Register research in DK — opportunities and limitations

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Outline

Possible questions to ask

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- . . . only diagnoses / operations / procedures
  — possibly more per visit

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- Individually linkable records necessary for proper analysis

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- Time frame unknown

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- Patients will also be in the other diabetes registers

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  - Result of eye examination
  - Update approx. once / year
  - Complete for T1, $\approx 30\%$ of T2 included

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- $\Rightarrow$ Information on previous cancer diagnoses are reliable

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  - "being a user"
  - "not being a user anymore"
- But we only have dates and amounts of drug purchases...

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- Analysis of (adverse) event (complications) rates:
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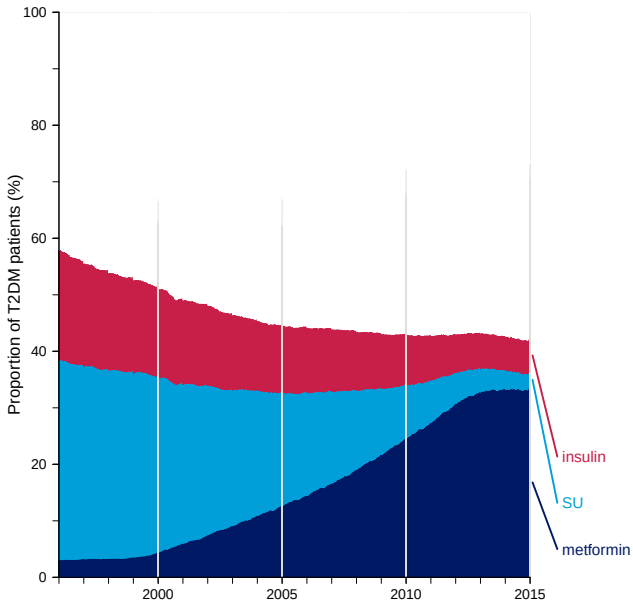
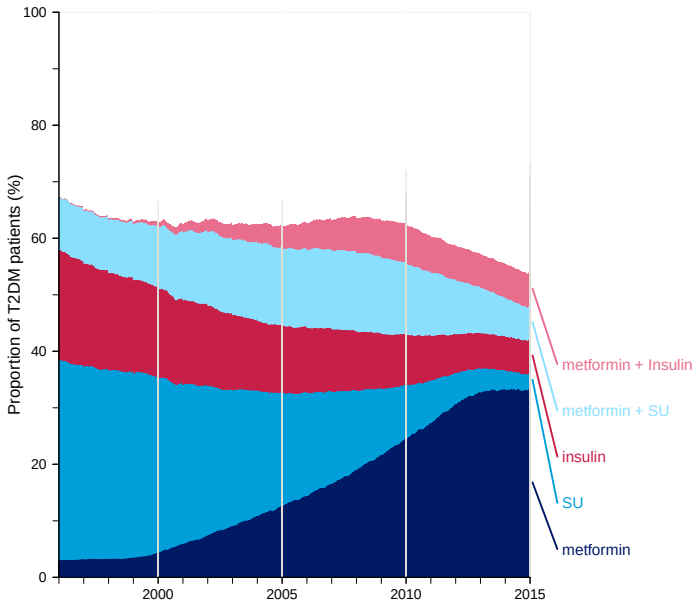
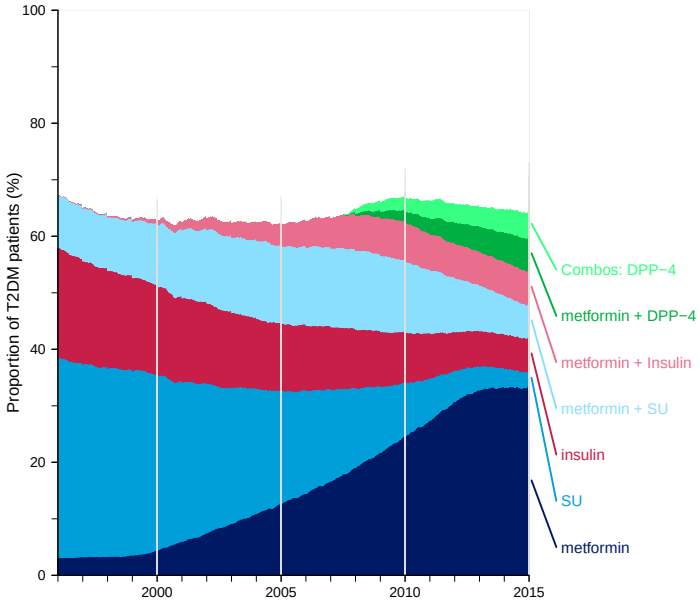
  - what proportion of these are in each treatment group






