Do the guidelines apply to me? - Patient information and expert agency in prenatal diagnostics

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BACKGROUND

- Asymmetry of information between providers and patients is a well-established market failure in health care skewing demand to inefficient allocations (Arrow,1993).
- We assess if health care professional (experts) demand better/more treatment than non-experts (Johnson & Rehavi, 2016) in a universal health care system (Denmark).
- We test this difference by comparing access to prenatal diagnostic tests in the Danish NHS.
- Prenatal diagnostic test uses advanced and costly technology (roughly half the cost of a standard birth DRG) to detect rare chromosomal diseases. The test is accurate in diagnosing chromosomal diseases but involves a small risk of miscarries.
  - Clinical guidelines specifies eligibility for testing based on a measure of a priory risk of Downs Syndrome.
- In this setting we test three hypotheses related to the differences in testing between experts and non-experts
  - If experts are better to better to signal their risk or health state given equal need and preference for testing (statistical discrimination).
  - Or non-experts being easier persuaded away from costly testing due to limited information about their health state compared to experts (agency discrimination).
  - If the introduction of more precise screening impacts the difference between experts and non-experts.

METHODS

- We identify differences by comparing testing rates close to guideline eligibility thresholds.
- Danish clinical guidelines restrict access to prenatal tests according to a screening for a priory risk of having a child with Downs syndrome:
  - ➢ Before 2004 based on maternal age with age above 35 being the eligibility threshold
  - ➢ After 2004: combined first trimester screening (cFTS)
- In a narrow band around the thresholds women will face similar risk and eligibility is close to random.
- We restrict the sample to pregnancies started when the mothers' age was 35 +/- 500 days and estimate differences in discontinuities (Diff-in-disc) (Grempi et al., 2016):

$$Y_i = \delta_0 + \delta_1 Age_i^* + Over35_i\,(\gamma_0 + \gamma_1 Age_i^*) + Expert_i\,[\alpha_0 + \alpha_1 Age_i^* + Over35_i\,(\beta_0 + \beta_1 Age_i^*)] + \phi X_i + \xi_i$$

- Y_i is diagnostic testing, Age_i^* is age in days centered on age 35. $Over35_i$ is an indicator for being over the threshold and $Expert_i$ indicates whether the father or mother where trained as a nurse, doctor or midwife.
- β_0 is the parameter of interest: the difference in the testing discontinuities at the threshold between experts and non-experts
- Assuming equal testing preference across the threshold β_0 yields the difference between experts and non-expert below the threshold controlling for differences in testing preferences above the threshold.

