Data Linkage For Pharmacovigilance Using Routinely Acquired Electronic Health Records

Brad Kirby[1,3], Colin Simpson[2], Peter Helms[1], Marion Bennie[3], Rachael Wood[3], James McLay[1]

1. Department of Child Health, The University of Aberdeen
2. eHealth Research Group, Centre for Population Health Sciences, The University of Edinburgh.
3. Information Services Division (ISD) Scotland

Background

- Adverse Drug Reactions (ADRs) are a Problem
- High cost to NHS
- Current Pharmacovigilance limitations
- Additional methods required
- Data linkage using routine data

Child Medical Records for Safer Medicines (CHIMES)

- Acceptability and validity of datasets derived from linked routinely acquired NHS data for post marketing surveillance of medicines in children

Work Package 1	Work Package 2	Work Package 3
User Communities	*Evidence Synthesis*	*Pharmacovigilance*

UNIVERSITY OF ABERDEEN

ISD SCOTLAND

NHS Grampian

CHIEF SCIENTIST OFFICE

Child Medical Records for Safer Medicines (CHIMES)

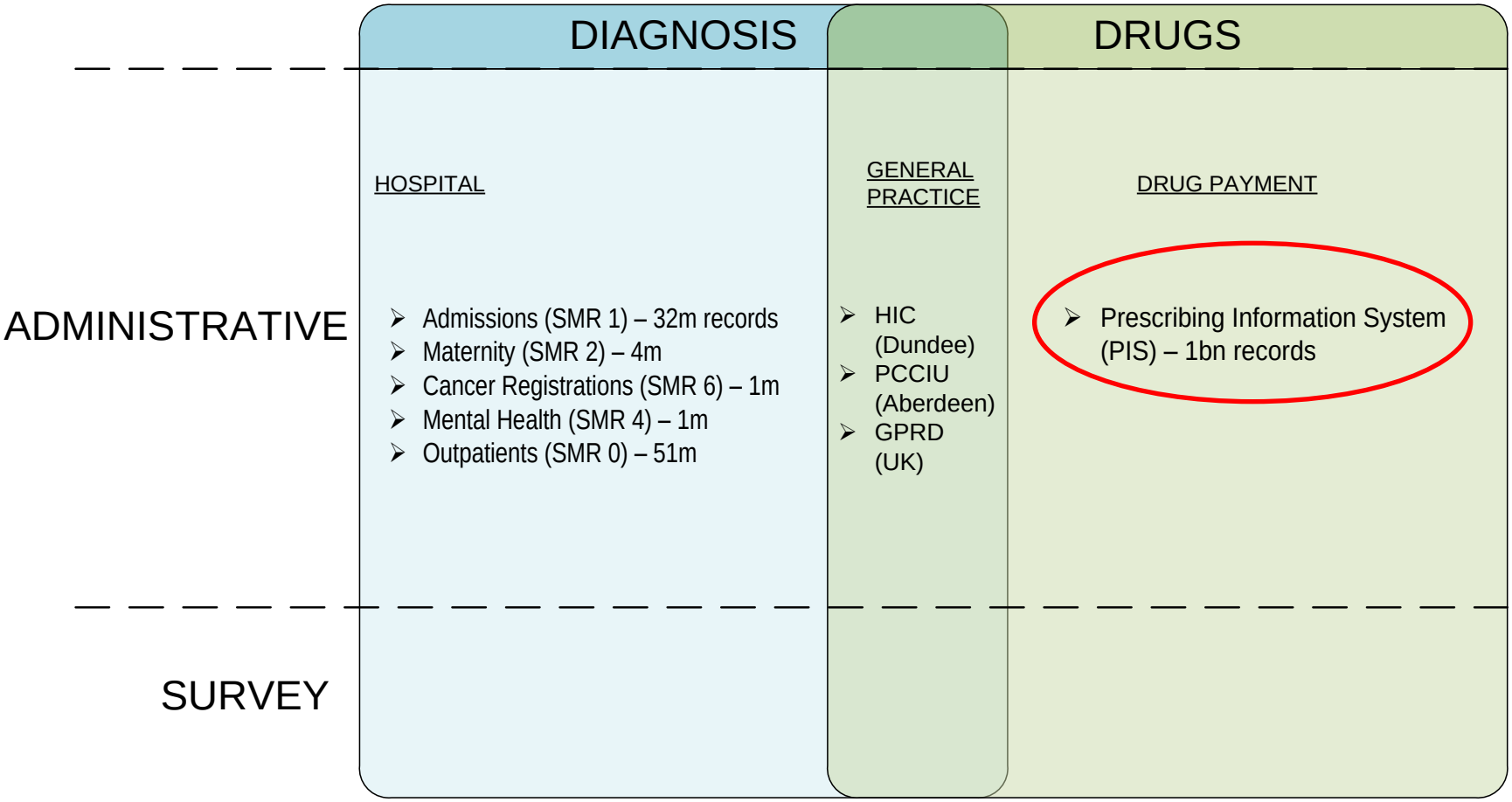
- Accuracy and validity of routinely acquired linked NHS data to support a routine mechanism for post marketing surveillance of medicines in children

Work Package 1	**Work Package 2**	Work Package 3
User Communities	*Evidence Synthesis*	*Pharmacovigilance*

Research Questions

- What routine NHS data are available for post market drug surveillance?
- What's the best way to link data to support Pharmacovigilance and Pharmacoepi?
- How accurate are the data?

What routine NHS data are available for post market surveillance?



Measuring Error in Databases

RELIABILITY	AGREEMENT	VALIDITY (ACCURACY)
Same source used more than once for the same individual -> Comparison of these results -> Not validity!	Different sources compared, without one being distinctly 'superior' -> Not validity or reliability!	Different sources compared, one being distinctly 'superior' (gold / 'alloy' gold standard) -> Sensitivity (aka completeness) -> Specificity

West. *Pharmacoepidemiology* 2005; 45:709-765.

Measuring Error in Databases

SENSITIVITY

Degree to which inferior data source correctly identifies individuals who, according to the superior data source, **have the characteristic of interest**

