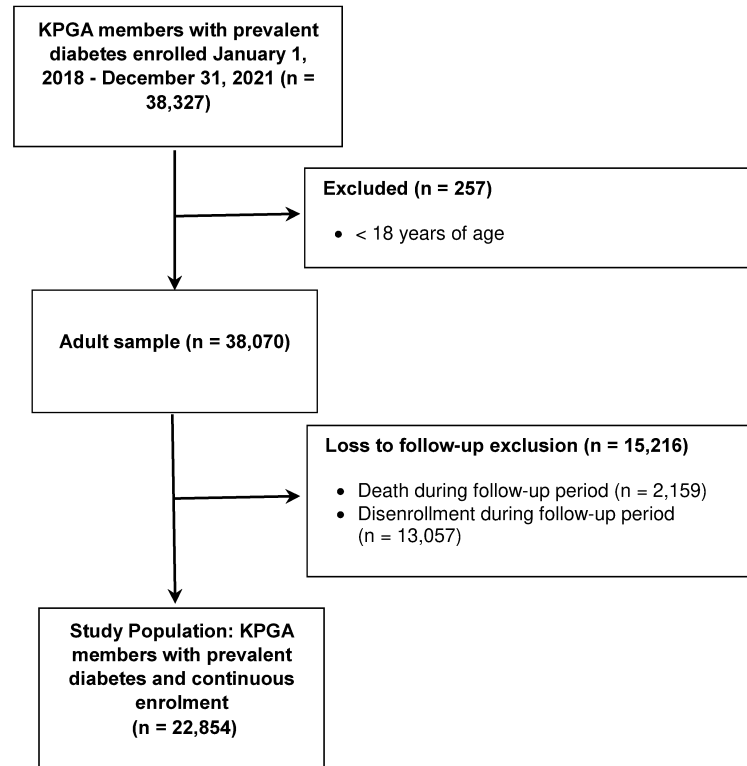


## Supplementary Material



**Supplementary Figure 1** Flow diagram of study inclusion and exclusion criteria for study population; adult KPGA members with prevalent diabetes; 2018-2021.

**Supplementary Table 1.** Baseline characteristics of KPGA members with continuous enrollment and discontinuous enrollment from January 1, 2018 to December 31, 2021

Characteristics	Continuous enrollment (included in study population)	Died or discontinued enrollment <sup>1</sup> (excluded from study population)
N (%)	22,854 (60.0)	15,216 (40.0)
<b>Demographics</b>		
Age in years, mean (SD)	58.9 (13.0)	52.4 (13.5)
Age category (%)		
18-44	13.2	22.2
45-64	51.0	54.3
65+	35.8	23.5
Sex (%)		
Women	55.5	54.5
Men	44.5	45.5
Race (%)		
White	32.6	35.4
Black	57.5	49.9
Other <sup>2</sup>	9.9	14.8
High deductible plan at time of enrollment (%)	1.9	4.4
Primary language English (%)	95.0	91.3
<b>Comorbidities</b>		
Body mass index in kg/m <sup>2</sup> , median (IQR)	32.08 (27.98-37.18)	32.12 (27.78-37.64)
Body mass index (%)		
Normal weight (18.5 to <25)	10.4	12.1
Overweight (25 to <30)	26.7	25.3
Obese (≥30)	62.9	62.5
Ever a smoker (%)		
Yes	10.7	13.0
No	89.3	87.0
Hypertension (%)	81.7	72.8
Congestive heart failure (%)	12.9	14.7
Hypertensive heart disease (%)	22.2	16.5
Renal failure (%)	20.2	18.7
Hypertensive renal disease (%)	17.9	15.7
Hypothyroidism (%)	12.5	12.5
Number of comorbidities (%) <sup>3</sup>		
None	15.7	24.0
1	42.7	42.1
2	17.8	12.8

≥3	23.8	21.2
<b>Neighborhood and SES characteristics</b>		
Median household income (USD), median (IQR)	67,159 (50,705-83,958)	66,244 (50,118-84,120)
Median household income (\$USD; %)		
≤\$50,000	24.0	24.8
\$50,001 - \$100,000	64.1	63.9
\$100,001 - \$150,000	10.1	9.6
>\$150,000	1.9	1.7
Social vulnerability index, median (IQR)	0.49 (0.27-0.73)	0.48 (0.26-0.73)
Social vulnerability index categories (%)		
Quartile 1 (low vulnerability)	22.8	23.7
Quartile 2	28.6	28.2
Quartile 3	27.3	26.2
Quartile 4 (high vulnerability)	21.3	21.9

<sup>1</sup>Excluded because died (n = 2,159) or discontinued enrollment with KPGA (n = 13,057) during follow-up period.

