

**Supplementary Table S1: Survey on Provider Perceptions on Type 2 Diabetes Prescribing Habits**

Questions
Approximately how often do you prescribe any of the following medications? NOTE: Brand names are in parentheses after the generic name.
1. Metformin (brand name: Glucophage) <ul style="list-style-type: none"><li>a. Never</li><li>b. 1 to 5 times per year</li><li>c. 6-20 times per year</li><li>d. &gt;20 times per year</li></ul>
2. Sulfonylureas: glipizide (Glucotrol); glyburide (Diabeta, Micronase); glimepiride (Amaryl) <ul style="list-style-type: none"><li>a. Never</li><li>b. 1 to 5 times per year</li><li>c. 6-20 times per year</li><li>d. &gt;20 per year</li></ul>
3. Thiazolidinediones: rosiglitazone (Avandia); pioglitazone (Actos) <ul style="list-style-type: none"><li>a. Never</li><li>b. 1 to 5 times per year</li><li>c. 6-20 times per year</li><li>d. &gt;20 times per year</li></ul>
4. Dipeptidyl peptidase-4 (DPP-4) inhibitors: sitagliptin (Januvia); saxagliptin (Onglyza); linagliptin (Tradjenta); alogliptin (Nesina) <ul style="list-style-type: none"><li>a. Never</li><li>b. 1 to 5 times per year</li><li>c. 6-20 times per year</li><li>d. &gt;20 times per year</li></ul>
5. Glucagon-like peptide-1 (GLP-1) receptor agonists: exenatide (Byetta, Bydureon); liraglutide (Victoza); lixisenatide (Adlyxin); albiglutide (Tanzeum); dulaglutide (Trulicity); semaglutide (Ozempic, Rybelsus) <ul style="list-style-type: none"><li>a. Never</li><li>b. 1 to 5 times per year</li><li>c. 6-20 times per year</li><li>d. &gt;20 times per year</li></ul>
6. Sodium-glucose cotransporter-2 (SGLT2) inhibitors: empagliflozin (Jardiance); canagliflozin (Invokana); dapagliflozin (Farxiga); ertugliflozin (Steglatro) <ul style="list-style-type: none"><li>a. Never</li><li>b. 1 to 5 times per year</li><li>c. 6-20 times per year</li><li>d. &gt;20 times per year</li></ul>
7. Insulin: aspart (Novolog, Fiasp); lispro (Humalog, Lyumjev); glulisine (Apidra); regular (Novolin R, Humulin R); NPH insulin (Novolin N, Humulin N); detemir (Levemir); glargine (Lantus, Basaglar, Toujeo); degludec (Tresiba) <ul style="list-style-type: none"><li>a. Never</li><li>b. 1 to 5 times per year</li><li>c. 6-20 times per year</li></ul>

d. >20 times per year
<p>Which medication do you choose to prescribe most often as a second-line diabetes therapy after metformin? Check all that apply.</p> <ul style="list-style-type: none"> <li>a. Not applicable, I do not prescribe medications for diabetes</li> <li>b. Sulfonylurea</li> <li>c. Thiazolidinedione</li> <li>d. DPP-4 inhibitor</li> <li>e. GLP-1 receptor agonist</li> <li>f. SGLT-2 inhibitor</li> <li>g. Insulin</li> <li>h. None of the above</li> </ul>
<p>Which factors do you consider when choosing a second-line diabetes medication for your patients? Check all that apply</p> <ul style="list-style-type: none"> <li>a. Not applicable, I do not prescribe medications for diabetes</li> <li>b. Lower cost and/or increased accessibility</li> <li>c. Improvement in hemoglobin A1c</li> <li>d. Comorbidity benefit (cardiac, renal)</li> <li>e. Mortality benefit</li> <li>f. To minimize weight gain/promote weight loss</li> <li>g. To minimize hypoglycemia</li> <li>h. Ease of taking medicine/compliance</li> <li>i. None of the above</li> </ul>
<p>Rate how comfortable you are prescribing each of the following medications</p> <ol style="list-style-type: none"> <li>1. Metformin (brand name: Glucophage) <ul style="list-style-type: none"> <li>a. Very comfortable</li> <li>b. Comfortable</li> <li>c. Somewhat comfortable</li> <li>d. Not comfortable at all</li> <li>e. No opinion</li> </ul> </li> <li>2. Sulfonylureas: glipizide (Glucotrol); glyburide (Diabeta, Micronase); glimepiride (Amaryl) <ul style="list-style-type: none"> <li>a. Very comfortable</li> <li>b. Comfortable</li> <li>c. Somewhat comfortable</li> <li>d. Not comfortable at all</li> <li>e. No opinion</li> </ul> </li> <li>3. Thiazolidinediones: rosiglitazone (Avandia); pioglitazone (Actos) <ul style="list-style-type: none"> <li>a. Very comfortable</li> <li>b. Comfortable</li> <li>c. Somewhat comfortable</li> <li>d. Not comfortable at all</li> <li>e. No opinion</li> </ul> </li> <li>4. Dipeptidyl peptidase-4 (DPP-4) inhibitors: sitagliptin (Januvia); saxagliptin (Onglyza); linagliptin (Tradjenta); alogliptin (Nesina) <ul style="list-style-type: none"> <li>a. Very comfortable</li> <li>b. Comfortable</li> <li>c. Somewhat comfortable</li> <li>d. Not comfortable at all</li> <li>e. No opinion</li> </ul> </li> </ol>