-> Completeness

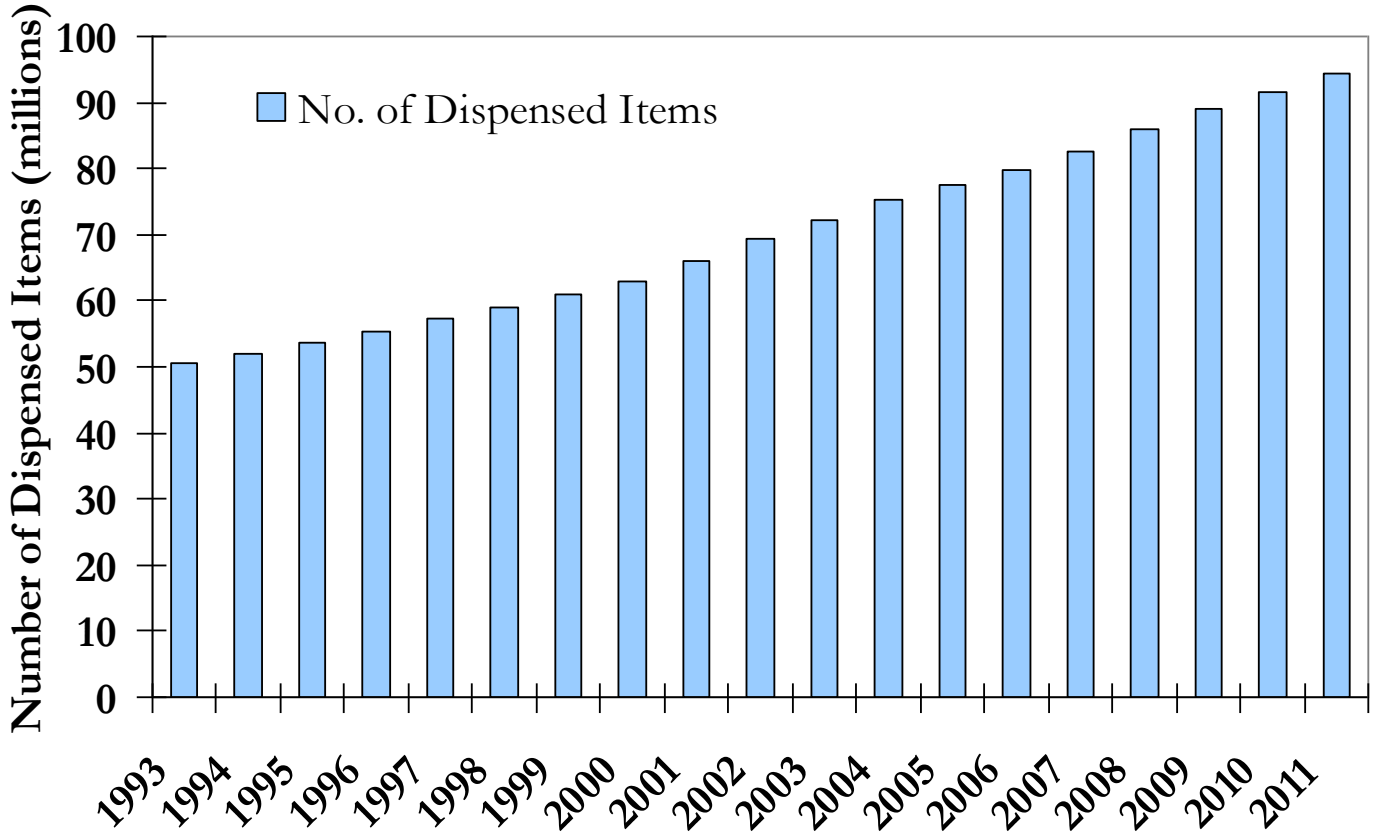
SPECIFICITY

Degree to which the inferior data source correctly identifies individuals who, according to the superior data source, **don't have the characteristic of interest**

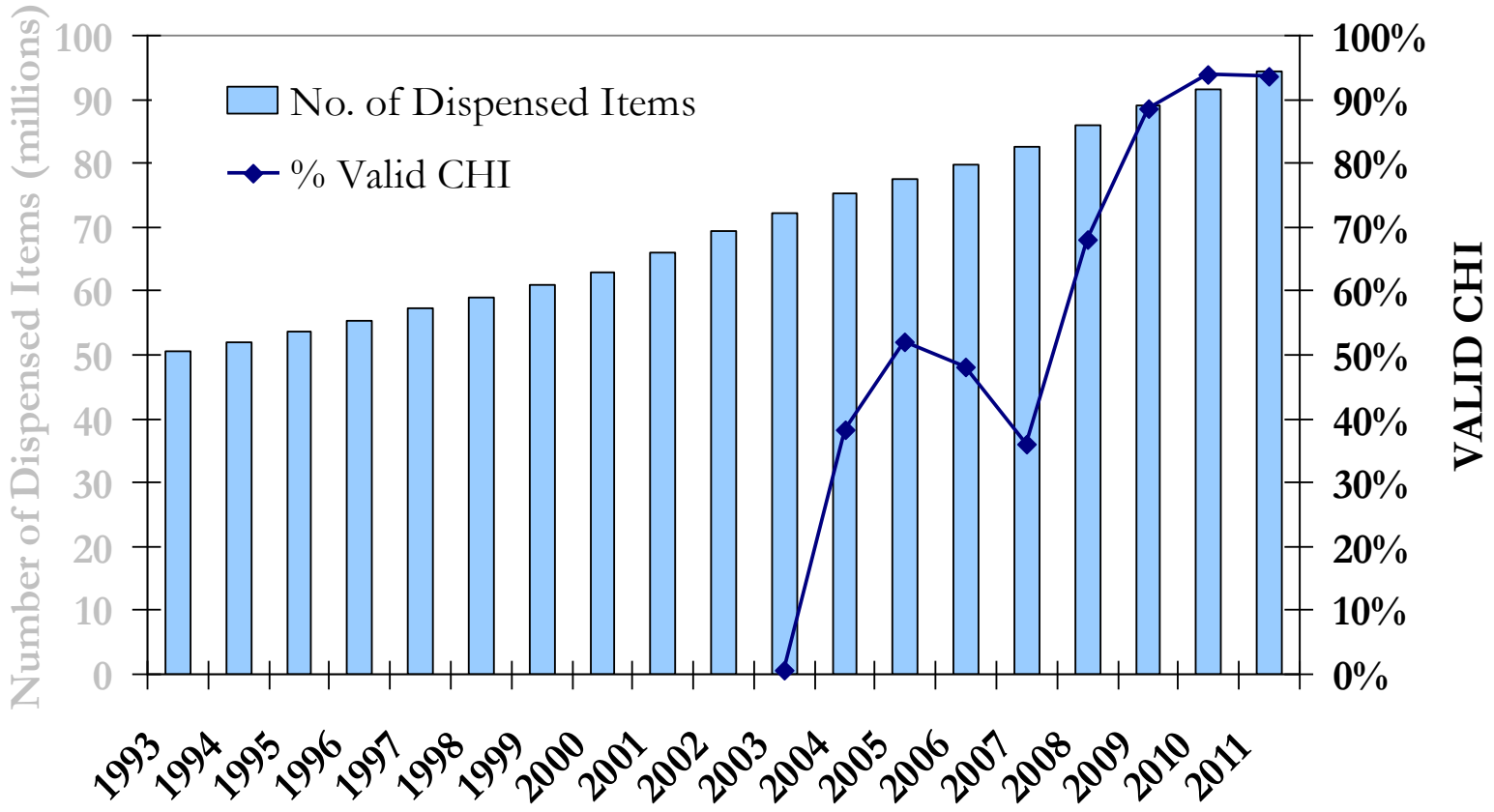
One may be more important than the other, depending on the study

West. *Pharmacoepidemiology* 2005; 45:709-765.

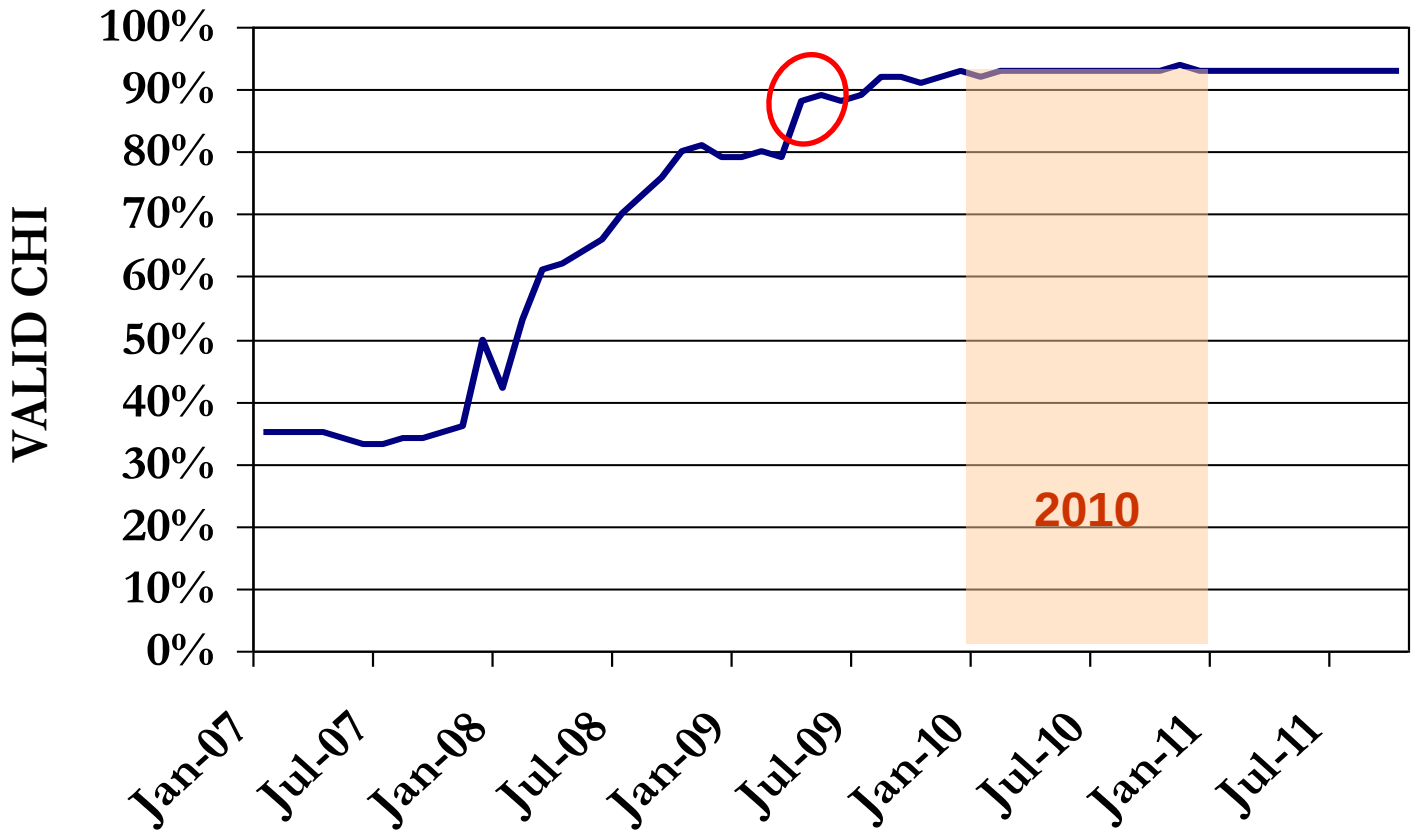
Number of items dispensed in the community in Scotland



