

# Variations in incidence and clinical presentation of preeclampsia according to method of data collection and diagnostic criteria in a Danish cohort

Ravn JD<sup>1</sup>, Bendix EJ<sup>1</sup>, Riishede I<sup>2</sup>, Ekelund CK<sup>2</sup>, Rode L<sup>2,3</sup>, Tabor A<sup>2</sup>, Overgaard M<sup>4,5</sup>, Sperling L<sup>1,4</sup>

Odense University Hospital: <sup>1</sup>Fetal Medicine Unit, <sup>4</sup>Department of Clinical Research, <sup>5</sup>Department of Clinical Biochemistry  
Copenhagen University Hospital, Rigshospitalet: <sup>2</sup>Centre of Fetal Medicine, <sup>3</sup>Department of Clinical Biochemistry

## Background

Diagnostic criteria for preeclampsia have a long history of adjustments. Today, guidelines by the American College of Obstetricians and Gynecologists (ACOG) and the International Society for the Study of Hypertension in Pregnancy (ISSHP) are often cited in an international context, but some of their definitions differ. In Denmark, the Danish Society of Obstetrics and Gynaecology (DSOG) have published their own diagnostic criteria, which contain elements from both ACOG and ISSHP guidelines.

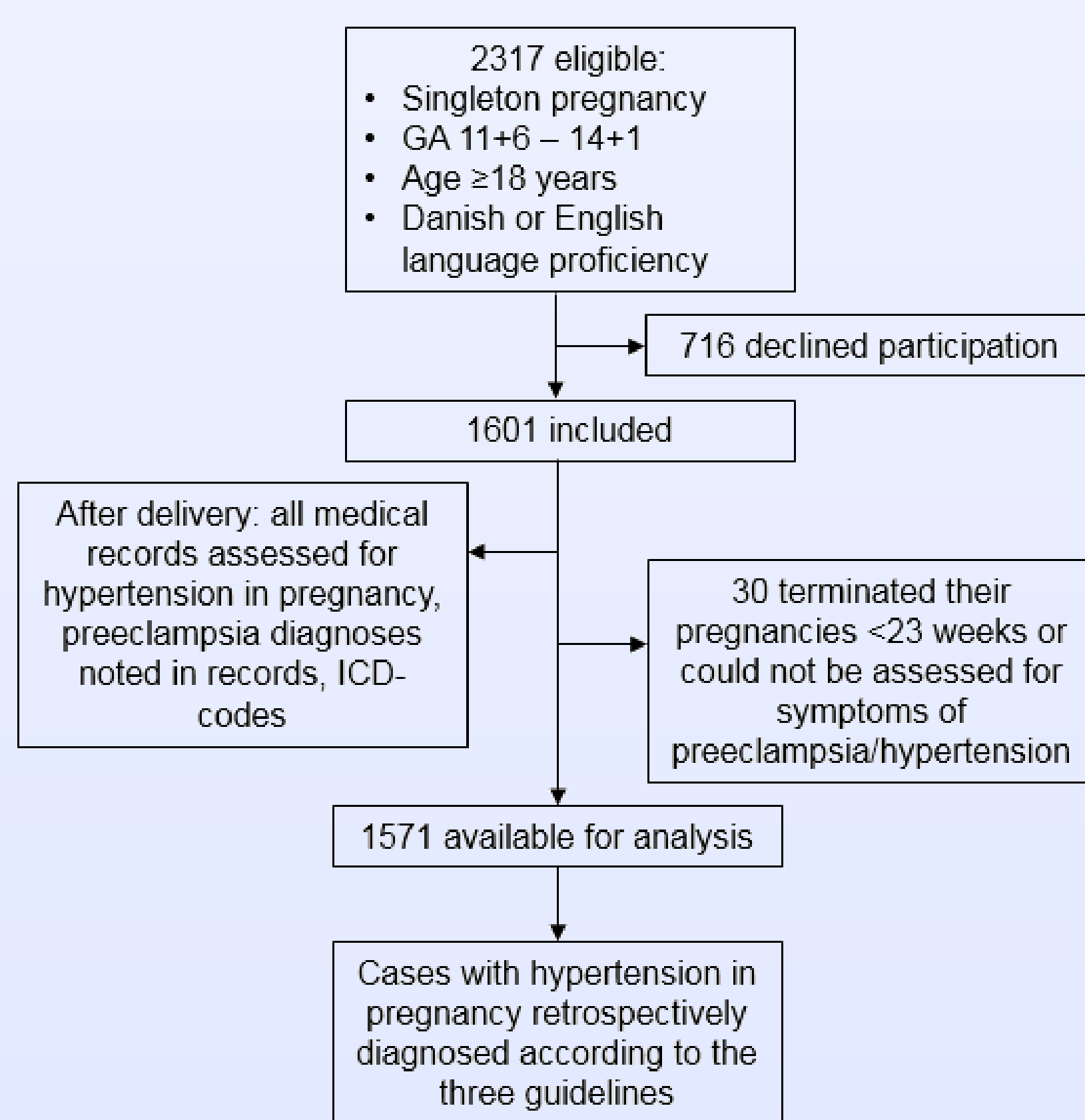
Preeclampsia incidence in Denmark has, as in other Scandinavian countries, previously been found to be low (<3.5%) according to register-based studies. Considering the changes to the diagnostic criteria of preeclampsia over time, the current differences between guidelines, and the possibility of ICD codes being misreported, this study aims to:

*Evaluate the incidence of preeclampsia and clinical presentation in a Danish cohort according to reported ICD codes, medical records, and 2018 Danish Society of Obstetrics and Gynaecology (DSOG), 2020 American College of Obstetricians and Gynecologists (ACOG), and 2018 International Society for the Study of Hypertension in Pregnancy (ISSHP) guidelines.*

## Methods

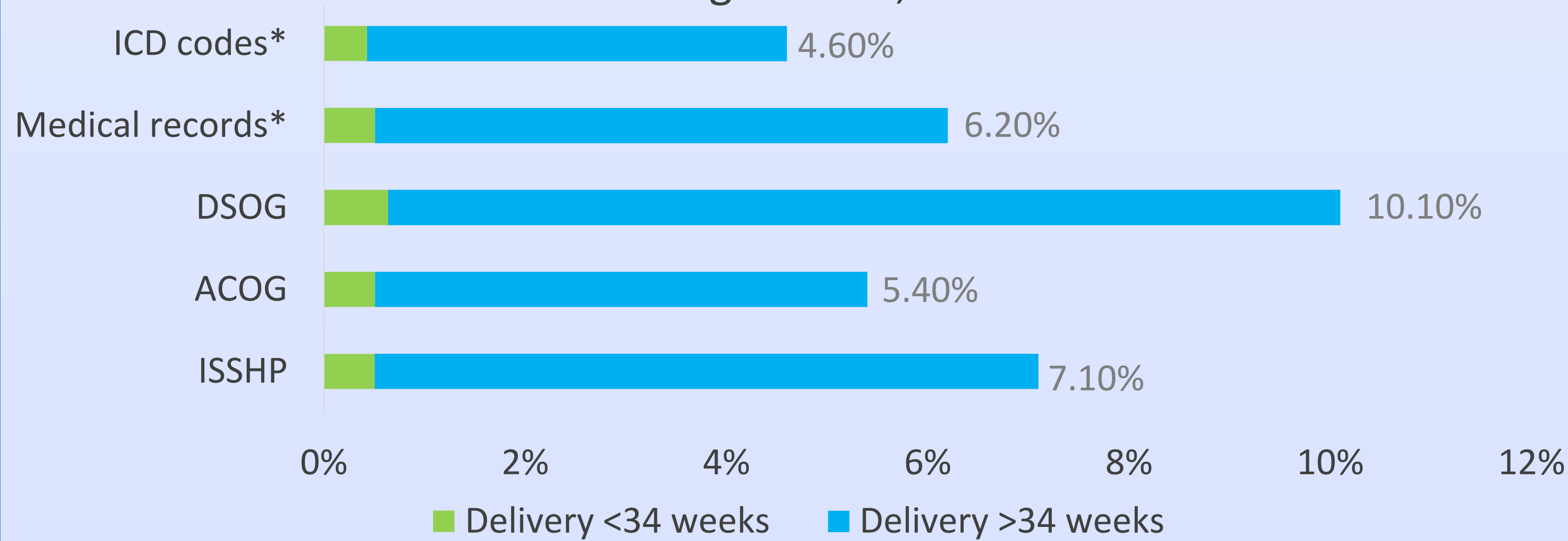
We enrolled a prospective cohort of 1,601 pregnant women who attended a routine first trimester ultrasound scan at Odense University Hospital between 14 August 2019 and 9 December 2021. The cohort formed part of a larger national study of the accuracy of screening for early-onset preeclampsia (PRESIDE; Preeclampsia Screening in Denmark).