5. Glucagon-like peptide-1 (GLP-1) receptor agonists: exenatide (Byetta, Bydureon); liraglutide (Victoza); lixisenatide (Adlyxin); albiglutide (Tanzeum); dulaglutide (Trulicity); semaglutide (Ozempic, Rybelsus)
  - a. Very comfortable
  - b. Comfortable
  - c. Somewhat comfortable
  - d. Not comfortable at all
  - e. No opinion
6. Sodium-glucose cotransporter-2 (SGLT2) inhibitors: empagliflozin (Jardiance); canagliflozin (Invokana); dapagliflozin (Farxiga); ertugliflozin (Steglatro)
  - a. Very comfortable
  - b. Comfortable
  - c. Somewhat comfortable
  - d. Not comfortable at all
  - e. No opinion
7. Insulin: aspart (Novolog, Fiasp); lispro (Humalog, Lyumjev); glulisine (Apidra); regular (Novolin R, Humulin R); NPH insulin (Novolin N, Humulin N); detemir (Levemir); glargine (Lantus, Basaglar, Toujeo); degludec (Tresiba)
  - a. Very comfortable
  - b. Comfortable
  - c. Somewhat comfortable
  - d. Not comfortable at all
  - e. No opinion

Which of the following do you think are benefits of prescribing GLP-1 receptor agonists?  
Check all that apply.

- a. Improvement in hemoglobin A1c
- b. Comorbidity benefit (cardiac, renal)
- c. Mortality benefit
- d. To minimize weight gain/promote weight loss
- e. To minimize hypoglycemia
- f. Ease of taking medicine/compliance
- g. No opinion

Which of the following do you think are barriers to prescribing GLP-1 receptor agonists?  
Check all that apply.

- a. I have no/limited experience prescribing this medication.
- b. High cost and/or Prior authorization is burdensome
- c. Concern of adverse reactions
- d. It is an injectable medication
- e. Other medications have a better benefit-risk balance
- f. No opinion