Percentage of dispensed items with a unique patient identifier



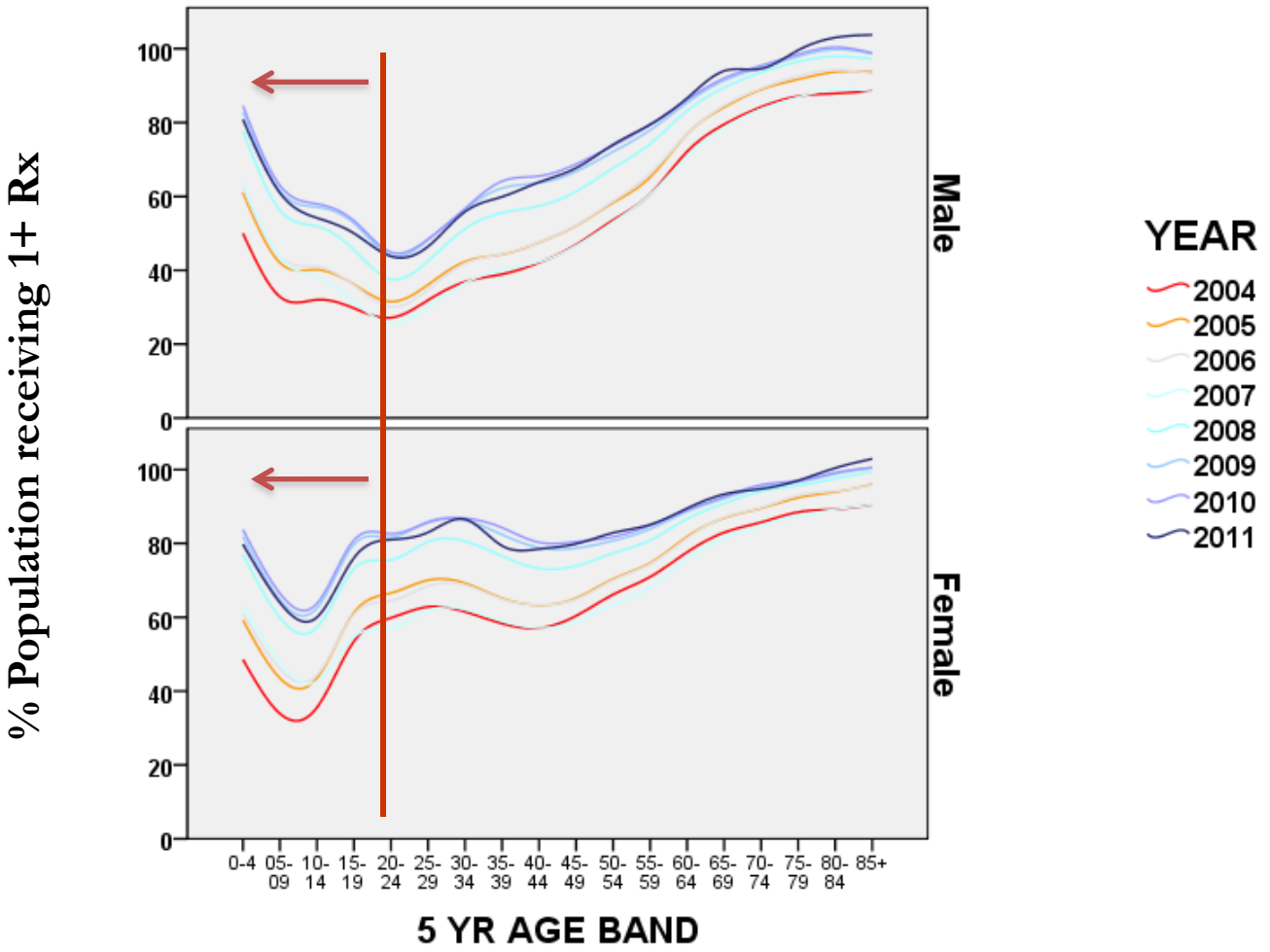
Percentage of dispensed items with valid CHI



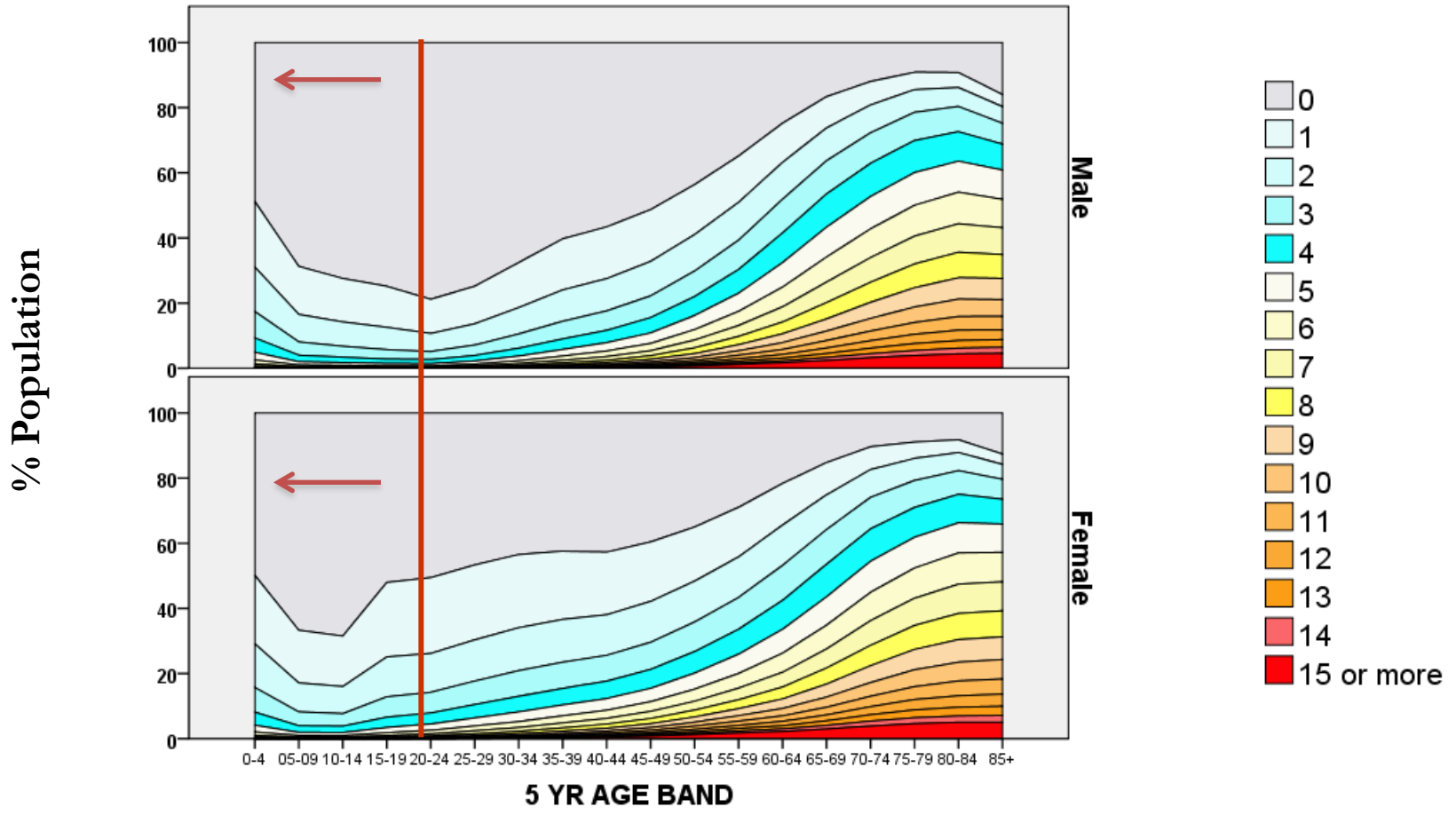
Reliability

-> Same source

Same shape occurs year on year. Typically, males receive less medication than females…