RESULTS

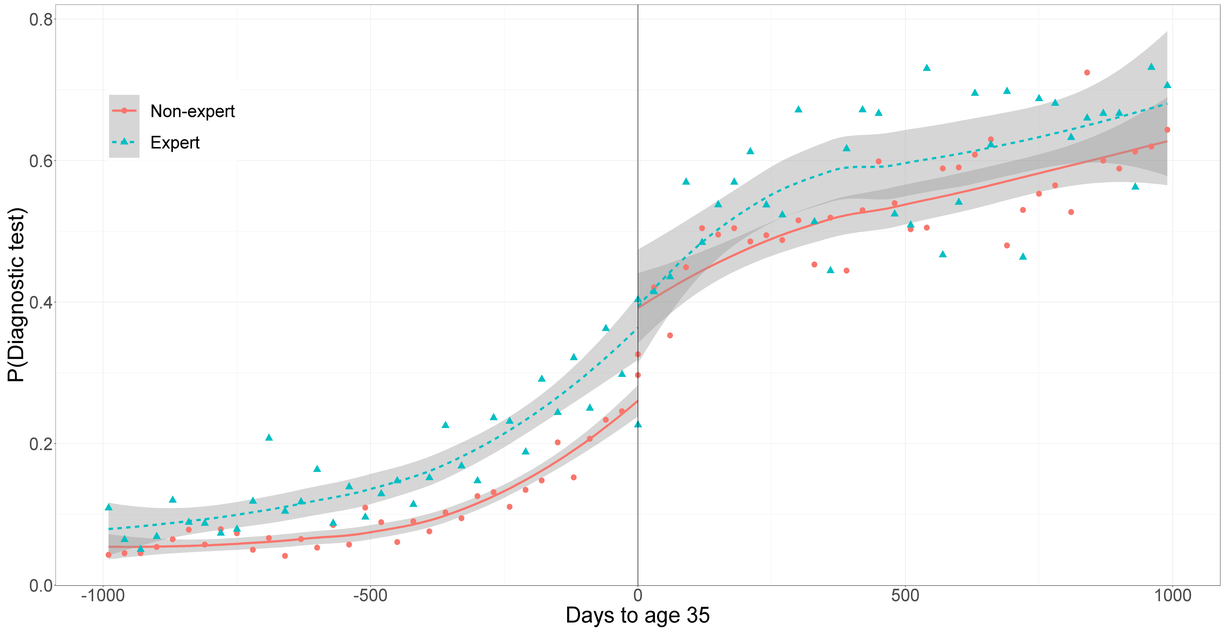

Figure 1: Testing rates for families with (experts) and without health training (non-experts) close to the age 35 risk eligibility threshold. Sample of experts and matched non experts from all Danish births between 1996 to 2002. Dots are testing rates in monthly bins with local linear regressions fitted on each side.

	Age 35 threshold (1996-2002)		1/300 threshold 2008-2015	
	CEM-matched	Linear controls	CEM-matched	Linear controls
	(1)	(2)	(3)	(4)
Baseline difference, α_0	0.095***	0.093***	0.036	0.067**
	(0.021)	(0.018)	(0.039)	(0.027)
Compliance non-expert, γ_0	0.146***	0.147***	0.424***	0.446***
	(0.015)	(0.007)	(0.025)	(0.010)
Diff-in-disc estimate, β_0	−0.077***	−0.075***	0.042	−0.017
	(0.030)	(0.025)	(0.053)	(0.036)
Match rate	0.96		0.89	
Experts	3609	3778	1141	1141
Controls	10912		3931	
Observations	14,521	45,455	5,072	21,181

Table 1: Results from local linear regressions using a triangular kernel for a sample experts and matched non-experts with similar education and income (1) and (3) or including of linear controlling for background variables (2) and (4).

- Experts generally have higher testing rates than non-experts.
- Below the thresholds experts are 9.5 percentage points more likely to be tested compared to a matched sample of non-expert mothers (the baseline difference, δ_0) ,
- But experts complies less at the threshold with a "jump" in testing rate that is 7.7 percentage points smaller compared to non-experts, β_0.
  - Just above the threshold experts are only 9.5 – 7.7 = 1.8 percentage points more likely to be tested,
- Doing the same comparison between income or education groups yields small measures of β_0
- Despite increased testing experts are be equally likely to have a late term abortion (table 2).
- After the introduction of new, more precise screening methods in 2008 experts and non-experts are have equally different testing rates above and below the threshold in column (3) and (4) in Table 1.

	Abortions	Tests	Test precision $\frac{Abortions}{Tests}$
1000 days before age 35			
Non-expert	78	5637	0.014
Expert	11	773	0.014
1000 days after age 35			
Non-expert	156	17033	0.009
Expert	13	1679	0.008

Table 2: Frequency of tests and late abortions (after week 12) for experts and non-experts in a sample of all pregnancies with gestational age over 12 weeks

DISCUSSION

- Experts are more likely to be tested below the threshold but not above:
  - → Experts gets more tests even when controlling for testing preferences above the threshold.
- The same difference does not exist when comparing across education groups:
  - → The difference is caused, specifically, by health knowledge.
- Experts and non-experts have similar pregnancy outcomes (abortion and birth rates as well as measures of child health)
  - → Indicating that differences are not caused by experts being better to signal their health state, statistical discrimination.
  - → And more likely from experts being less more successful in demanding test care given the same risk and preference (agency discrimination)
- The differences are reduced after the introduction of more precise screening technology, although the smaller sample (due to more accurate test) limits the precision of these results:
  - → More precise screening seems to decrease the information advantage of experts.

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