The Scottish HPV vaccine programme - why is it a success story?

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Cervical cancer by deprivation Scotland

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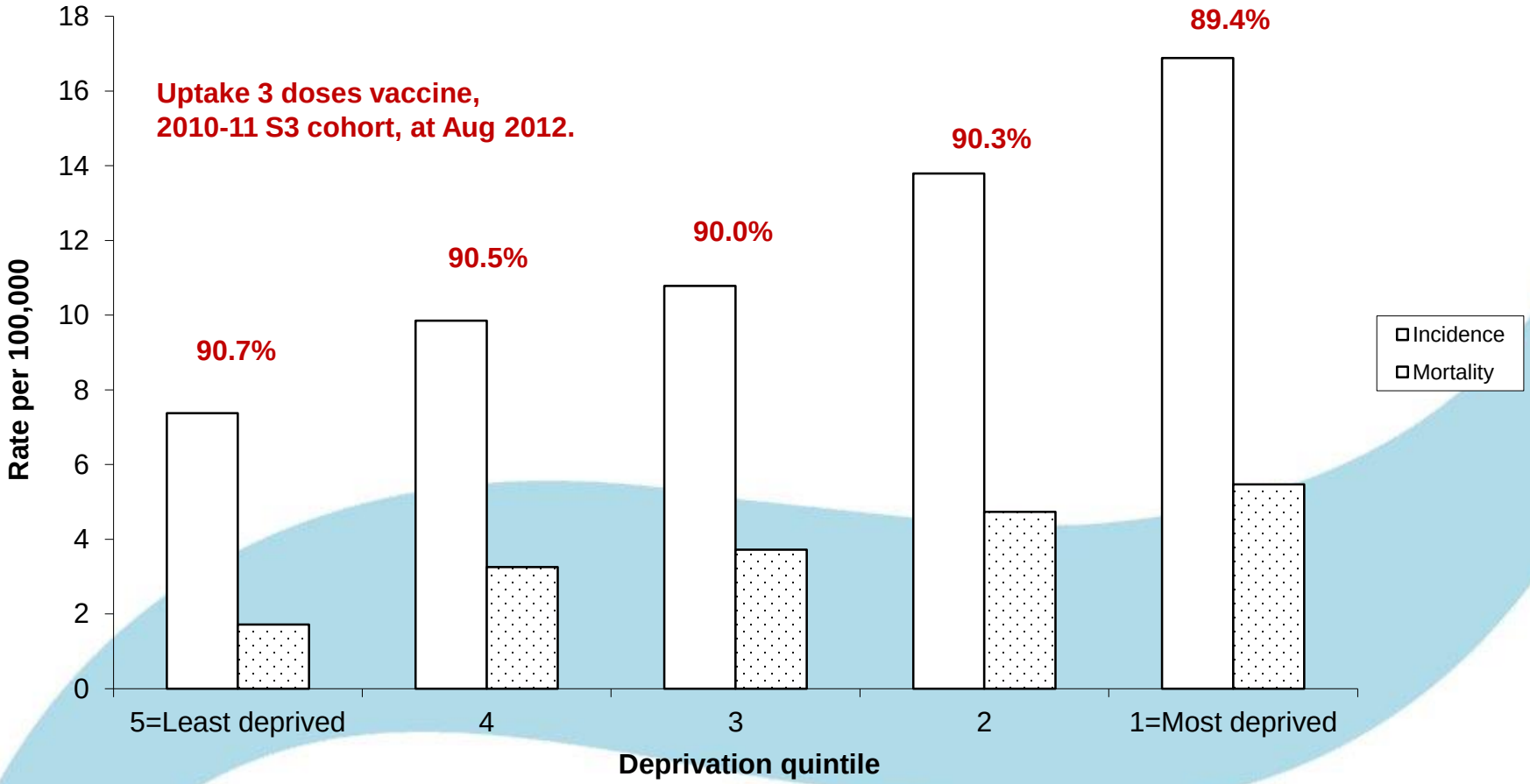
Cancer of the cervix uteri (ICD-10 C53)
Age-standardised incidence and mortality rates by SIMD 2012 deprivation quintile



HPV vaccines in Scotland

- Girls aged 12-13 (S2) routinely immunised from September 2008
- Catch-up campaign for girls up to 18 (2008-2011)
  - Some of these may have had prior HPV exposure