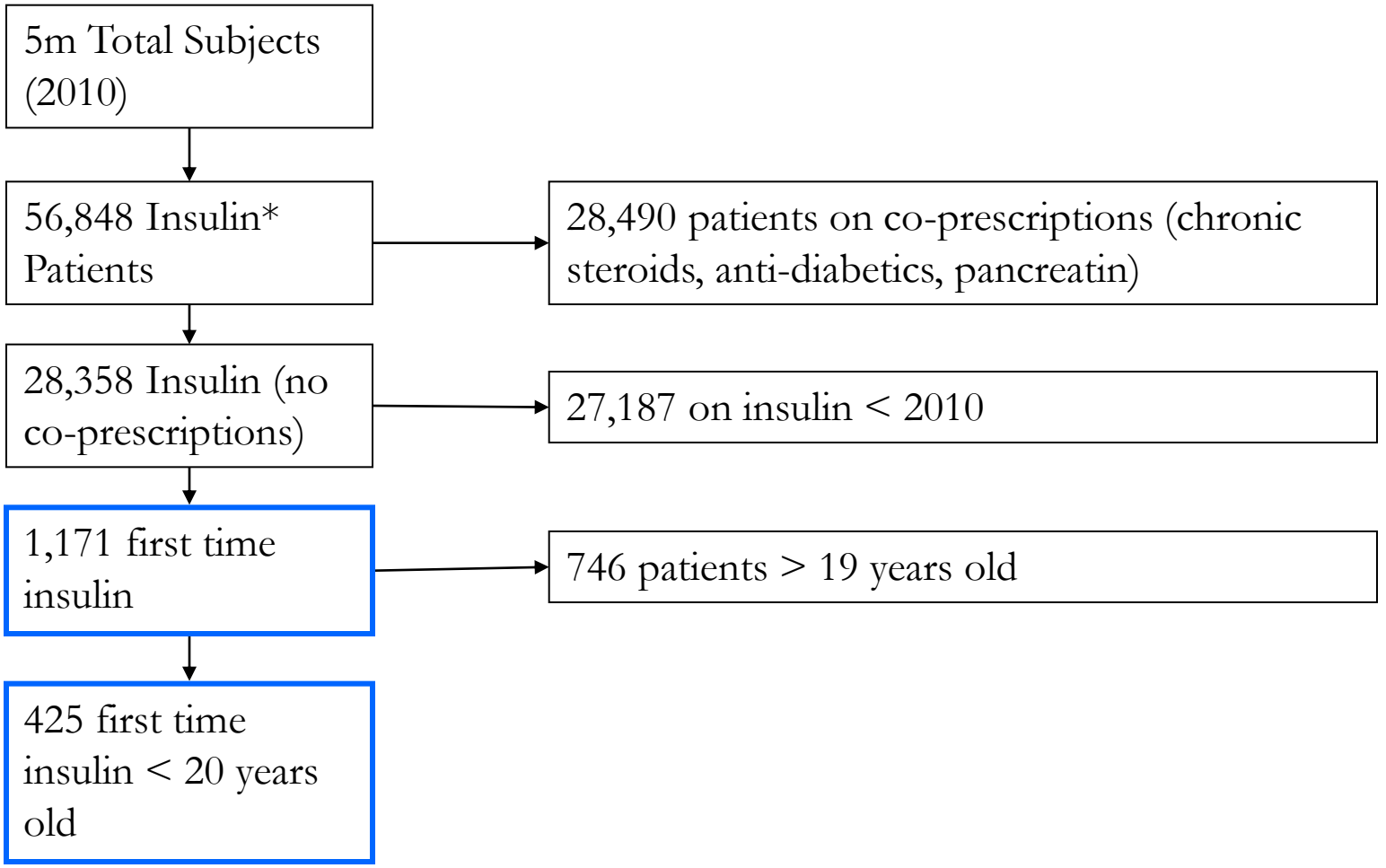
Number of drug classes dispensed in Scotland (Oct – Dec 2010)



Agreement

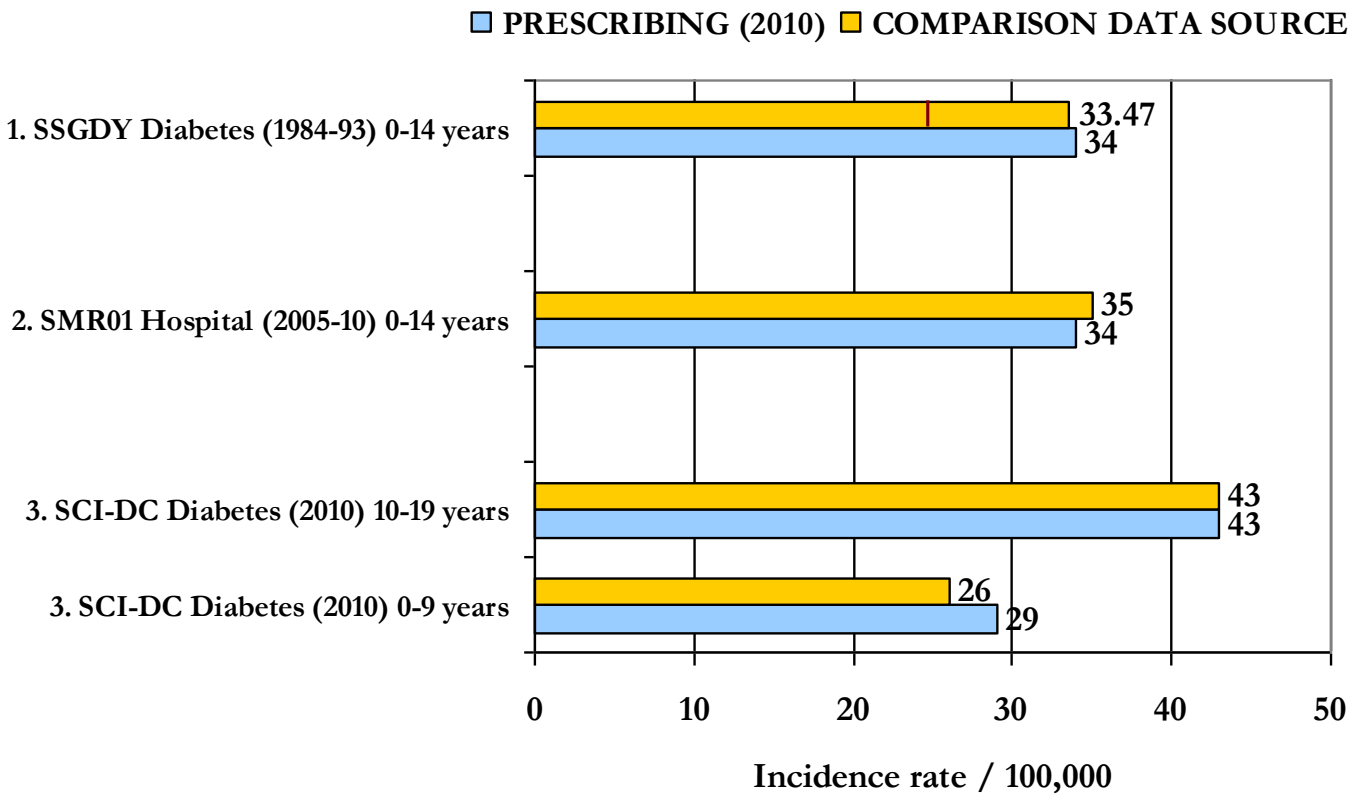
-> Different sources

Insulin prescribing can act as a proxy for type 1 diabetes in children



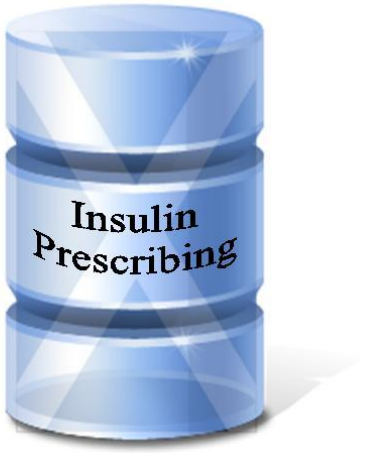
* Short acting; intermediate and long acting insulins

