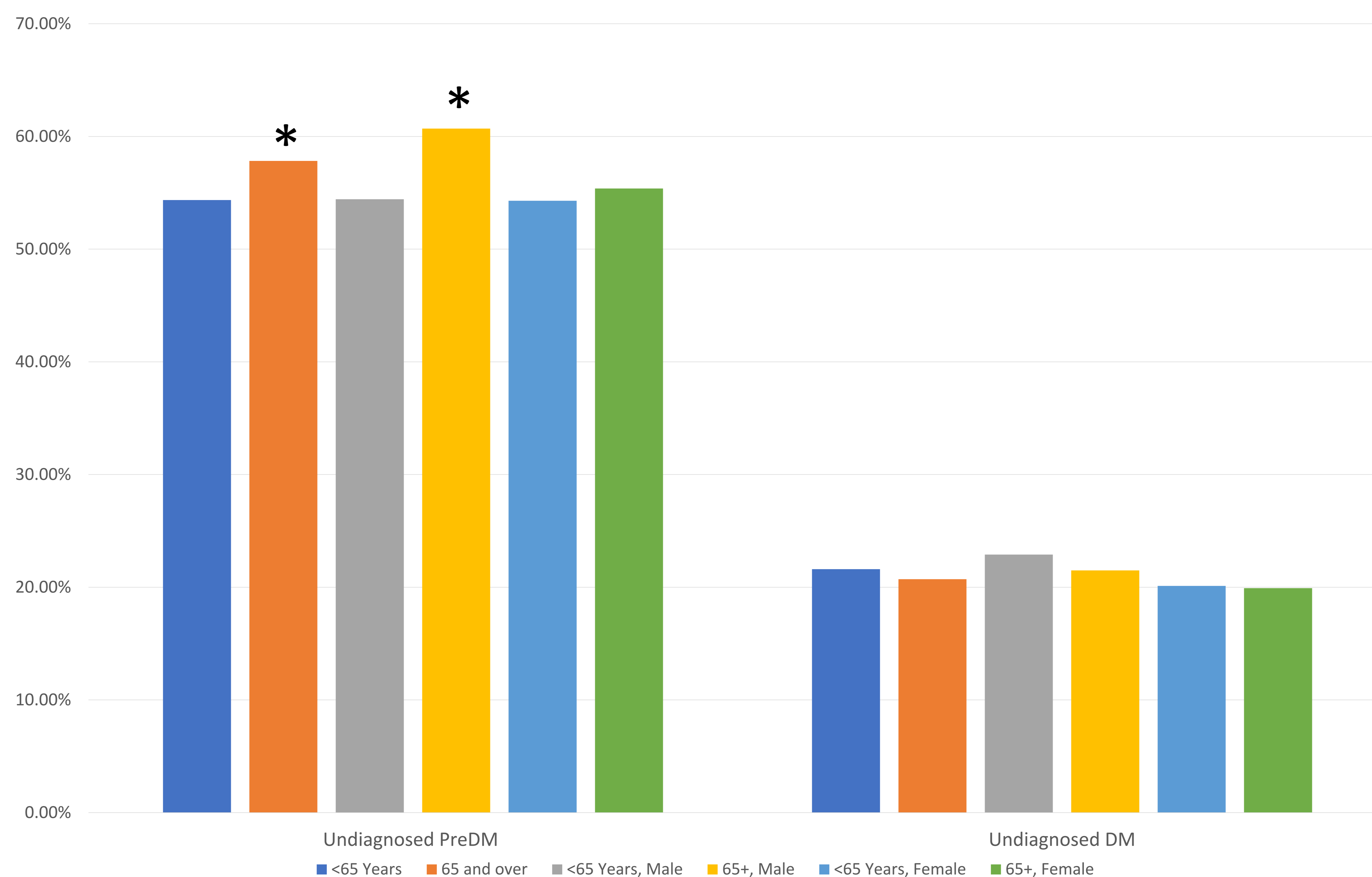## Figure 1. Algorithm with frequencies of QCIPN patients

Figure 2. Demographic characteristics of undiagnosed patients

Results

- We examined the records of 20,362 adult patients (51.3% were >65) from QCIPN (see Figure 1) .

- 6,371 (31.3%) were excluded from analysis.
  - They had no HbA1c screening in the past year or were overdue for screening (70.0%) based on standard guidelines.

- Of the remaining 13,991 patients identified by clinical/laboratory data to have PreDM/DM, 7317 were older adults (52.3%).
  - 6130 (84%) had a PreDM (50.6%) or DM (33.2%) HbA1c value
  - The rest were controlled or false-positive.

- **Of those older adults with probable PreDM/DM, 38.6% were undiagnosed in the EHR.**

- **Adults >65 were significantly more likely to be flagged with undiagnosed PreDM compared to their younger counterparts (58 versus 54%, p<.001).**

- **61% of older men flagged with PreDM were undiagnosed** (versus 54% of younger men).

- Of the 5,737 patients identified with DM, 22% of those 65 were undiagnosed in their EHR.

Conclusion

- Given the recognized high burden of diabetes among older adults, results indicate substantial missed opportunities for the prevention and early treatment of this condition as identified by an automated algorithm.

- Automated algorithms may help health care providers and practices to improve disease detection and clinical management.

References

1. Kirkman et al. Diabetes in Older Adults. Diabetes Care. 2012; 35(12): 2650-2664.

2. Ching LK, Ching LSK, Nett B, et al. Prevent Diabetes Hawai'i. Hawai'i State Department of Health;2016. https://www.healthyhawaii.com/wp-content/uploads/2017/03/trifold.pdf. Accessed November 30, 2018.