Proportion of prevalent T2DM patients on different combinations of GLDs 1996−2014
Proportion of T2DM patients (%)
100
80
60
40
20
0
2000
2005
2010
2015
Combos: DPP−4
metformin + DPP−4
metformin + Insulin
metformin + SU
insulin
SU
metformin

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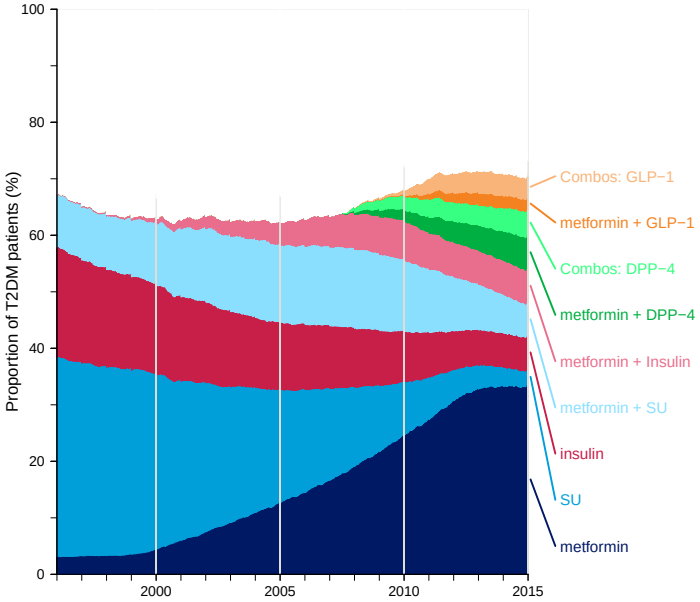