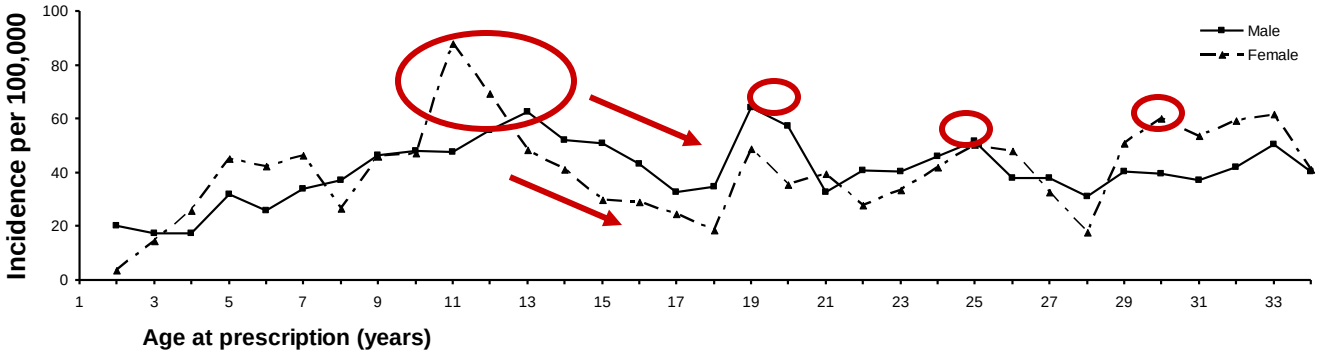
Insulin prescribing compared to T1 diabetes in Scotland

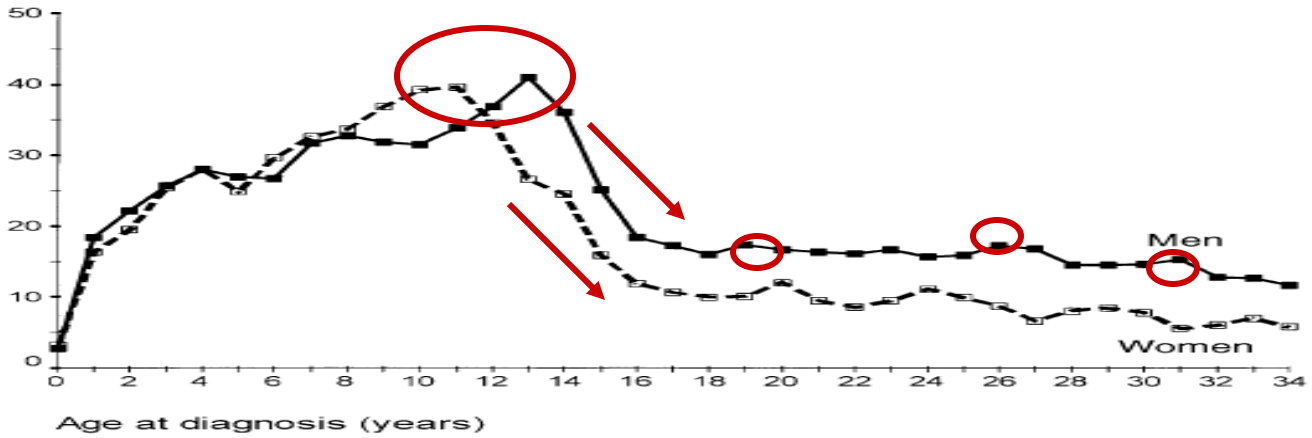


1. Rangasami. *Arch Dis Child* 1997;77(3):210-213. | 2. NHS National Services Scotland - ISD Scotland. Inpatient, Day Case and Outpatient Activity. 2011. | 3. The Scottish Diabetes Survey. 2010.

Insulin prescribing compared to T1 diabetes outside Scotland







Pundziute-Lycka. *Diabetologia* 2002;45(6):783

Validity

-> Different sources (using a gold standard)

Validity – Data Linkage

		Diagnosed diabetes in hospital (SMR1 'alloy' gold) < 20 years old (2010)	
		Y	**N**
Prescribed insulin < 20 years old (2007-11)	**Y**	**A) 1,020**	B) 4,155
	N	**C) 38**	D) 89,097

Sensitivity (A/(A+C)) = 96%

Specificity (D/(B+D)) = X%

SUMMARY

- Reliable – consistent & expected patterns year on year
- Agreement – patterns of insulin prescribing & T1 diabetes
- Valid – 96% hospitalised diabetics can be identified via their prescription records
- Routine prescribing data useful for post market surveillance of medicines in children

Future Work

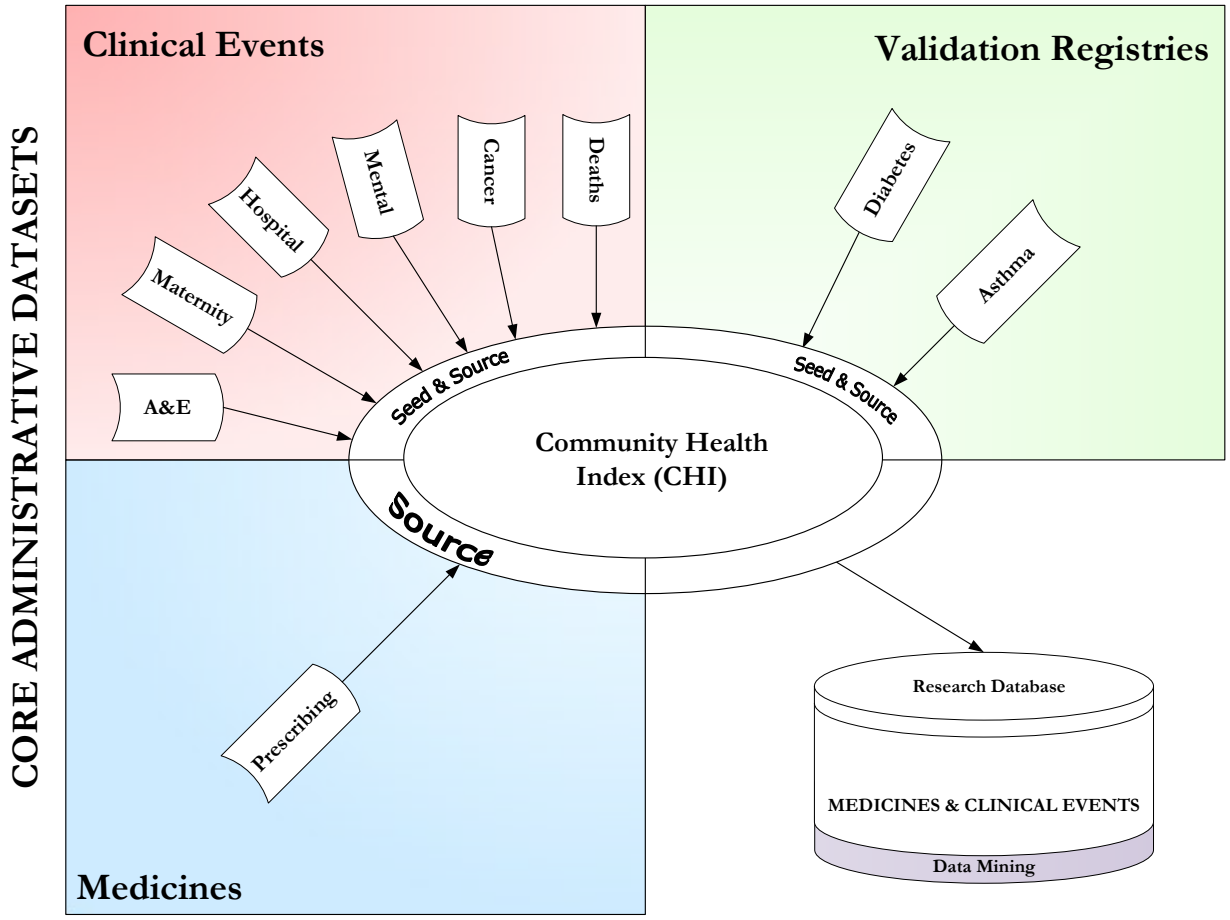
- Repeat measures using different disease sample (e.g. Asthma)
- Assess generalizability of results
- Publish validity of routinely collected national prescribing data in Scotland
- Continue working with ISD to build a platform for national Pharmacoepidemiology