The threshold for hypertension was defined as 140/90 measured in clinic or 135/85 measured at home. We only considered cases with at least two instances of hypertension measured >4 hours apart except in the case of blood pressure >160/110, which could be confirmed over the course of 15 minutes.



## Results: Incidence

Figure 1: Incidence of preeclampsia and its subtypes by method or guideline, n=1571



\*ICD codes and diagnoses in medical records have, in theory, been given with reference to DSOG guidelines

Figure 2A: Unanimity of preeclampsia diagnoses by all methods and guidelines

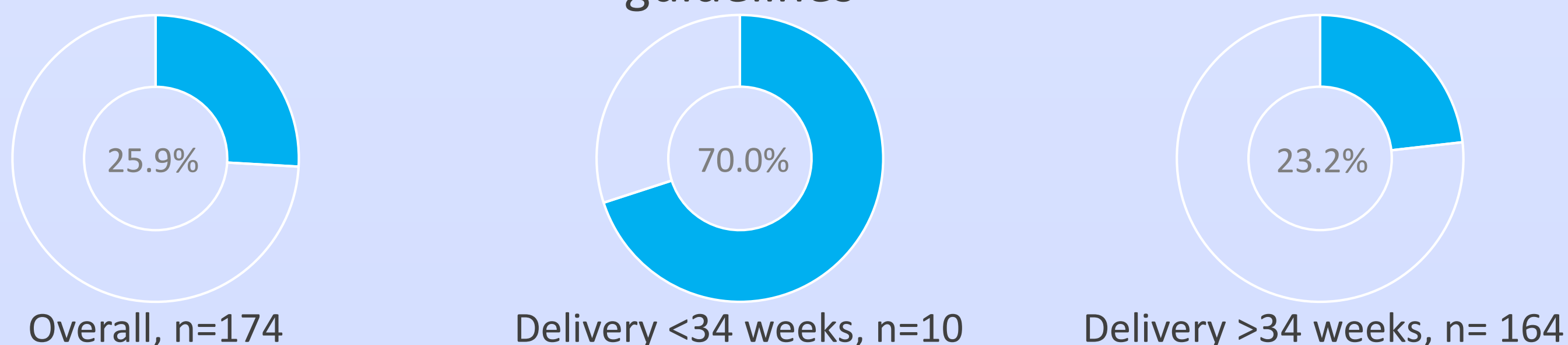


Figure 2B: Unanimity of preeclampsia diagnoses by all guidelines

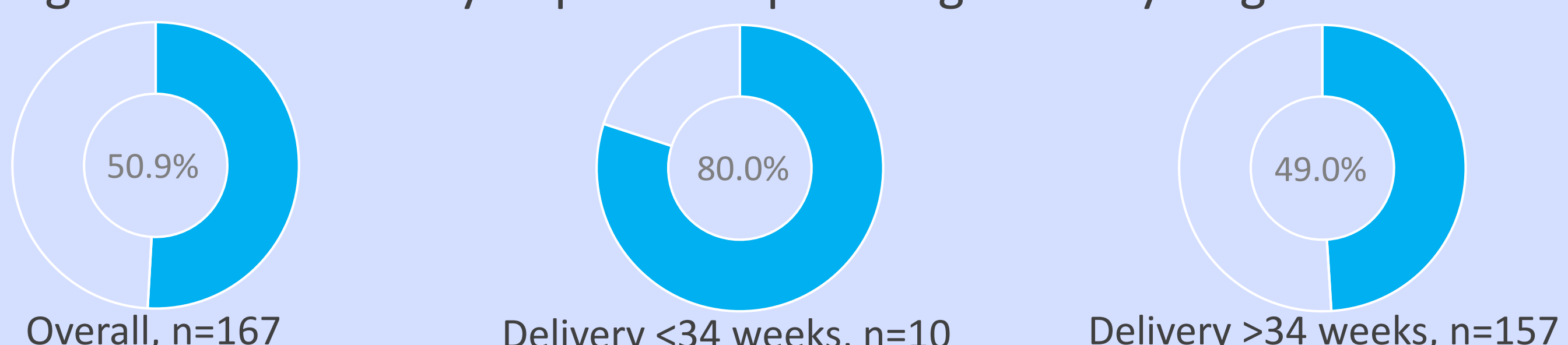


Fig. 2: Values are given as percentages relative to all cases classified as preeclampsia according to at least one of the given methods and/or guidelines. The total number of cases classified as preeclampsia according any method or guideline (n=174) includes seven cases which were either given the ICD code for preeclampsia or had received the diagnosis in their medical records without formally fulfilling the diagnostic criteria according to DSOG, ACOG, or ISSHP guidelines (n=167).