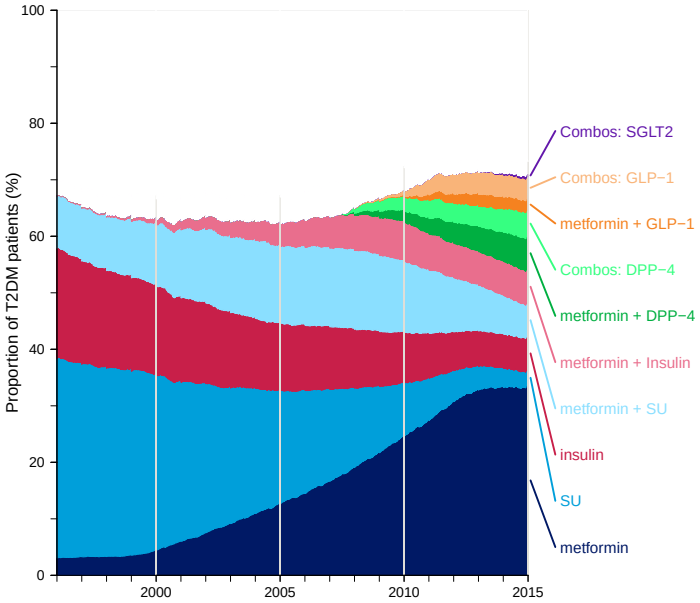

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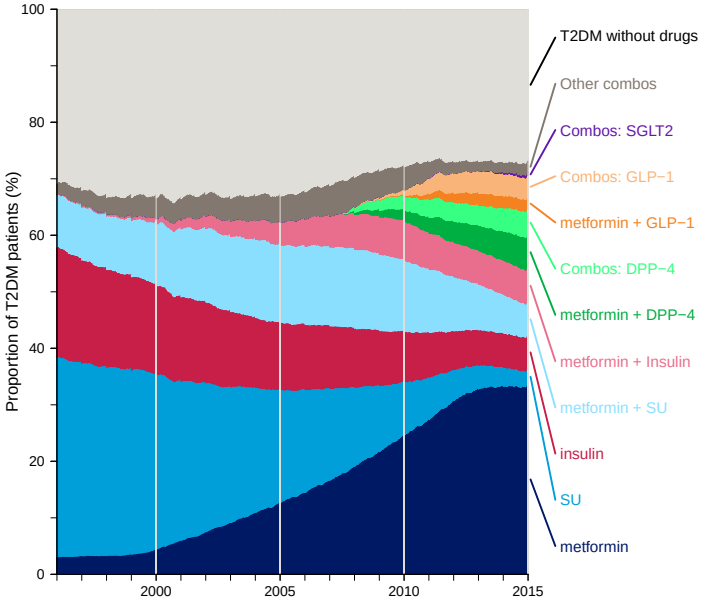
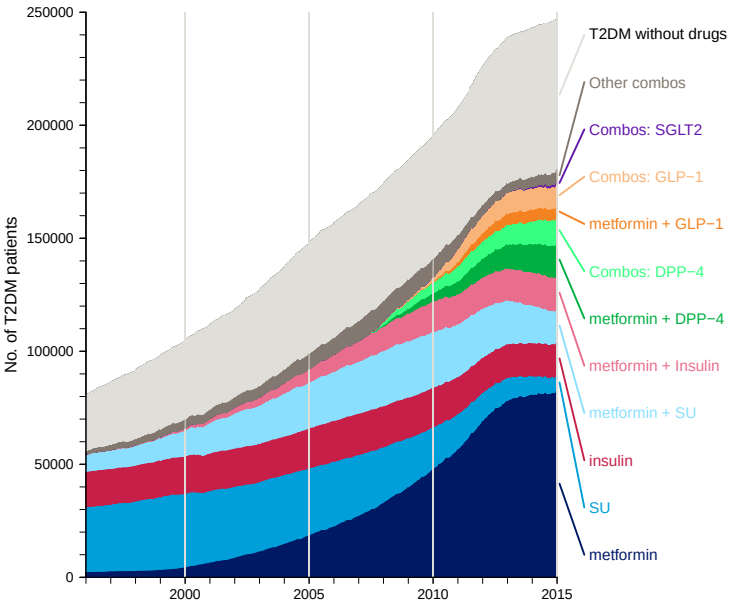




Incidence of Ketoacidosis in the Danish Type 2 Diabetes Population Before and After Introduction of Sodium–Glucose Cotransporter 2 Inhibitors—A Nationwide, Retrospective Cohort Study, 1995–2014

Majken Linnemann Jensen,[1]
Frederik Persson,[1]
Gregers S. Andersen,[1]
Martin Ridderstråle,[1] *John J. Nolan,*[1]
Bendix Carstensen,[1] *and*
Marit E. Jørgensen[1,2]

DOI: 10.2337/dc16-2793

The U.S. Food and Drug Administration warns that sodium–glucose cotransporter 2 (SGLT2) inhibitors may lead to diabetic ketoacidosis (DKA). To establish a baseline occurrence of DKA in type 2 diabetes, we used national registries in Denmark to estimate incidence rates of DKA and linked the data to information

diabetes diagnosis identified through national registers (1995–2014) (1,2) were included. Patients were followed from the date of diagnosis until an event or censoring due to death or emigration, or by end of study 31 December 2014, whichever occurred first. Events of DKA were defined as a primary or secondary

of 30 years were excluded. Rates of incidence were analyzed with Poisson regression, adjusted for sex, current age, calendar time, and duration of diabetes, with natural splines (5 knots) describing the time effects. The inclusion of calendar time was essential in order to avoid confounding, as SGLT2 inhibitors were

Denmark to estimate incidence rates of DKA and linked the data to information on filled prescriptions to determine treatment exposure, with special attention to SGLT2 inhibitor use.

Patients with filled prescription(s) for antidiabetes medication or a type 2 ... whichever occurred first. Events of DKA were defined as a primary or secondary diagnosis in the National Patient Register between 1 January 1995 and 31 December 2014. Patients diagnosed with type 1 diabetes or who had a filled prescription for any antidiabetes drug before the age ... dar time was essential in order to avoid confounding, as SGLT2 inhibitors were first introduced in Denmark in December 2012.