<sup>2</sup>Includes Asian, Native Hawaiian/Pacific Islander, American Indian/Alaskan Native, and multiple races.

<sup>3</sup>Includes hypertension, congestive heart failure, hypertensive heart disease, renal failure, hypertensive renal disease, and hypothyroidism.

Abbreviation: SD = standard deviation; IQR = interquartile range; SES = socio-economic status; USD = United States dollar

**Supplementary Table 2.** Definition of seven annual diabetes care processes

Diabetes Care Measure	Definition of assessment of completion	Guidelines <sup>1</sup>
<b>HbA1c</b>	At least one recorded value for HbA1c per year	<7.0%
<b>Urine albumin-to-creatinine ratio (UACR)</b>	At least one recorded value for UACR per year	<30 mg/g
<b>Blood pressure</b>	At least one recorded value for systolic or diastolic BP per year	<130/80 mmHg
<b>Cholesterol</b>	At least one recorded value for cholesterol per year	LDL <100 mg/dL
<b>Creatinine</b>	At least one lab recorded value for creatinine per year	*Used to estimate eGFR
<b>Eye exam<sup>2</sup></b>	At least one procedure code record for foot exam per year	N/A
<b>Foot exam<sup>3</sup></b>	At least one procedure code record for foot exam per year	N/A

<sup>1</sup>American Diabetes Association. Standards of Care in Diabetes - 2023. Diabetes Care. 2023;46:S1-S292

<sup>2</sup>CPT codes: 92002, 92004, 92012, 92014, 92015, 99172 and 99173

<sup>3</sup>CPT codes: G0245, G0246, G0247, G9226, 11055, 11056, 11057, 11719, 11720, 11721, S0390

\*\*There are no guidelines-specific cut-offs for creatinine. Instead, in combination with other factors such as age, sex and body surface area, creatinine is used to determine the estimated glomerular filtration rate (eGFR). eGFR is not reported here.

**Supplementary Table 3.** Logistic GEE regression comparing odds of meeting annual diabetes care guidelines in the during vs. pre pandemic period among KPGA adult members with prevalent diabetes 2018-2021, stratified by telehealth use and by age, sex, and race

Diabetes Care Process	Non-telehealth users				Telehealth users			
	Pre Pandemic (2018-2019)	During Pandemic (2020-2021)	Absolute change (During vs. Pre)	Odds Ratio (95%CI) <sup>1</sup>	Pre Pandemic (2018-2019)	During Pandemic (2020-2021)	Absolute change (During vs. Pre)	Odds Ratio (95%CI) <sup>1</sup>
<b>By Age</b>								
<i>18-44 years</i>								
HbA1c	53.0	23.5	-29.5	0.38 (0.31-0.47)	67.3	58.8	-8.5	0.76 (0.69-0.83)
Blood Pressure	83.1	34.6	-48.5	0.14 (0.11-0.18)	94.8	74.9	-19.9	0.15 (0.12-0.18)
Cholesterol	25.0	9.5	-15.5	0.35 (0.25-0.48)	32.1	20.1	-12.0	0.61 (0.54-0.68)
Creatinine	52.9	23.5	-29.4	0.36 (0.29-0.44)	72.4	61.8	-10.6	0.65 (0.58-0.71)
UACR	17.2	6.2	-11.0	0.37 (0.27-0.51)	28.7	20.1	-8.6	0.79 (0.70-0.88)
Eye exam	1.7	1.3	-0.4	0.85 (0.38-1.90)	2.4	2.4	0.0	1.1 (0.81-1.52)
Foot exam	NR <sup>2</sup>	NR	NR	NR	NR	NR	NR	NR
<i>45-64 years</i>								
HbA1c	76.7	46.0	-30.7	0.37 (0.33-0.41)	85.3	79.0	-6.3	0.71 (0.67-0.76)
Blood Pressure	89.4	46.5	-42.9	0.13 (0.12-0.15)	97.7	82.9	-14.8	0.13 (0.12-0.15)
Cholesterol	37.5	17.5	-20.0	0.38 (0.33-0.44)	42.5	31.2	-11.3	0.64 (0.60-0.68)
Creatinine	77.7	46.0	-31.7	0.32 (0.28-0.35)	89.6	82.4	-7.2	0.58 (0.54-0.63)
UACR	34.1	16.7	-17.4	0.48 (0.42-0.55)	42.4	34.1	-8.3	0.73 (0.69-0.78)
Eye exam	5.2	2.4	-2.8	0.52 (0.37-0.73)	6.7	5.9	-0.8	0.93 (0.83-1.04)
Foot exam	NR	NR	NR	NR	NR	NR	NR	NR
<i>≥ 65 years</i>								
HbA1c	83.5	59.2	-24.3	0.35 (0.26-0.47)	87.7	83.1	-4.6	0.67 (0.59-0.77)
Blood Pressure	95.5	64.3	-31.2	0.12 (0.09-0.17)	99.3	92.3	-7.0	0.12 (0.10-0.15)
Cholesterol	42.0	25.7	-16.3	0.42 (0.27-0.65)	42.3	34.6	-7.7	0.68 (0.58-0.79)
Creatinine	88.8	59.6	-29.2	0.28 (0.21-0.38)	95.4	90.3	-5.1	0.53 (0.45-0.62)
UACR	42.8	22.5	-20.3	0.62 (0.41-0.95)	47.3	41.8	-5.5	0.68 (0.59-0.79)
Eye exam	29.8	13.8	-16.0	0.32 (0.11-0.91)	32.8	22.6	-10.2	0.78 (0.54-1.13)