END OF PRESENTATION

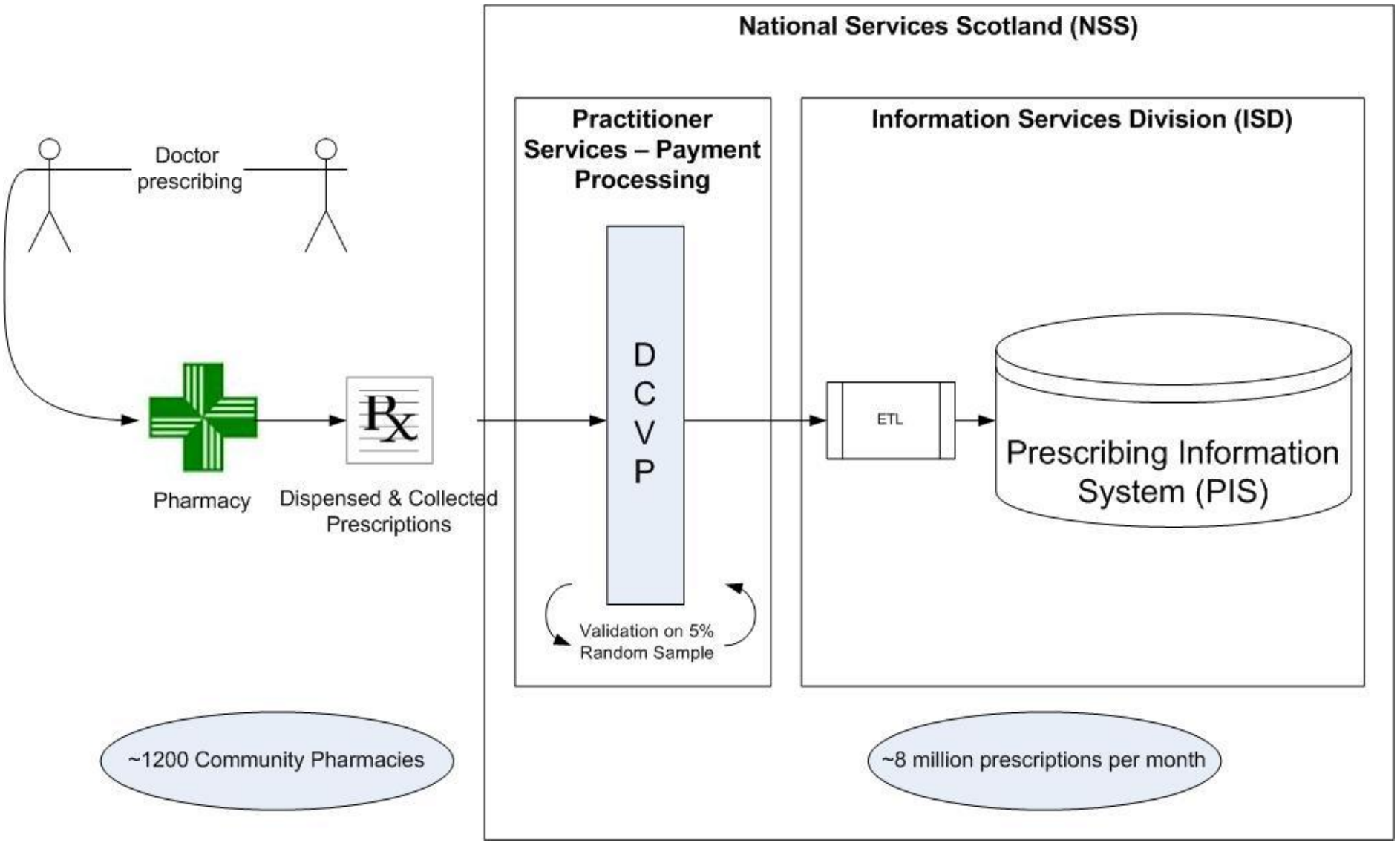
CHIMES acknowledges the financial support of the Chief Scientist Office

Brad Kirby – Child Medical Records for Safer Medicines

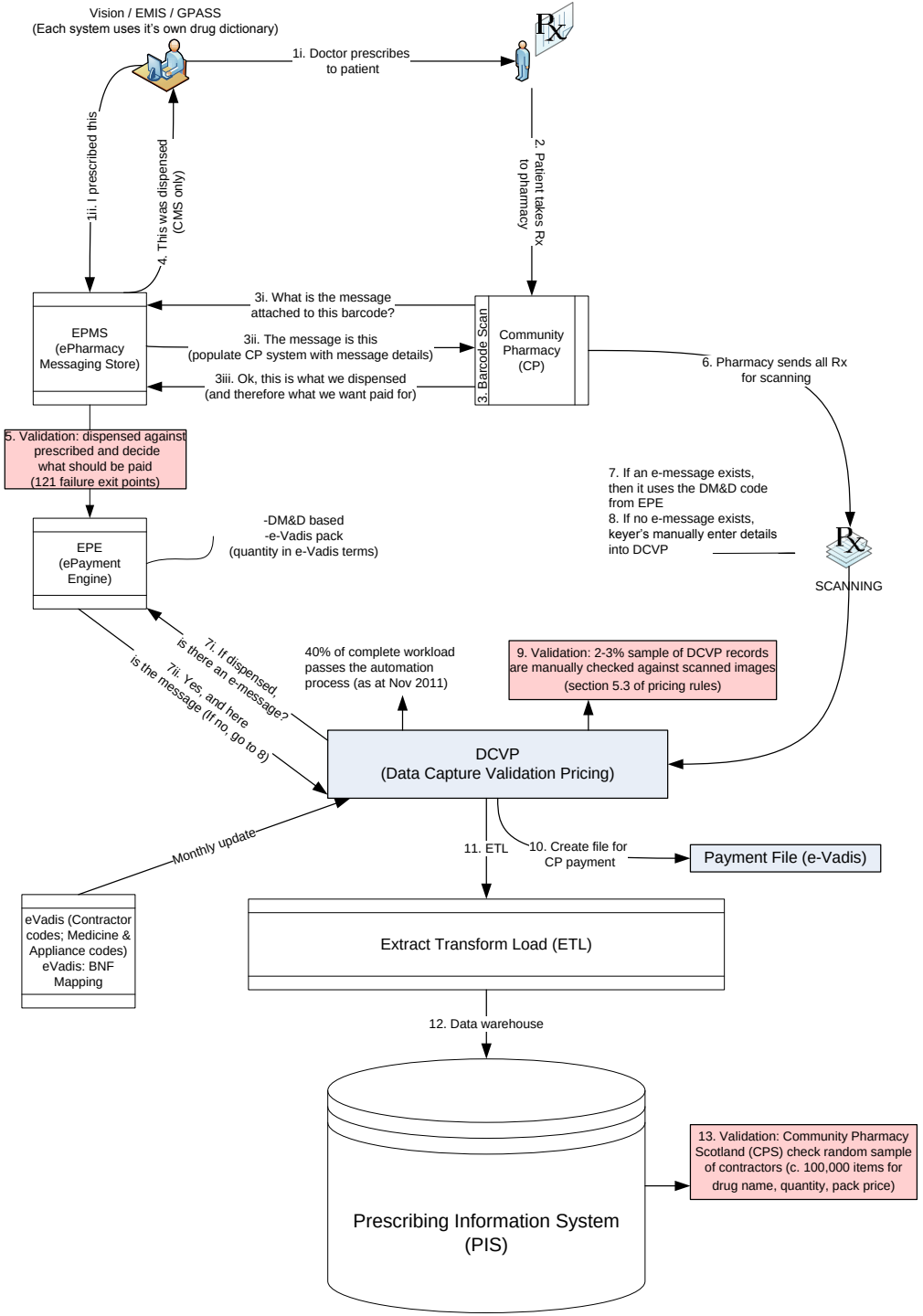
Index based pharmaco-epi in Scotland (whole pop)