- Bivalent
  - HPV 16 and 18 — Sept 2008-Aug 2012
  - AS04-type adjuvant

- Quadrivalent
  - HPV 6, 11, 16 and 18 — Sept 2012- present
  - Alum adjuvant

Vaccine uptake

S2 in school year	% Uptake		
	Dose 1	Dose 2	Dose 3
2008/09	94.5	93.8	92.4
2009/10	93.6	92.5	90.9
2010/11	92.9	92.0	90.1
2011/12	94.2	93.4	91.4
2012/13	94.4	93.4	91.4
2013/14	94.4	92.5	88.8

Source:
CHSP/SIRS

- Routine uptake > 90%

- Catch-up vaccine uptake from 65-75%

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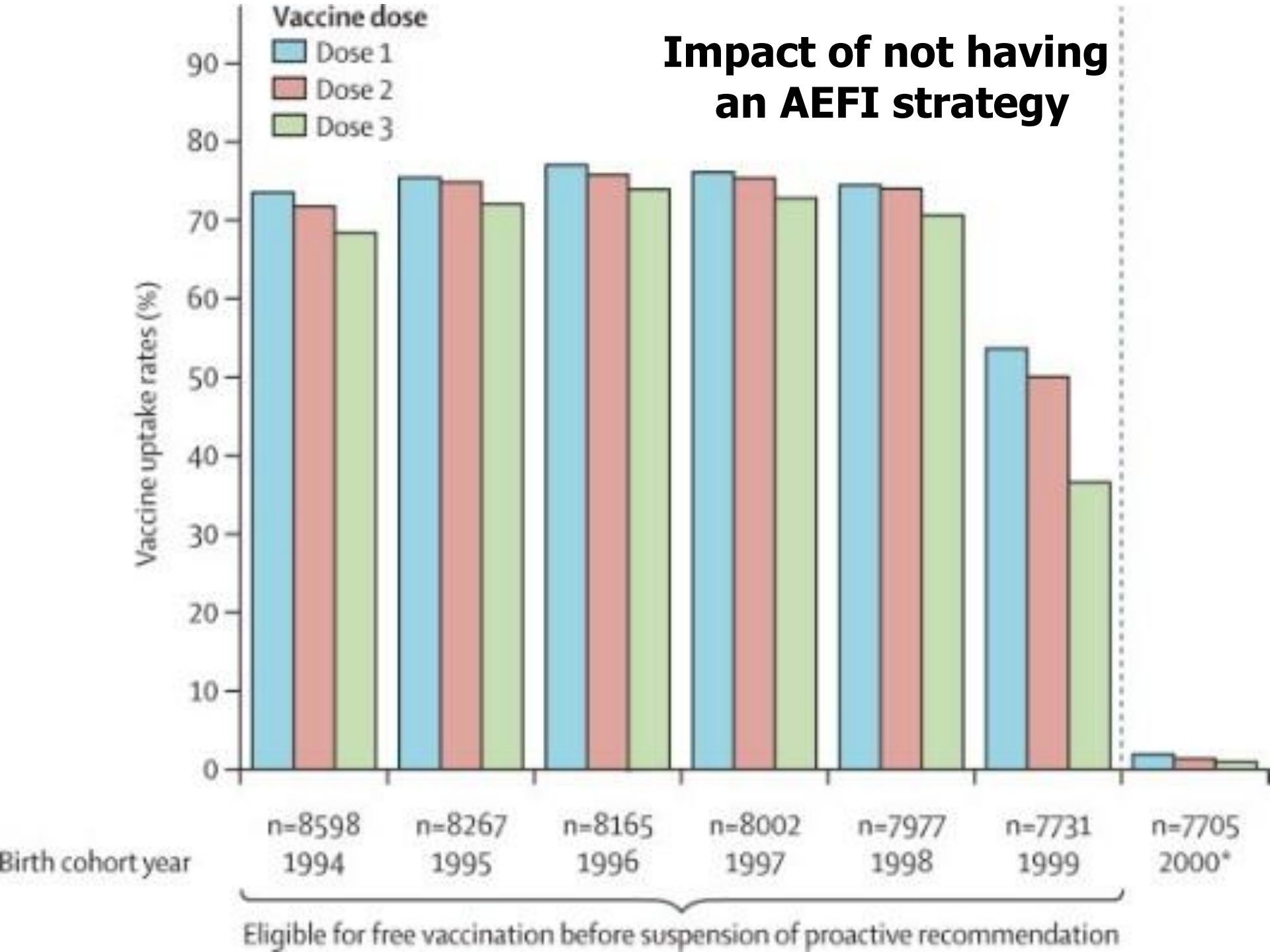
Adverse event monitoring

- Two systems
  - UK - MHRA – yellow card system
  - Scotland – SMR01 system
- ‘Blue hands’
- ‘Pain at injection site’
- No increase in over 60 conditions associated with either vaccine
  - Includes POTS, CFS and other neurological conditions
- Excellent safety profile

Adverse event monitoring of the human papillomavirus vaccines in Scotland. Cameron RL, Ahmed S, Pollock KG. Intern Med J. 2016 Apr;46(4):452-7.