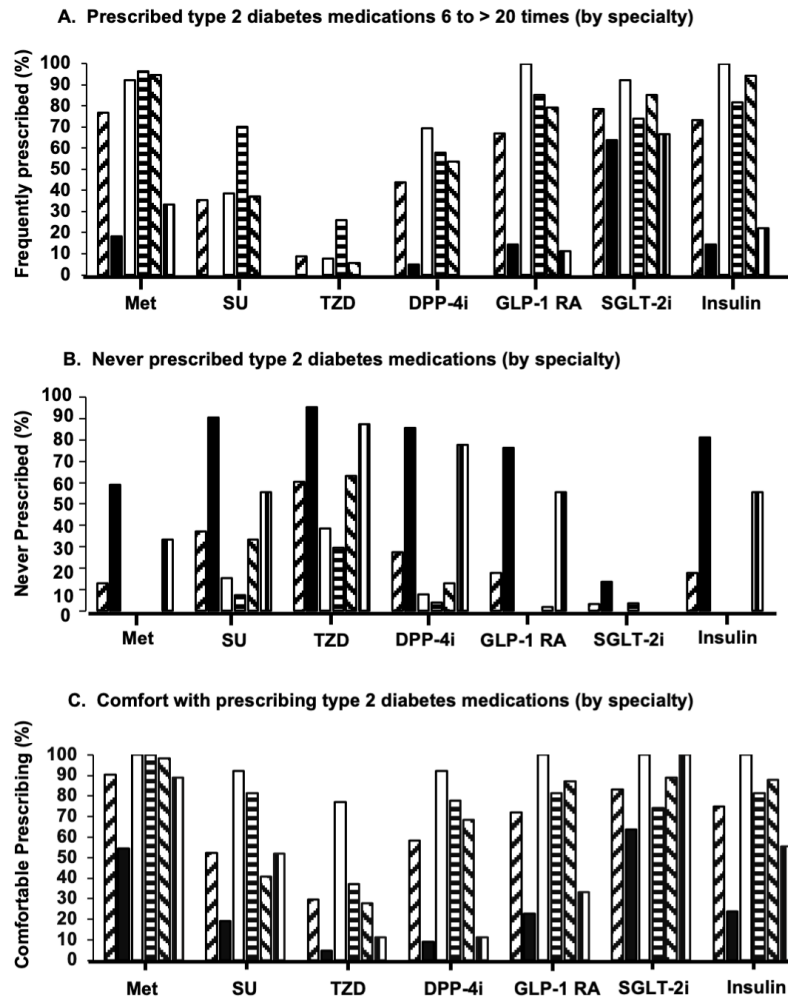
Who do you think should be the main prescriber of GLP-1 receptor agonists? Check all that apply.

- a. Cardiologists
- b. Endocrinologists
- c. Nephrologists
- d. Primary Care Physicians
- e. I do not know
- f. Other (please specify)

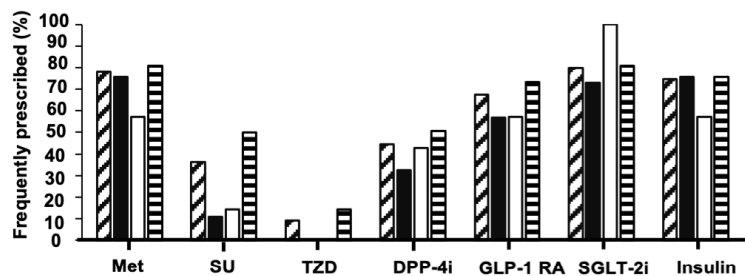
<p>Which of the following do you think are benefits of SGLT-2 inhibitors? Check all that apply.</p> <ul style="list-style-type: none"> <li>a. Improvement in hemoglobin A1c</li> <li>b. Comorbidity benefit (cardiac, renal)</li> <li>c. Mortality benefit</li> <li>d. To minimize weight gain/promote weight loss</li> <li>e. To minimize hypoglycemia</li> <li>f. Ease of taking medicine/compliance</li> <li>g. No opinion</li> </ul>
<p>Which of the following do you think are barriers to prescribing SGLT-2 inhibitors? Check all that apply.</p> <ul style="list-style-type: none"> <li>a. I have no/limited experience prescribing this medication.</li> <li>b. High cost and/or prior authorization is burdensome</li> <li>c. Concern of adverse reactions</li> <li>d. Other medications have a better benefit-risk balance</li> <li>e. No opinion</li> </ul>
<p>Who do you think should be the main prescriber of SGLT-2 inhibitors? Check all that apply.</p> <ul style="list-style-type: none"> <li>a. Cardiologists</li> <li>b. Endocrinologists</li> <li>c. Nephrologists</li> <li>d. Primary Care Physicians</li> <li>e. I do not know</li> <li>f. Other (please specify)</li> </ul>
<p>Who does prior authorizations for medications?</p> <ul style="list-style-type: none"> <li>a. Department secretary</li> <li>b. Specialty pharmacy (for example, Pharmacy Advantage)</li> <li>c. Regular pharmacy</li> <li>d. We do not have anyone who helps with prior authorizations</li> <li>e. Not applicable</li> <li>f. Other (please specify)</li> </ul>