During follow-up, 415,670 patients had 4,045 first events of DKA in 3 million person-years, corresponding to a crude

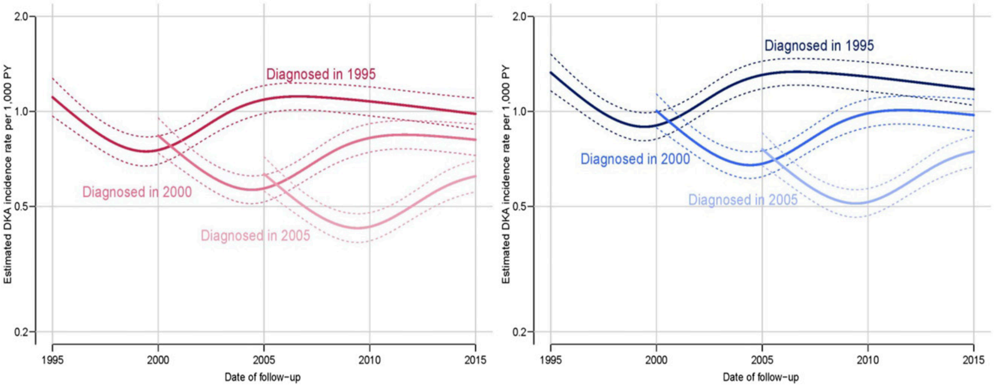
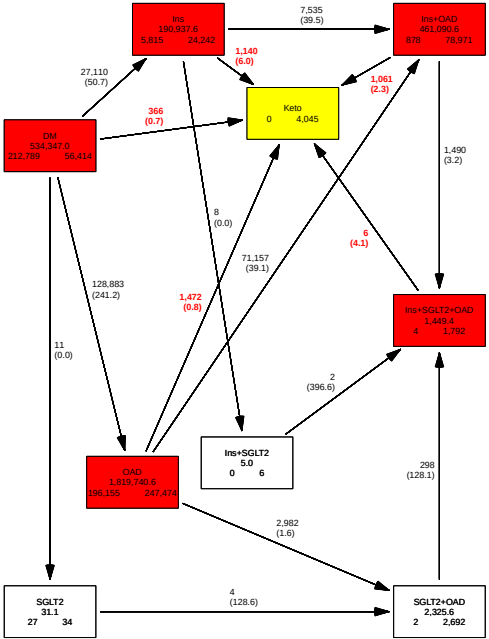


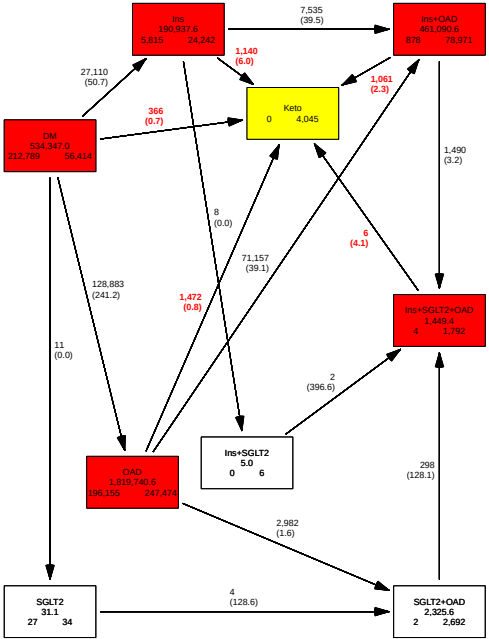
Figure 1—Estimated incidence rates of a first DKA event per 1,000 person-years (PY) among women (left panel) and men (right panel) diagnosed with type 2 diabetes at age 65 years in 1995, 2000, and 2005 and exposed to noninsulin glucose-lowering drugs.