Impact of not having an AEFI strategy



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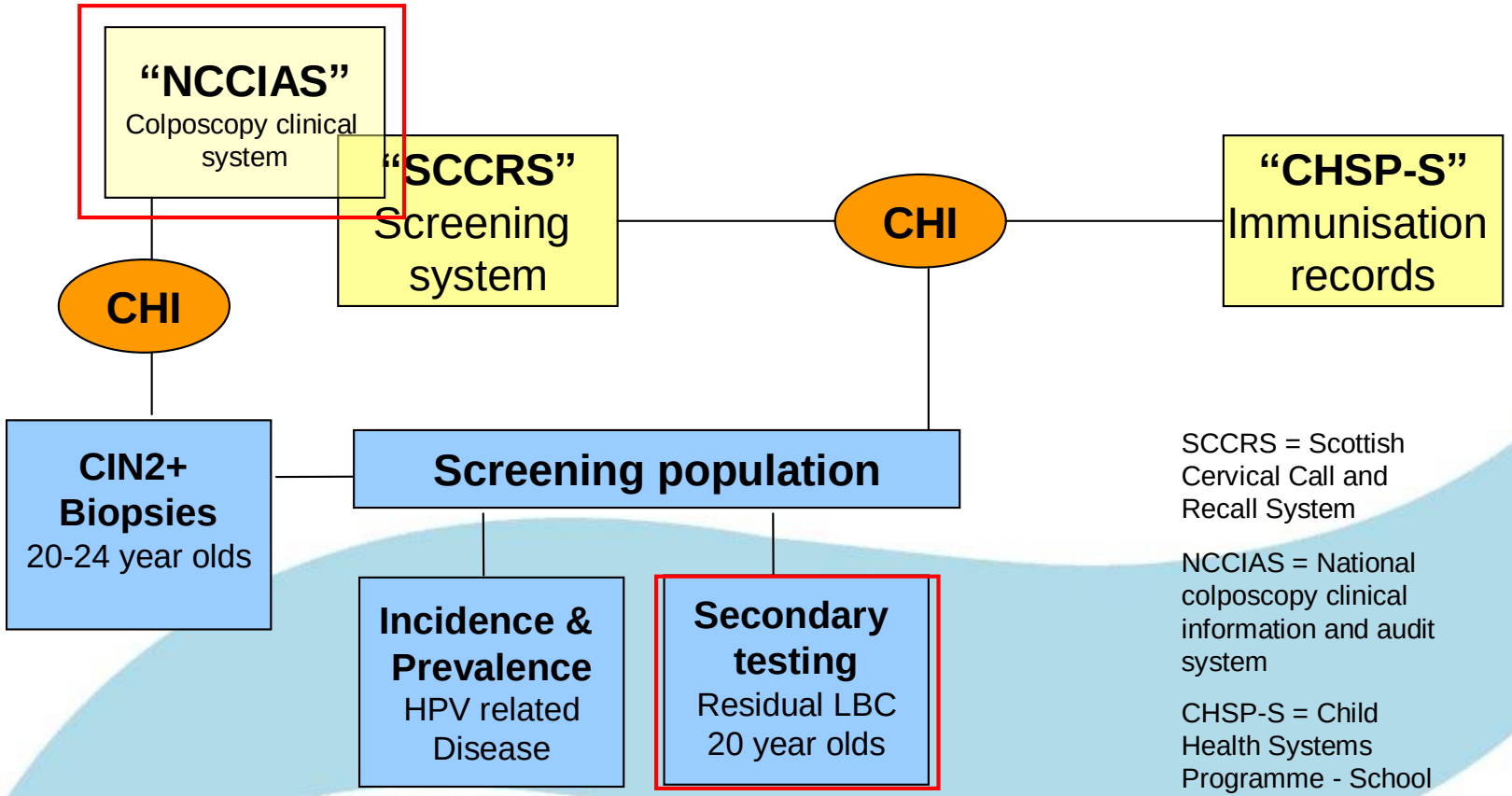
Data linkage ensures robust analyses