**Supplementary Figure S1. Type 2 diabetes medication prescribing practices of healthcare providers in different specialties and with different professional designations.** (A) Prevalence of healthcare providers who prescribed various type 2 diabetes medications 6 to > 20 times per year (by specialty). (B) Prevalence of healthcare providers who never prescribed various type 2 diabetes medications (by specialty). (C) Percentage of healthcare providers who answered “comfortable” or “very comfortable” when asked their comfort level in prescribing type 2 diabetes medications (by specialty). Diagonal stripes (up left to right) = All respondents (n=125); black bars = Cardiology (n=22); white bars = Endocrinology (n=13); horizontal stripes = Family Medicine (n=27); diagonal stripes (down left to right) = Internal Medicine (n = 54); and vertical stripes = Nephrology (n=9). (D) Prevalence of healthcare providers who prescribed various type 2 diabetes medications 6 to > 20 times per year (by professional designation). (E) Prevalence of healthcare providers who never prescribed various type 2 diabetes medications (by professional designation). (F) Percentage of healthcare providers who answered “comfortable” or “very comfortable” when asked their comfort level in prescribing type 2 diabetes medications (by professional designation). Diagonal stripes (up left to right) = All respondents (n=122); black bars = Trainees (interns, residents and fellows) (n=37); white bars = Certified nurse practitioners (n=7); horizontal stripes = Attending physicians (n=78). Abbreviations: Met=metformin; SU=sulfonylureas; TZD=thiazolidinediones; DPP-4i= dipeptidyl peptidase-4 inhibitors; GLP-1 RA= glucagon-like peptide-1 receptor agonists; SGLT-2i= sodium-glucose cotransporter-2 inhibitors.

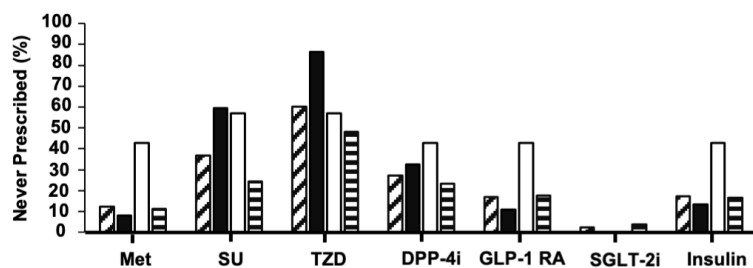
**Figure 1. Type 2 diabetes medication prescribing practices of healthcare providers in different specialties and with different professional designations.**



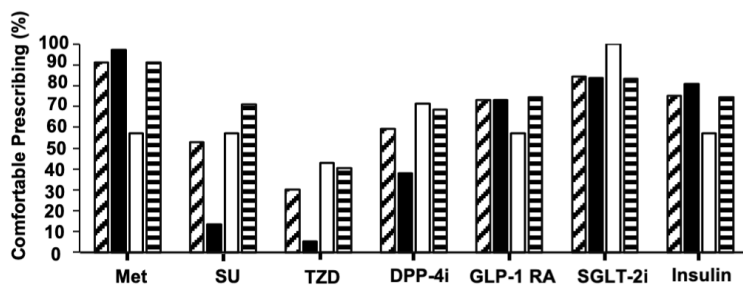
**D. Prescribed type 2 diabetes medications 6 to > 20 times (by professional designation)**



**E. Never prescribed type 2 diabetes medications (by professional designation)**



**F. Comfort with prescribing type 2 diabetes medications (by professional designation)**



**Supplementary Figure S2. Preference for second type 2 diabetes medication to be added on to a**

**regimen that includes metformin.** (A) Healthcare providers' preference for second type 2 diabetes medication to be added on to a regimen that includes metformin (by different specialties). (B)

Questionnaire responses regarding the factors influencing healthcare providers' choice of a second type 2 diabetes medication in different specialties. Diagonal stripes (up left to right) = All respondents (n=125);

black bars = Cardiology (n=22); white bars = Endocrinology (n=13); horizontal stripes = Family

Medicine (n=27); diagonal stripes (down left to right) = Internal Medicine (n = 54); and vertical stripes =

Nephrology (n=9). (C) Healthcare providers' preference for second type 2 diabetes medication to be

added on to a regimen that includes metformin (by different professional designations). (D) Questionnaire

responses regarding the factors influencing healthcare providers' choice of a second type 2 diabetes

medication in different professional designations. Diagonal stripes (up left to right) = All respondents

(n=123); black bars = Trainees (interns, residents and fellows) (n=37); white bars = Certified nurse

practitioners (n=7); horizontal stripes = Attending physicians (n=79). Abbreviations: SU=sulfonylureas;