	NR	NR	NR	NR	NR	NR	NR	NR
<b>Foot exam</b>	NR	NR	NR	NR	NR	NR	NR	NR
<b>By Sex</b>								
<i>Women</i>								
HbA1c	73.7	47.1	-26.6	0.43 (0.38-0.48)	82.2	75.5	-6.7	0.70 (0.66-0.74)
Blood Pressure	92.5	52.9	-39.6	0.11 (0.10-0.13)	98.2	86.6	-11.6	0.12 (0.11-0.14)
Cholesterol	35.4	19.0	-16.4	0.45 (0.39-0.53)	39.8	29.3	-10.5	0.64 (0.61-0.68)
Creatinine	76.7	46.4	-30.3	0.30 (0.27-0.34)	89.1	80.8	-8.3	0.56 (0.52-0.60)
UACR	30.6	16.0	-14.6	0.51 (0.44-0.59)	38.1	30.9	-7.2	0.74 (0.70-0.78)
Eye exam	13.2	5.6	-7.6	0.46 (0.36-0.59)	15.2	11.5	-3.7	0.71 (0.66-0.77)
Foot exam	1.7	0.1	-1.6	0.30 (0.22-0.41)	3.1	1.6	-1.5	0.56 (0.48-0.66)
<i>Men</i>								
HbA1c	78.0	45.9	-32.1	0.35 (0.31-0.39)	87.0	80.7	-6.3	0.71 (0.66-0.76)
Blood Pressure	88.8	47.3	-41.5	0.14 (0.13-0.16)	97.6	83.7	-13.9	0.15 (0.13-0.16)
Cholesterol	39.4	18.4	-21.0	0.40 (0.35-0.46)	43.4	33.1	-10.3	0.65 (0.61-0.69)
Creatinine	79.7	46.5	-33.2	0.30 (0.27-0.34)	90.8	84.9	-5.9	0.62 (0.56-0.67)
UACR	39.3	17.5	-21.8	0.43 (0.37-0.49)	49.8	40.5	-9.3	0.73 (0.69-0.79)
Eye exam	13.4	5.7	-7.7	0.48 (0.38-0.61)	16.8	11.5	-5.3	0.67 (0.61-0.73)
Foot exam	2.7	0.4	-2.3	0.36 (0.25-0.51)	4.4	2.6	-1.8	0.63 (0.55-0.73)
<b>By Race</b>								
<i>White</i>								
HbA1c	75.8	52.4	-23.4	0.48 (0.41-0.55)	81.9	77.0	-4.9	0.72 (0.67-0.77)
Blood Pressure	91.5	55.4	-36.1	0.13 (0.11-0.16)	98.3	86.0	-12.3	0.13 (0.11-0.15)
Cholesterol	42.8	24.7	-18.1	0.50 (0.42-0.59)	44.0	34.5	-9.5	0.63 (0.59-0.67)
Creatinine	79.7	53.5	-26.2	0.34 (0.29-0.41)	90.3	83.3	-7.0	0.56 (0.51-0.61)
UACR	33.7	19.0	-14.7	0.55 (0.46-0.66)	39.8	32.0	-7.8	0.71 (0.66-0.75)
Eye exam	15.9	7.6	-8.3	0.54 (0.40-0.72)	16.3	13.0	-3.3	0.70 (0.63-0.77)
Foot exam	1.8	0.4	-1.4	0.34 (0.19-0.62)	3.0	2.2	-0.8	0.82 (0.69-0.98)
<i>Black</i>								
HbA1c	75.5	43.3	-32.2	0.27 (0.17-0.41)	85.1	77.8	-7.3	0.73 (0.5-0.93)