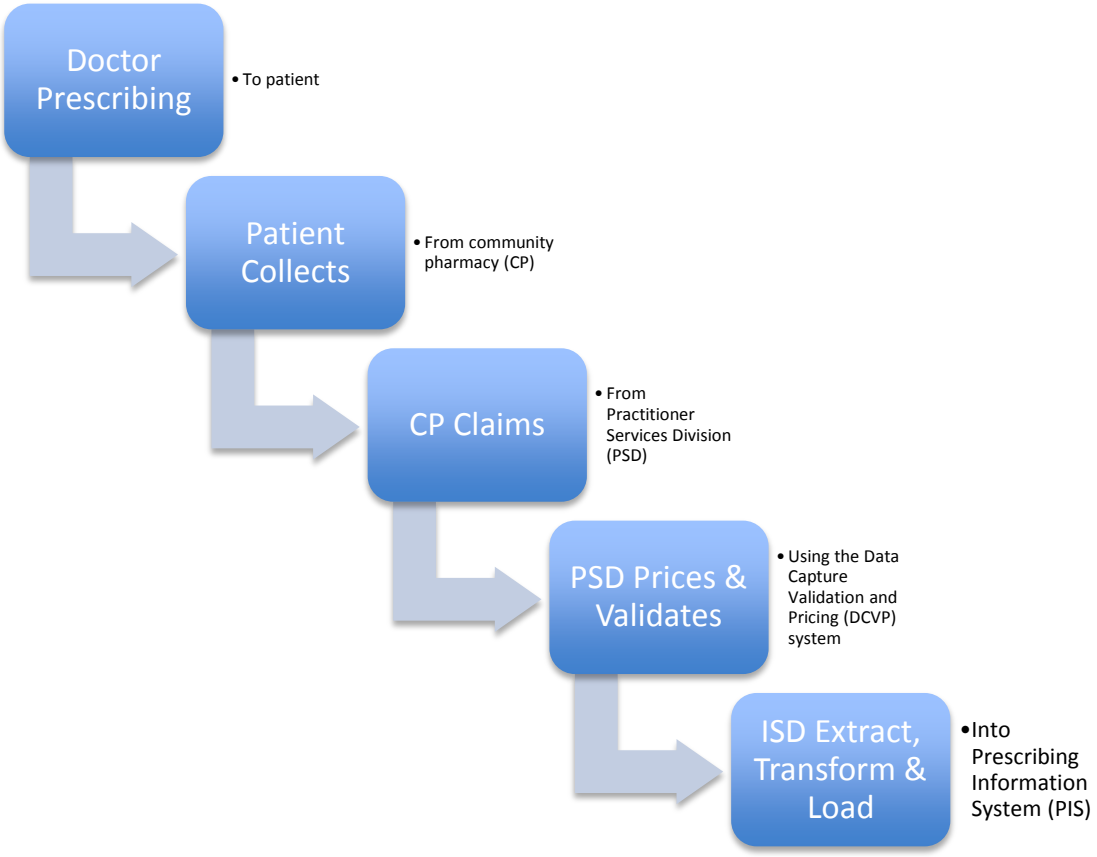


Data flow into the Prescribing Information System:



Data flow into the Prescribing Information System (Detailed):




Doctor Prescribing
• To patient
Patient Collects
• From community pharmacy (CP)
CP Claims
• From Practitioner Services Division (PSD)
PSD Prices & Validates
• Using the Data Capture Validation and Pricing (DCVP) system
ISD Extract, Transform & Load
• Into Prescribing Information System (PIS)

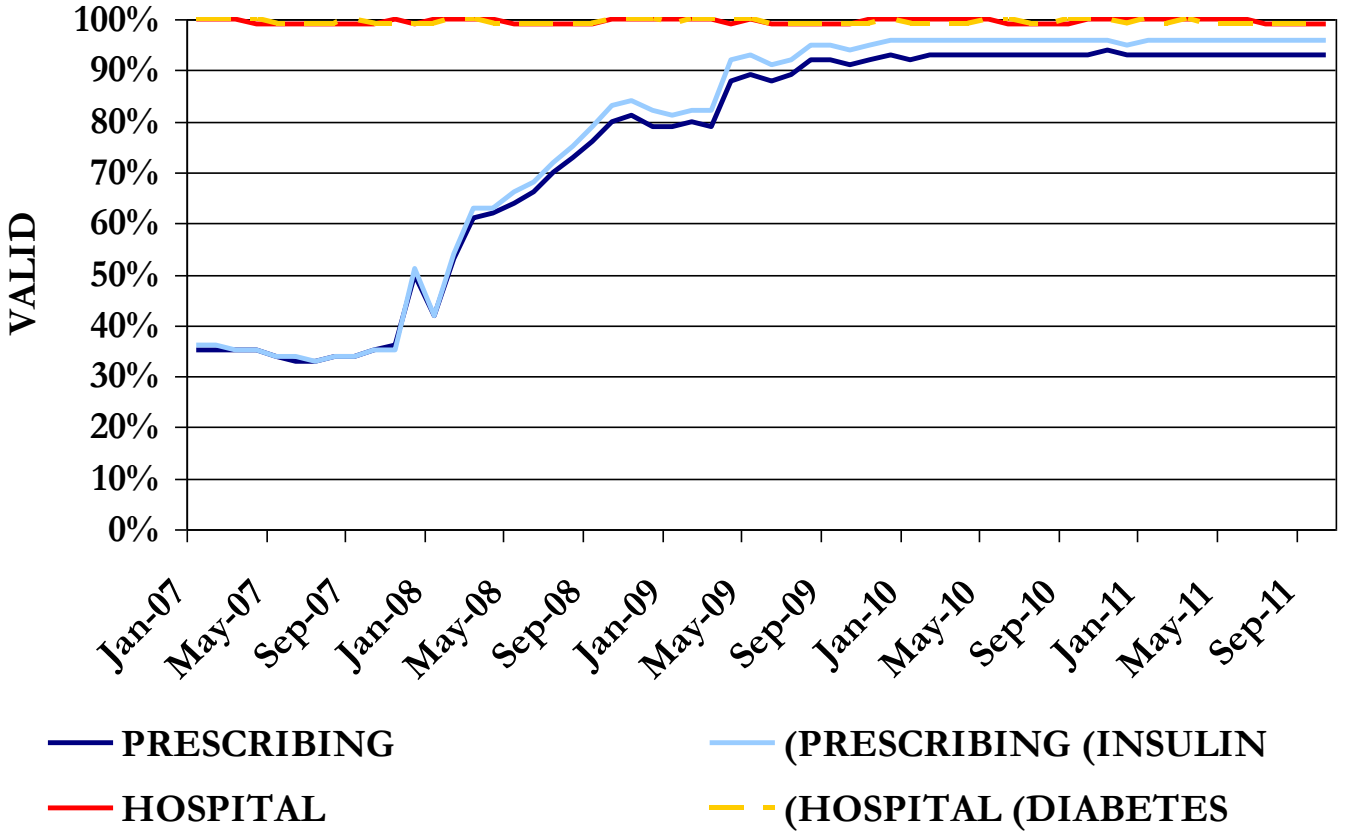
Routine Datasets (Fields for linkage)

	EVENTS							MEDICINES	
	Hospital discharges	Cancer Reg	Deaths	Mental Health	OP	Maternity	A&E	Prescr.	E-Pharm
Seeded Chi Number	✓	✓	✓	✓	✓				
CHI Number	✓	✓		✓	✓	✓ (mother & baby)	✓	✓	✓
Surname	✓	✓	✓	✓	✓	✓			✓
Forename	✓	✓	✓	✓	✓	✓			✓
Date of Birth	✓	✓	✓	✓	✓	✓			✓
Sex	✓	✓	✓	✓	✓	✓			✓
Marital status	✓	✓	✓	✓	✓	✓			
Postcode	✓	✓	✓	✓	✓	✓	✓	✓	✓