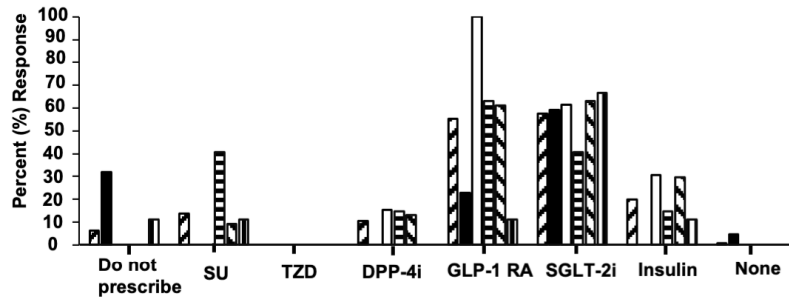
TZD= thiazolidinediones; DPP-4i= dipeptidyl peptidase-4 inhibitors; GLP-1 RA= glucagon-like peptide-

1 receptor agonists; SGLT-2i= sodium-glucose cotransporter-2 inhibitors

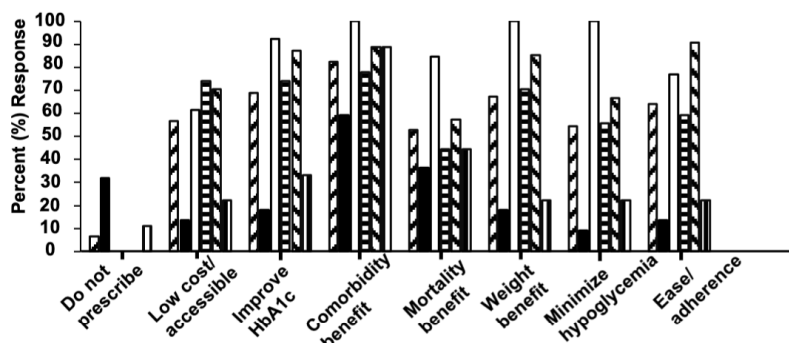


Figure 2. Preference for second type 2 diabetes medication to be added on to a regimen that includes metformin

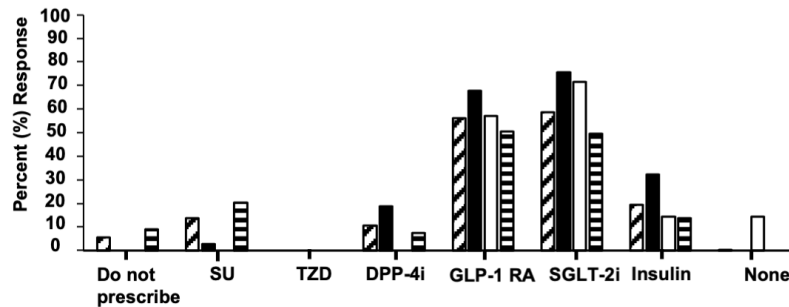
A. Preference for second type 2 diabetes medication by different specialties



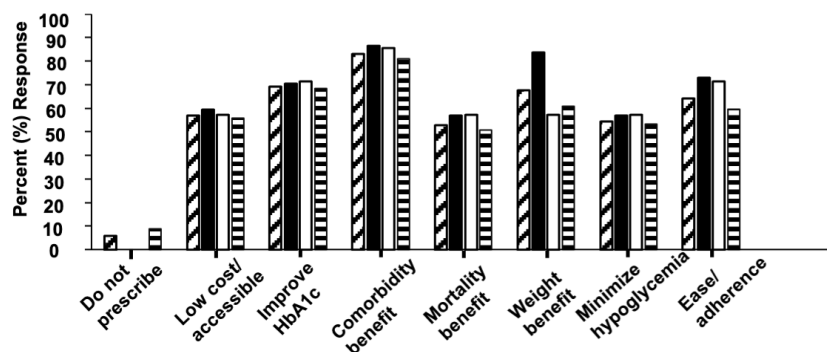
B. Factors influencing choice of second type 2 diabetes medication in different specialties