Blood Pressure	90.6	49.1	-41.5	0.11 (0.07-0.19)	98.0	85.6	-12.4	0.14 (0.10-0.20)
Cholesterol	32.3	14.0	-18.3	0.25 (0.15-0.42)	37.8	27.3	-10.5	0.67 (0.53, 0.84)
Creatinine	77.4	43.9	-33.5	0.24 (0.15-0.37)	89.8	82.3	-7.5	0.66 (0.50, 0.88)
UACR	35.9	16.1	-19.8	0.36 (0.21-0.62)	44.3	37.3	-7.0	0.71 (0.56, 0.89)
Eye exam	12.3	4.4	-7.9	0.72 (0.31-1.69)	15.6	11.0	-4.6	0.59 (0.40, 0.88)
Foot exam	2.7	0.2	-2.5	1.18 (0.24-5.70)	4.2	2.2	-2.0	0.19 (0.06, 0.62)
<i>Other</i> <sup>3</sup>								
HbA1c	77.0	45.8	-31.2	0.36 (0.29-0.44)	85.1	79.6	-5.5	0.72 (0.64-0.82)
Blood Pressure	88.6	42.5	-46.1	0.12 (0.10-0.16)	95.9	81.0	-14.9	0.13 (0.11-0.17)
Cholesterol	47.1	23.4	-23.7	0.35 (0.28-0.45)	54.8	41.5	-13.3	0.65 (0.58-0.73)
Creatinine	77.0	42.1	-34.9	0.29 (0.23-0.35)	86.9	81.8	-5.1	0.61 (0.53-0.70)
UACR	32.7	14.7	-18.0	0.45 (0.35-0.58)	41.1	32.2	-8.9	0.71 (0.63-0.79)
Eye exam	11.2	6.4	-4.8	0.62 (0.42-0.93)	15.5	9.6	-5.9	0.64 (0.53-0.78)
Foot exam	0.7	0.3	-0.4	0.63 (0.30-1.31)	1.8	0.5	-1.3	0.40 (0.22-0.71)

<sup>1</sup>Compares during vs pre period, adjusted for baseline age.

<sup>2</sup>Not reported – sample size too small.

<sup>3</sup>Includes Asian, Native Hawaiian/Pacific Islander, American Indian/Alaskan Native, and multiple races.

Abbreviations: GEE = generalized estimating equation; KPGA = Kaiser Permanente Georgia; UACR = Urine-albumin-creatinine ratio

**Supplementary Table 4.** Logistic GEE regression comparing odds of meeting annual diabetes care guidelines in telehealth users vs non-telehealth users, stratified by period

<b>Diabetes care process</b>	<b>Telehealth use</b>	<b>Pre COVID-19<sup>1</sup></b>	<b>During COVID-19<sup>1</sup></b>
HbA1c	No	Ref	Ref
	Yes	1.4 (1.3, 1.5)	2.6 (2.4, 2.8)
UACR	No	Ref	Ref
	Yes	1.3 (1.2, 1.4)	2.1 (1.9, 2.3)



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Blood pressure	No	Ref	Ref
	Yes	3.8 (3.3, 4.4)	4.1 (3.7, 4.5)
Cholesterol	No	Ref	Ref
	Yes	1.1 (1.1, 1.2)	1.7 (1.5, 1.9)
Creatinine	No	Ref	Ref
	Yes	2.1 (1.9, 2.2)	4.0 (3.6, 4.3)
Eye exam	No	Ref	Ref
	Yes	1.1 (1.1, 1.2)	1.7 (1.4, 2.0)
Foot exam	No	Ref	Ref
	Yes	1.3 (1.1, 1.5)	2.3 (1.7, 2.9)