SCCRS = Scottish Cervical Call and Recall System

NCCIAS = National colposcopy clinical information and audit system

CHSP-S = Child Health Systems Programme - School

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Scottish HPV Ref Lab (SHPVRL)

- Women attending their 1st cervical smear appointment (from age 20 in Scotland)
- HPV DNA testing of ~ 1000 anonymised residual liquid based cytology (LBC) samples
- Genotyping data for HPS surveillance since 2009 with current assay
  - High risk or putative high-risk types: 16,18,26,31,33,35,39,45,51,52,53,56,58,59,66,68,73,82
  - Low risk types: 6,11,42,43,44 & 70
  - Generates numeric value for HPV type(s) in sample

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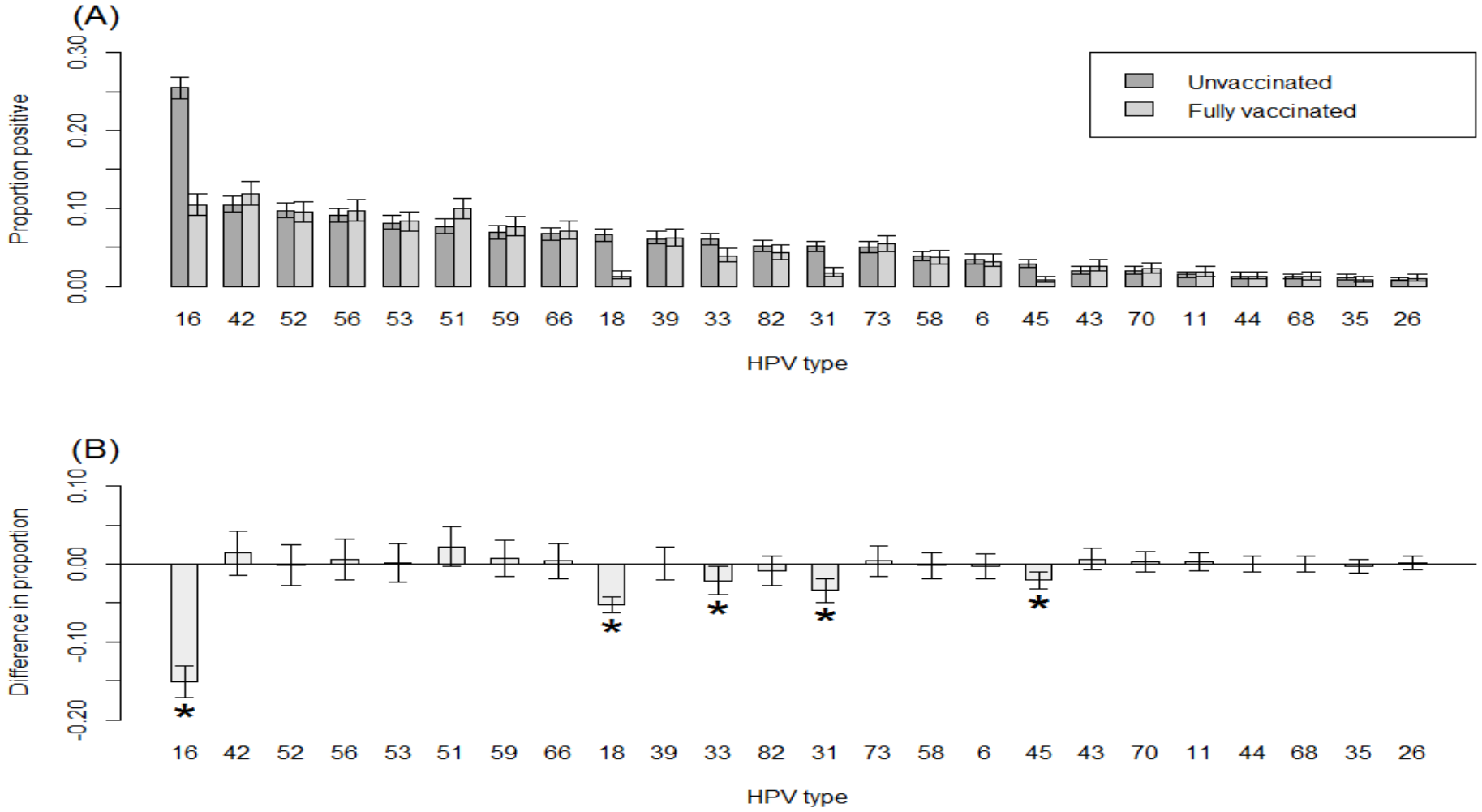
HPV type from anonymised LBC samples, 2009-2014 non-vaccinated vs fully vaccinated



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Evidence of herd protection in unvaccinated females?