C. Preference for second type 2 diabetes medication by different professional designations



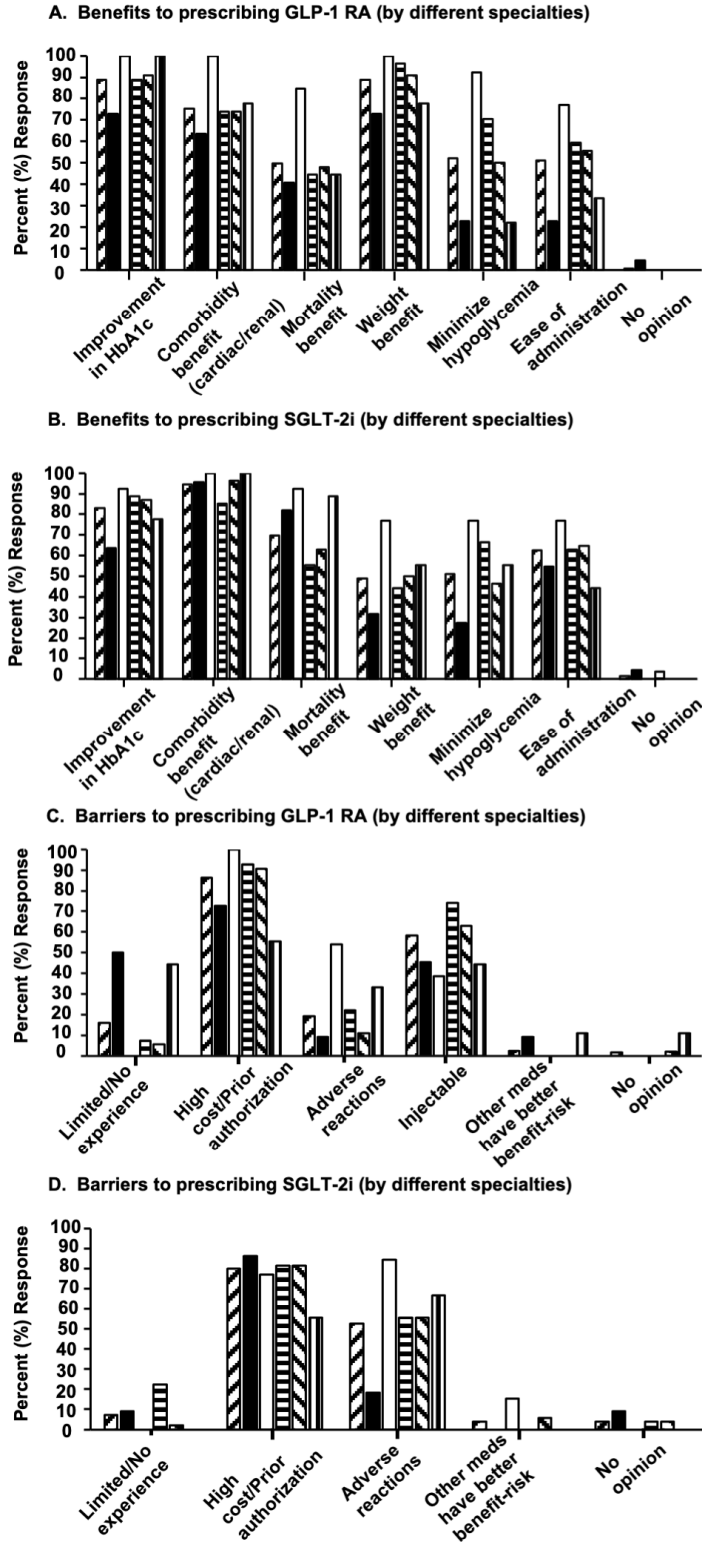
D. Factors influencing choice of second type 2 diabetes medication in different professional designations



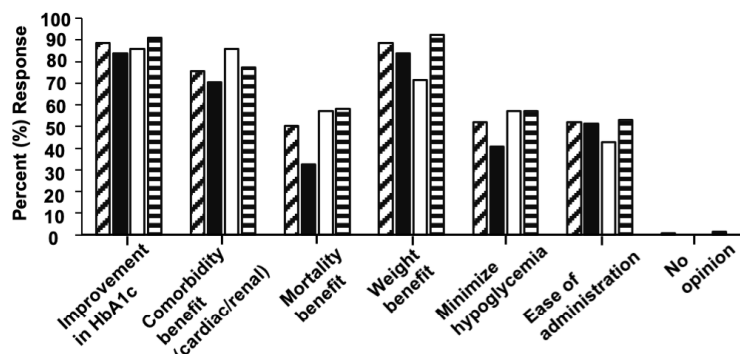
**Supplementary Figure S3. Perceived benefits and barriers to prescribing GLP-1 RA and SGLT-2i**