## Results: Clinical presentation

Table 1: Extra cases diagnosed by addition of diagnostic criterion

	DSOG (n=158)	ACOG (n=85)	ISSHP (n=112)
Proteinuria 1+ on dipstick (DSOG) vs 2+ (ACOG, ISSHP)	-	65 (76.5%)	55 (49.1%)
Urine albumin/creatinine ratio > 8 mg/mmol (DSOG)	-	0	0
Serum platelet count <150 x 10 <sup>9</sup> /L (ISSHP) vs <100 x 10 <sup>9</sup> /L (DSOG, ACOG)	6 (3.8%)	15 (17.6%)	-
Haemolysis, DIC (DSOG, ISSHP)	-	0	-
Serum creatinine >90 mmol/L (ISSHP) vs >100 mmol/L (DSOG, ACOG)	0	33 (38.8%)	-
Serum ALAT >40 mmol/L (ISSHP) vs >80 mmol/L (DSOG, ACOG)	3 (1.9%)	8 (9.4%)	-
Eclampsia, altered mental status, blindness, stroke, clonus, persistent visual scotomata (DSOG, ISSHP)	-	0	-
Estimated foetal weight -15% incl. chronic hypertension (DSOG)	-	11 (12.9%)	3 (2.7%)
Estimated foetal weight -15% excl. chronic hypertension (ISSHP)	-	7 (8.2%)	-
Abnormal umbilical artery Doppler, stillbirth (ISSHP)	0	2 (2.4%)	-
Pulmonary oedema (DSOG, ACOG)	-	-	0