e-LETTERS – OBSERVATIONS

- Multistate model



- Multistate model
- Keep track of who is exposed to what when



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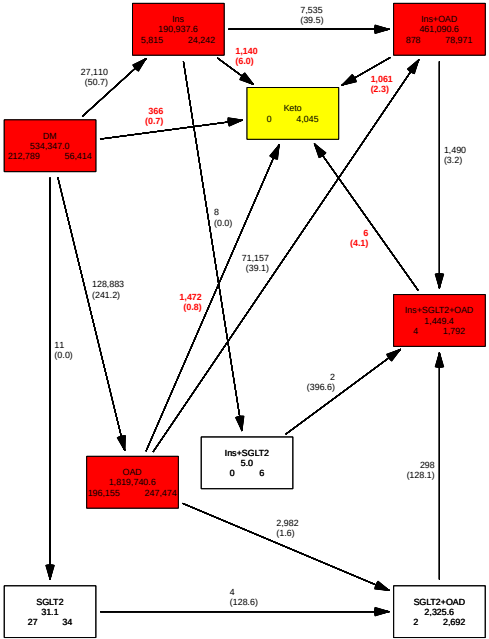

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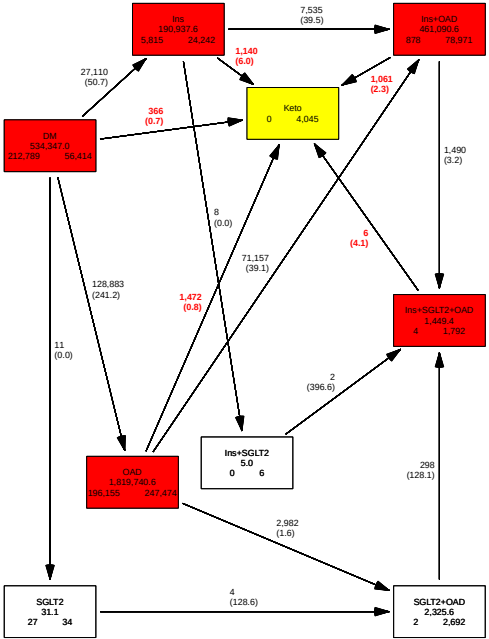
- Rates of:
  - treatment change



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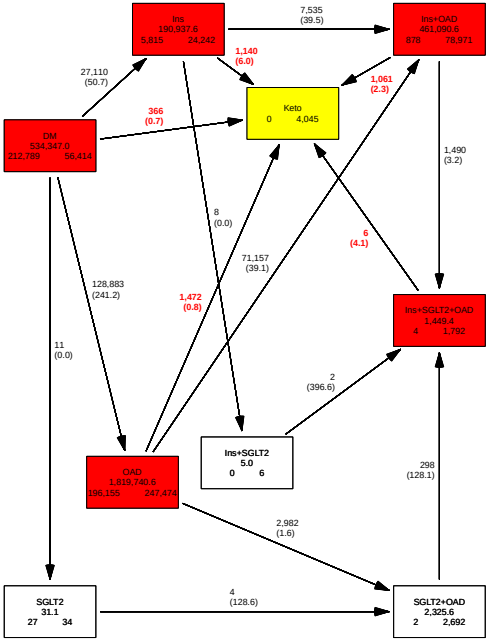

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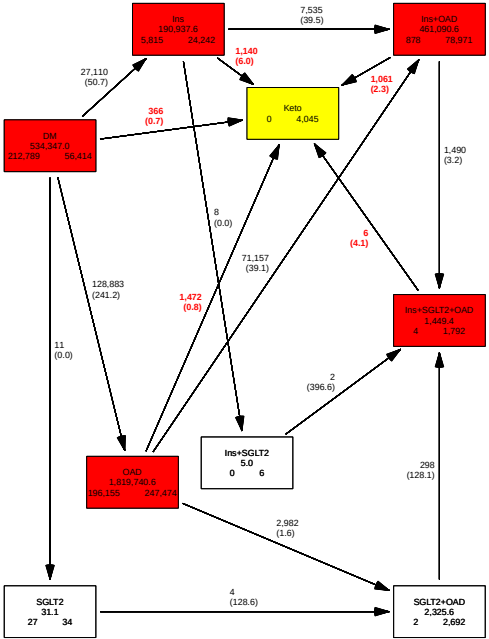