**for type 2 diabetes.** Percent of healthcare providers in different specialties who reported perceived benefits to prescribing (A) glucagon-like peptide-1 receptor agonists (GLP-1 RA) and (B) sodium-glucose cotransporter-2 inhibitors (SGLT-2i) for type 2 diabetes. Percent of healthcare providers in different specialties who reported perceived barriers to prescribing (C) glucagon-like peptide-1 receptor agonists (GLP-1 RA) and (D) sodium-glucose cotransporter-2 inhibitors (SGLT-2i) for type 2 diabetes. Diagonal stripes (up left to right) =All respondents (n=125); black bars = Cardiology (n=22); white bars = Endocrinology (n=13); horizontal stripes = Family Medicine (n=27); diagonal stripes (down left to right) = Internal Medicine (n = 54); and vertical stripes = Nephrology (n=9). Percent of healthcare providers with different professional designations who reported perceived benefits to prescribing (E) glucagon-like peptide-1 receptor agonists (GLP-1 RA) and (F) sodium-glucose cotransporter-2 inhibitors (SGLT-2i) for type 2 diabetes. Percent of healthcare providers with different professional designations who reported perceived barriers to prescribing (G) glucagon-like peptide-1 receptor agonists (GLP-1 RA) and (H) sodium-glucose cotransporter-2 inhibitors (SGLT-2i) for type 2 diabetes. Diagonal stripes (up left to right) = All respondents (n=123); black bars = Trainees (interns, residents and fellows) (n=37); white bars = Certified nurse practitioners (n=7); horizontal stripes = Attending physicians (n=79). Abbreviations: GLP-1 RA= glucagon-like peptide-1 receptor agonists; SGLT-2i= sodium-glucose cotransporter-2 inhibitors; HbA1c = glycated hemoglobin.

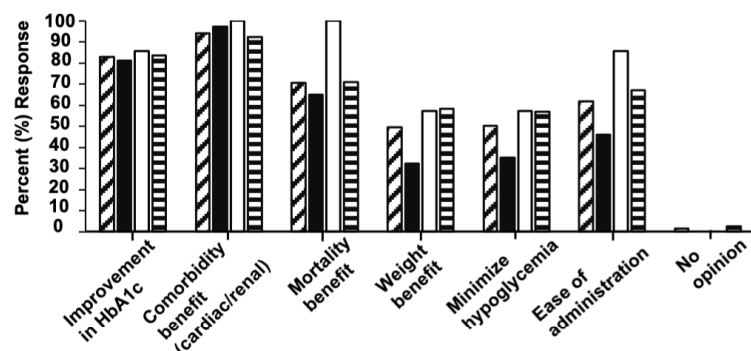
Figure 3. Perceived benefits and barriers to prescribing GLP-1 RA and SGLT-2i for type 2 diabetes



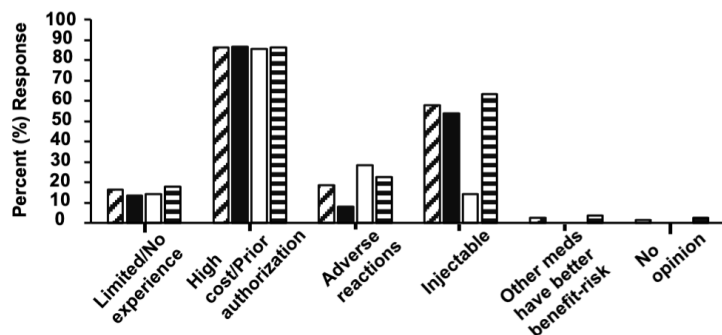
E. Benefits to prescribing GLP-1 RA (by different professional designations)