Figure 3: Severe manifestations of preeclampsia

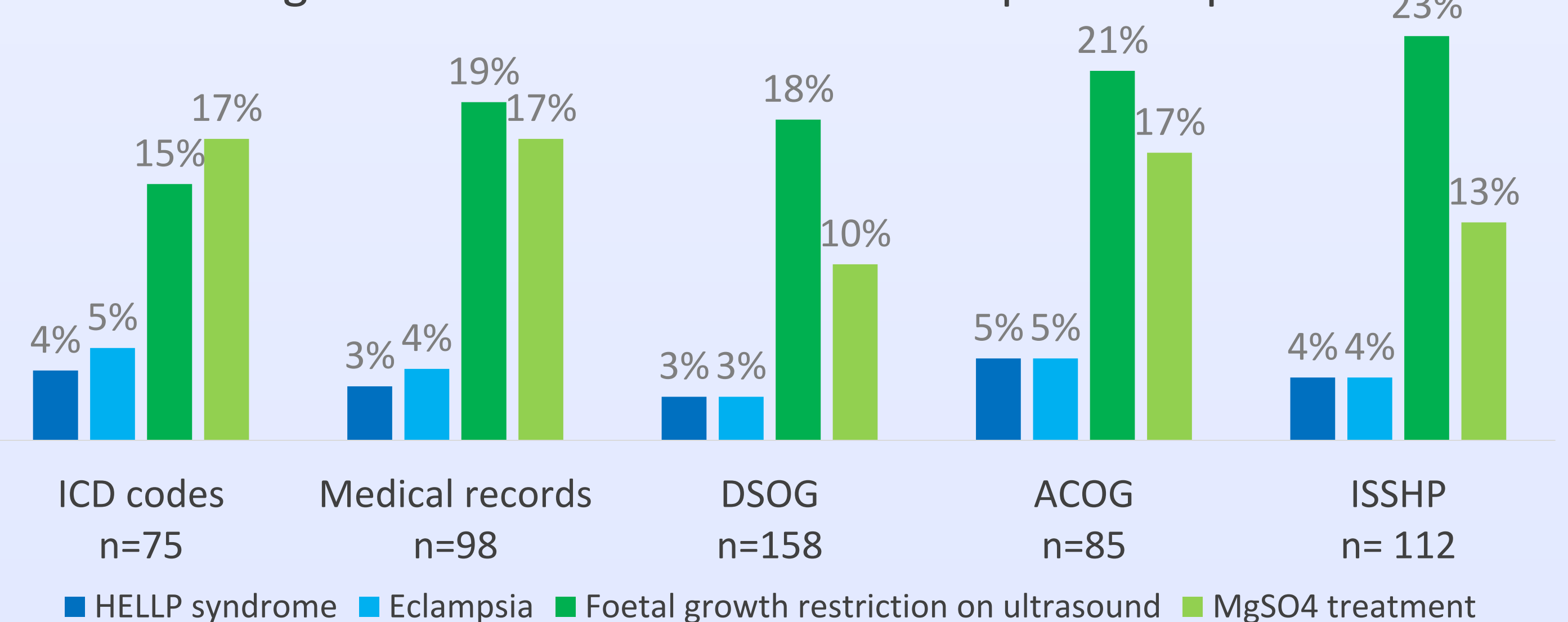


Fig. 3: Values are given as incidence rates relative to number of cases classified as preeclampsia according to each method or guideline.

Figure 4: Antihypertensive treatment and ICD codes for hypertension in pregnancy

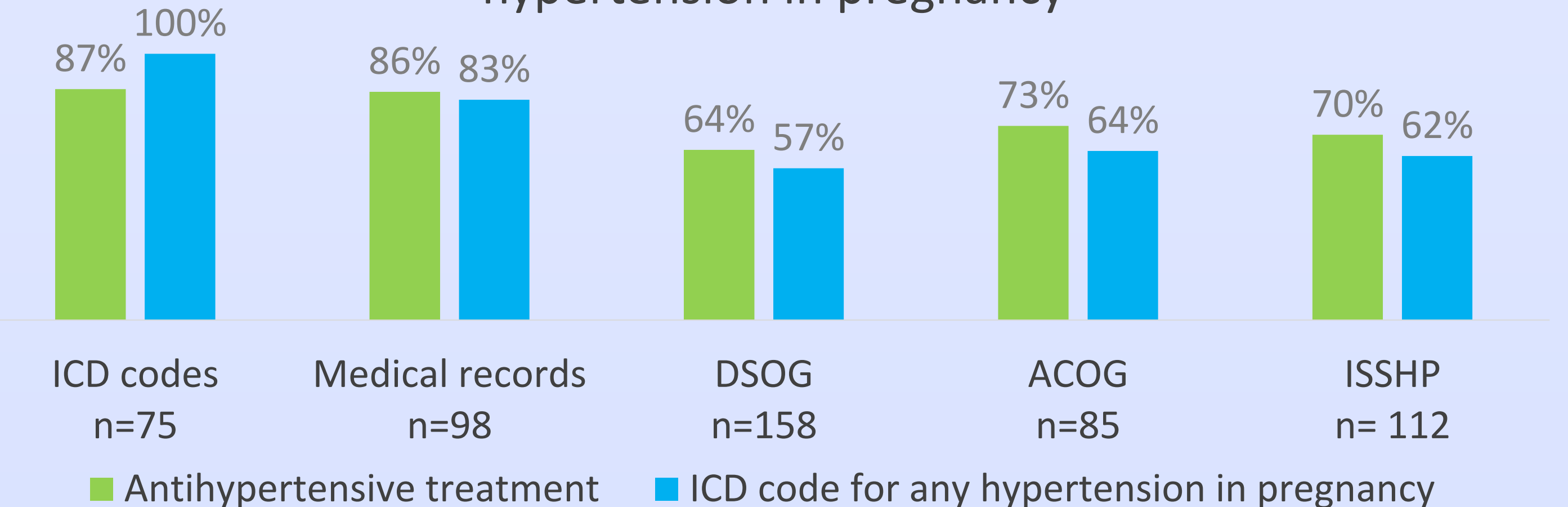


Fig. 4: Values are given as percentages of each case group which a) received any antihypertensive treatment in pregnancy and b) were given an ICD code signifying any hypertensive disorder in pregnancy.

## Strengths and limitations

- Representative sample with 69% participation and 0.3% loss to follow-up
- Small sample, which did not allow detection of differences in outcomes with low incidence (e.g., HELLP syndrome, eclampsia)
- Retrospective diagnoses based on literal interpretations of diagnostic criteria with no clinical assessment

## Conclusions

- Incidence rates of preeclampsia vary considerably depending on method of data collection and diagnostic criteria used, with incidence according to reported ICD codes being the lowest
- Disagreement between diagnoses is more pronounced in cases with delivery closer to term and is mostly caused by differences in thresholds for significant proteinuria, followed by serum creatinine and platelet count
- ICD codes for preeclampsia are relatively underreported in the cohort, seemingly mainly due to insufficient diagnosis of cases with milder phenotypes