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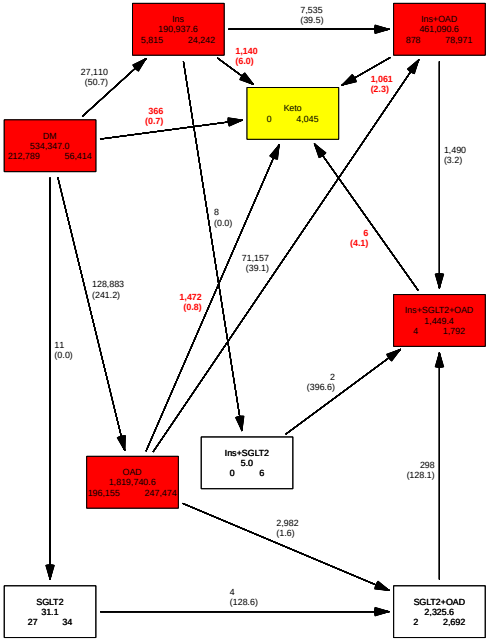
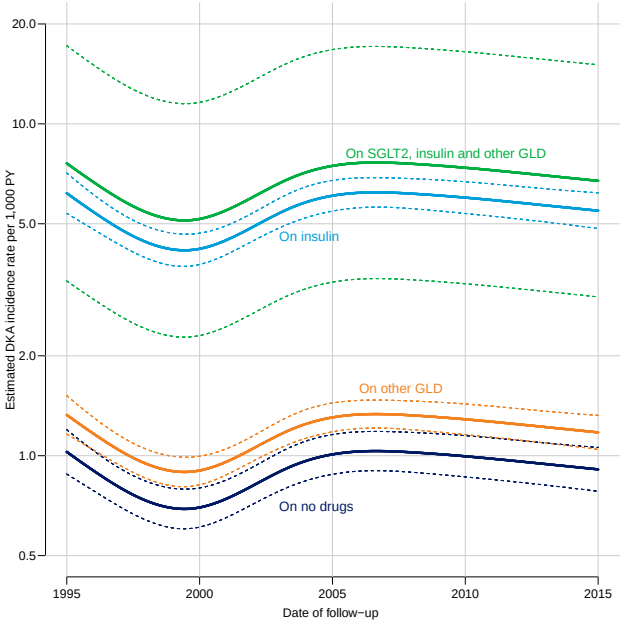
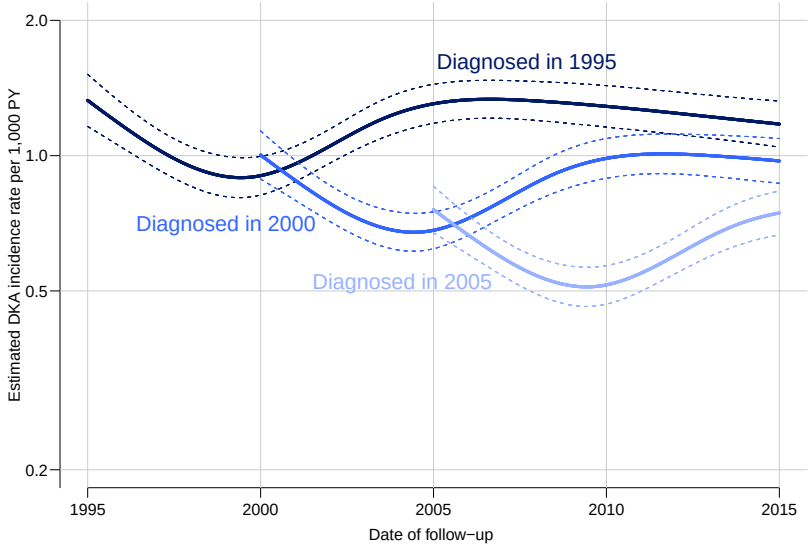



20.0
10.0
5.0
2.0
1.0
0.5
Estimated DKA incidence rate per 1,000 PY
On SGLT2, insulin and other GLD
On insulin
On other GLD
On no drugs
1995
2000
2005
2010
2015
Date of follow−up



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  - popular to use propensity scoring to control (some of) the confounding by indication.

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- Both assume some sort of continuous effect of PS

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