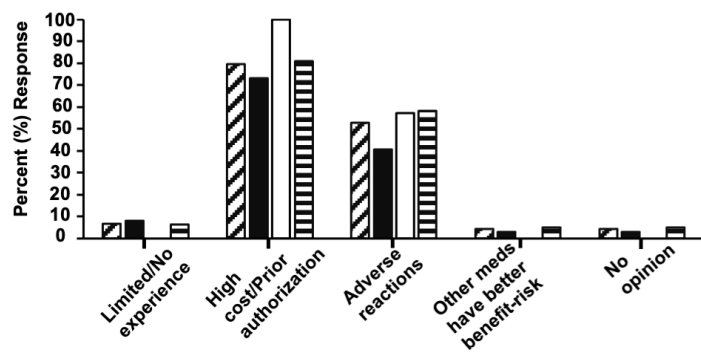
F. Benefits to prescribing SGLT-2i (by different professional designations)



G. Barriers to prescribing GLP-1 RA (by different professional designations)

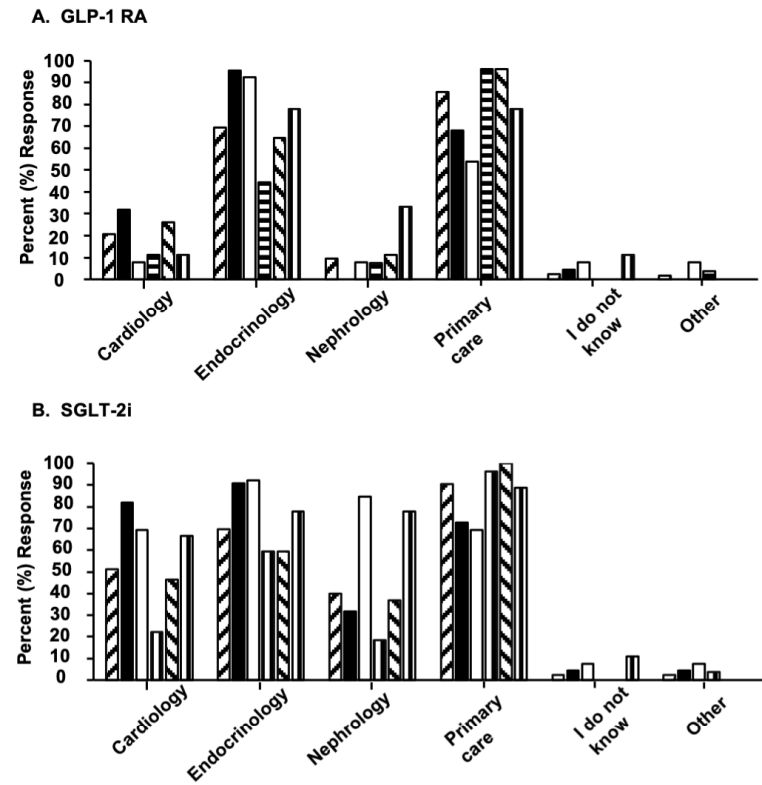


H. Barriers to prescribing SGLT-2i (by different professional designations)



**Supplementary Figure S4. Specialties perceived to be responsible for prescribing GLP-1 RA and SGLT-2i.** Percent of healthcare providers in different specialties who reported specialties perceived to be responsible for prescribing (A) glucagon-like peptide-1 receptor agonists (GLP-1 RA) and (B) sodium-glucose cotransporter-2 inhibitors (SGLT-2i) for type 2 diabetes. Diagonal stripes (up left to right) =All respondents (n=125); black bars = Cardiology (n=22); white bars = Endocrinology (n=13); horizontal stripes = Family Medicine (n=27); diagonal stripes (down left to right) = Internal Medicine (n = 54); and vertical stripes = Nephrology (n=9). Abbreviations: GLP-1 RA= glucagon-like peptide-1 receptor agonists; SGLT-2i= sodium-glucose cotransporter-2 inhibitors.

Figure 4. Specialties perceived to be responsible for prescribing GLP-1 RA and SGLT-2i



**Supplementary Figure S5. Staff perceived to be responsible for prior authorizations for medications.** Percent of healthcare providers in different specialties who reported staff perceived to be responsible for helping with prior authorizations for new medications in their department. Diagonal stripes (up left to right) =All respondents (n=125); black bars = Cardiology (n=22); white bars = Endocrinology (n=13); horizontal stripes = Family Medicine (n=27); diagonal stripes (down left to right) = Internal Medicine (n = 54); and vertical stripes = Nephrology (n=9).

Figure 5. Staff perceived to be responsible for prior authorizations for medications (by specialty)