Routine Datasets (Fields for analysis)

	EVENTS							MEDICINES	
	Hospital discharges	Cancer Reg	Deaths	Mental Health	OP	Maternity	A&E	Prescr.	E-Pharm
Condition	✓	✓	✓	✓	✓	✓	✓		
Procedure	✓				✓	✓			
Drug								✓	✓
Demographics	✓	✓	✓	✓	✓	✓	✓	✓	✓

Percentage of dispensed items and hospital episodes with valid CHI



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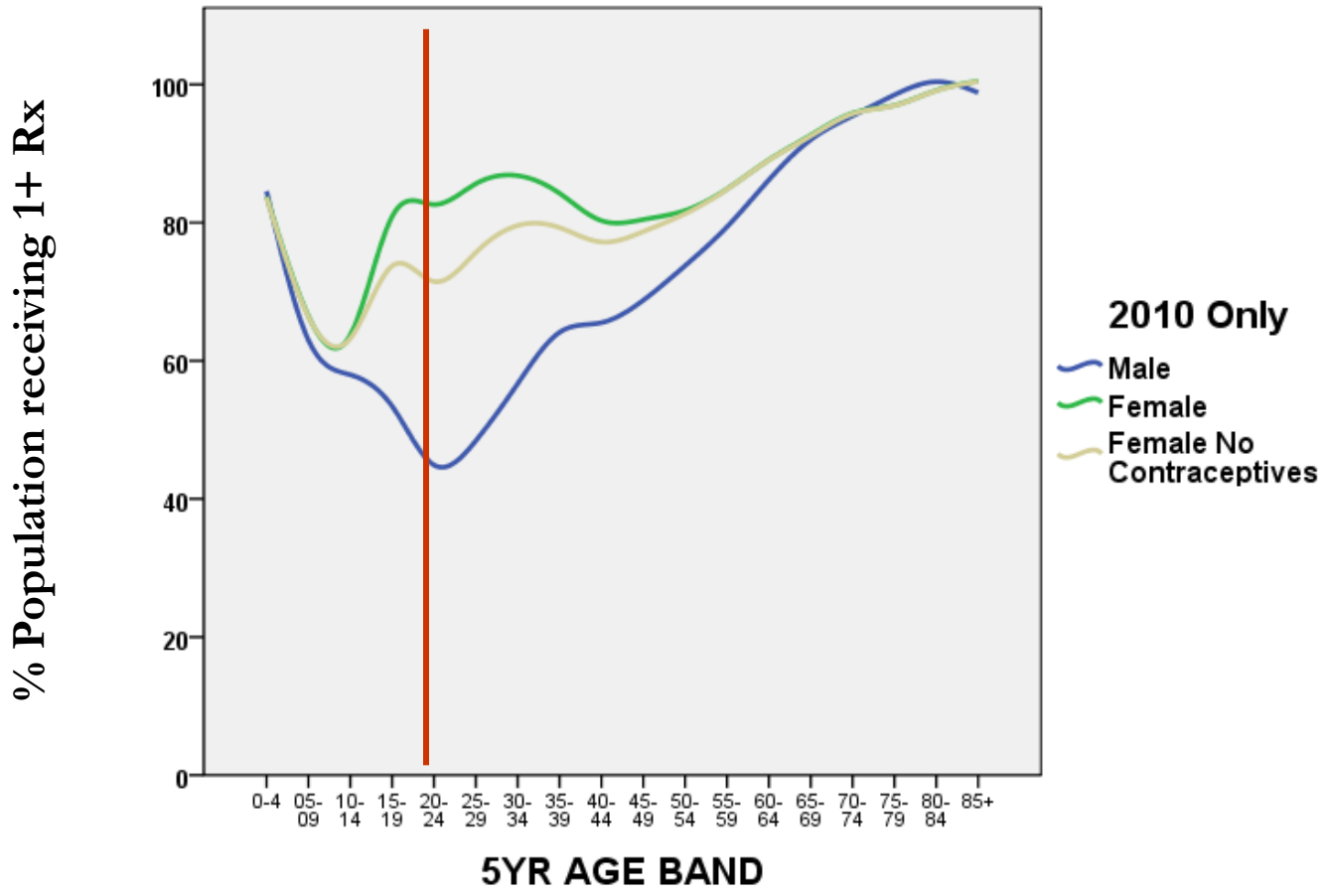

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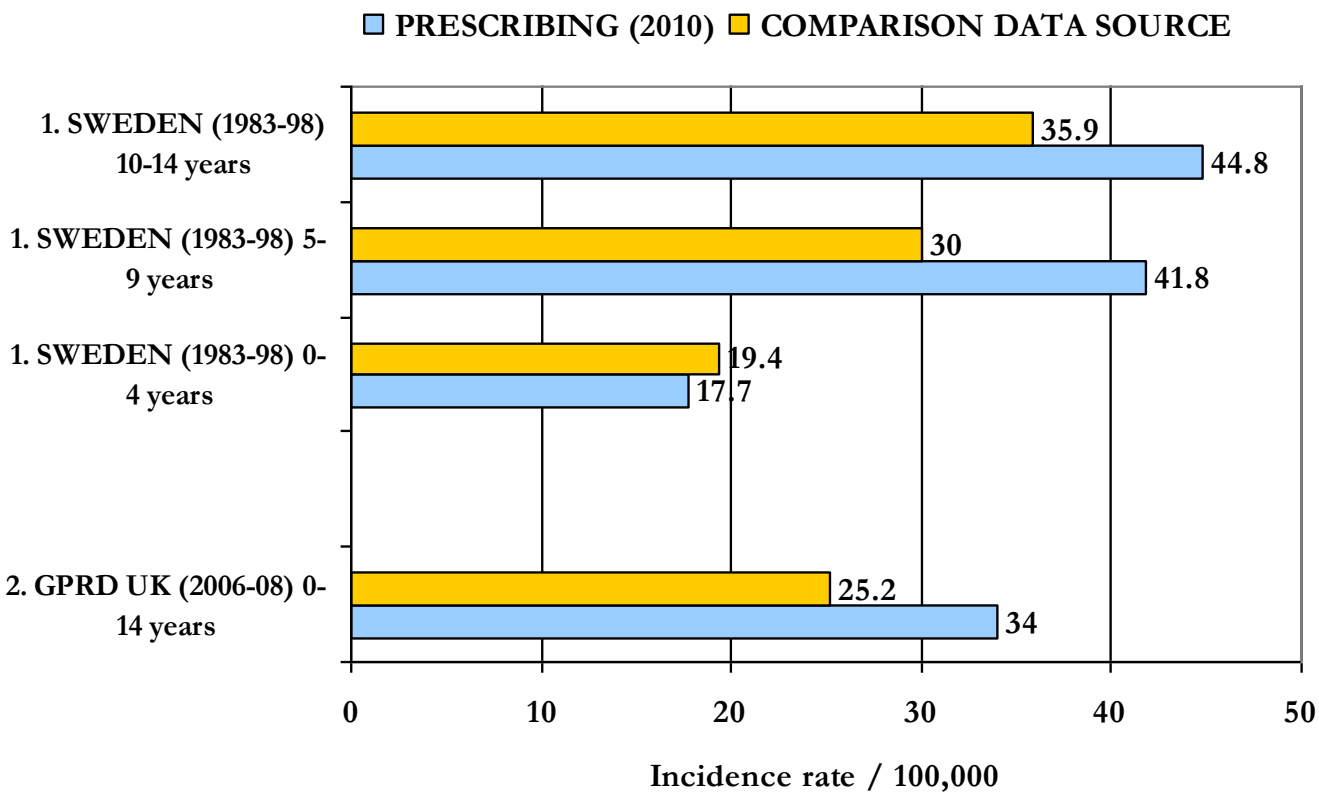

1. Pundziute-Lycka. *Diabetologia* 2002;45(6):783. | 2. Imkampe. Diabet Med 2011;28(7):811.