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<sup>1</sup>Compares telehealth utilization vs no telehealth utilization, adjusted for baseline age.  
Abbreviations: GEE = generalized estimating equations; UACR = Urine albumin-to-creatinine ratio

**Supplementary Table 6.** Sensitivity analyses comparing odds of meeting annual diabetes care guidelines in the during vs pre pandemic period among KPGA adult members with prevalent diabetes 2018-2021, and excluding members with prevalent neuropathy, retinopathy, or CHF (n=12,437)

**Supplementary Table 5.** Sensitivity analyses comparing odds of completing at least one diabetes screening in the during vs pre-COVID-19 pandemic period among KPGA adult members with prevalent diabetes, 2018-2021, and changing the definition of telehealth use from at least one per year per period (primary analysis) to at least one per period

Diabetes care process	Non telehealth users				Telehealth users			
	Pre Pandemic (2018-2019)	During Pandemic (2020-2021)	Absolute Change (During vs Pre)	OR (95% CI) <sup>1</sup>	Pre Pandemic (2018-2019)	During Pandemic (2020-2021)	Absolute Change (During vs Pre)	OR (95% CI) <sup>1</sup>
HbA1c	91.8	71.7	-20.2	0.29 (0.26-0.32)	97.0	94.7	-2.4	0.56 (0.50-0.64)
UACR	67.7	42.2	-25.5	0.48 (0.45-0.52)	74.1	64.6	-9.5	0.66 (0.63-0.68)
Blood pressure	97.5	78.1	-19.3	0.12 (0.10-0.13)	99.9	98.1	-1.8	0.10 (0.04-0.11)
Cholesterol	79.7	55.6	-24.1	0.35 (0.32-0.39)	84.7	76.0	-8.7	0.57 (0.54-0.61)
Creatinine	93.1	72.5	-20.6	0.26 (0.23-0.29)	98.4	96.9	-1.6	0.53 (0.45-0.61)
Eye exam	38.3	25.4	-12.9	0.64 (0.58-0.71)	45.0	40.5	-4.5	0.85 (0.81-0.89)
Foot exam	4.7	1.4	-3.3	0.49 (0.40-0.61)	8.1	5.7	-2.4	0.75 (0.69-0.81)

<sup>1</sup>Compares during vs pre period, adjusted for baseline age

Abbreviations: GEE = generalized estimating equations; KPGA = Kaiser Permanente Georgia; UACR = urine albumin-to-creatinine ratio

Diabetes care processes	Non telehealth users				Telehealth users			
	Pre Pandemic (2018-2019)	During Pandemic (2020-2021)	Absolute Change (During vs Pre)	OR (95% CI) <sup>1</sup>	Pre Pandemic (2018-2019)	During Pandemic (2020-2021)	Absolute Change (During vs Pre)	OR (95% CI) <sup>1</sup>
HbA1c	67.1	40.6	-26.5	0.43 (0.39-0.47)	75.0	69.1	-5.9	0.77 (0.72-0.83)
UACR	25.2	12.4	-12.8	0.49 (0.43-0.56)	31.4	25.4	-6.0	0.75 (0.70-0.81)
Blood pressure	87.9	46.5	-41.4	0.15 (0.13-0.17)	97.0	80.7	-16.3	0.14 (0.12-0.17)
Cholesterol	36.3	17.5	-18.8	0.42 (0.35-0.46)	41.1	29.5	-11.6	0.60 (0.56-0.64)
Creatinine	70.5	41.2	-29.3	0.35 (0.31-0.38)	83.7	75.3	-8.3	0.61 (0.57-0.67)
Eye exam	8.6	3.7	-4.9	0.44 (0.33-0.57)	9.3	7.6	-1.8	0.78 (0.69-0.88)
Foot exam	NR <sup>2</sup>	NR	NR	NR	NR	NR	NR	NR

<sup>1</sup>Compares during vs pre period, adjusted for baseline age.

<sup>2</sup>Not reported - sample size too small.

Abbreviations: CHF = congestive heart failure; GEE = generalized estimating equations; KPGA = Kaiser Permanente Georgia; UACR = urine albumin-to-creatinine ratio