	HPV 16 or 18		HPV31 or 33 or 45	
Study year	**OR**	**95% CI**	**OR**	**95% CI**
2009	1	-	1	-
2010	1.128	(0.95, 1.339)	1.095	(0.87, 1.379)
2011	1.045	(0.846, 1.291)	0.989	(0.742, 1.32)
2012	1.175	(0.879, 1.57)	0.876	(0.576, 1.333)
2013	**0.669**	**(0.468, 0.956)**	0.714	(0.436, 1.171)

Emerg Infect Dis. 2016 Jan;22(1):56-64.
Human Papillomavirus Prevalence and Herd Immunity after Introduction of Vaccination Program, Scotland, 2009-2013. Cameron RL, Kavanagh K, Pan J, Love J, Cuschieri K, Robertson C, Ahmed S, Palmer T, Pollock KG.

Effectiveness of < 3 doses

	No. of Doses	Unadjusted VE [%, (95 CI's)]	P value	Adjusted VE: [%, (95 CI's)]	P value
HPV 16/18	0	0		0	
	1	25.1 (-5.7,48.0)	0.1093	48.2 (16.8,68.9)	0.0075
	2	36 (15.3, 52.3)	0.0023	54.8 (30.7, 70.8)	<0.0001
	3	70.2 (65.0, 74.7)	<0.0001	72.8 (63.8, 80.3)	<0.0001
HPV 31/33/45	0	0		0	-
	1	-15.9 (-74.6, 25.9)	0.4978	-1.62 (-85.1, 45.3)	0.9588
	2	41.4 (12.1, 62.8)	0.0143	48.3 (7.6, 71.8)	0.0287
	3	55.5 (45.1, 64.1)	<0.0001	55.2 (32.6, 70.2)	<0.0001

Implications for developing countries

Impact of partial bivalent HPV vaccination on vaccine-type infection: a population-based analysis. Cuschieri K, Kavanagh K, Moore C, Bhatia R, Love J, Pollock KG. Br J Cancer. 2016 Apr 26. doi: 10.1038/bjc.2016.97. [Epub ahead of print]

Effect of vaccination on cervical intraepithelial neoplasia (CIN)

- Assessment of screened cohort for women born 1988-1994
  - 1988,1989,1990 – pre-vaccine
  - 1991-94 – post-vaccine
- Omission of small number of episodes (referred to colposcopy before screening)
- Inclusion of incident abnormal (CIN1-3) cases in 1st year after 1st screen, by cohort year
- Poisson regression model adjustment for birth cohort and deprivation
- **3495** individuals censored to December 2015

		RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value
	CIN1			CIN2		CIN3	
Dose	0	1		1		1	
	1	0.75 (0.45-1.25)	0.270578	1.10 (0.74-1.63)	0.64964	1.08 (0.7-1.68)	0.73036
	2	1.03 (0.74-1.43)	0.854938	0.92 (0.67-1.27)	0.60862	0.80 (0.55-1.16)	0.23769
	3	0.82 (0.69-0.98)	**0.027616**	0.49 (0.41-0.59)	**<0.0001**	0.41 (0.33-0.51)	**<0.0001**
Birth year	1988	1		1		1	
	1989	0.90 (0.76-1.07)	0.242296	0.99 (0.84-1.18)	0.9177	0.80 (0.66-0.97)	**0.02135**
	1990	0.86 (0.72-1.03)	0.098124	0.93 (0.78-1.11)	0.43691	0.95 (0.79-1.14)	0.56585
	1991	0.74 (0.59-0.92)	**0.006367**	0.89 (0.72-1.11)	0.30228	0.94 (0.75-1.19)	0.62306
	1992	0.67 (0.53-0.85)	**0.000973**	0.70 (0.55-0.90)	**0.00477**	0.69 (0.52-0.9)	**0.0072**
	1993	0.76 (0.60-0.95)	**0.016985**	0.81 (0.64-1.03)	**0.08217**	0.57 (0.43-0.75)	**<0.0001**
	1994	0.62 (0.47-0.82)	**0.000576**	0.61 (0.45-0.82)	**0.00128**	0.47 (0.33-0.68)	**<0.0001**
Deprivation	SIMD1	1		1		1	
	SIMD2	0.88 (0.75-1.03)	0.109791	0.82 (0.70-0.95)	**0.00875**	0.96 (0.81-1.14)	0.67025
	SIMD3	0.82 (0.70-0.97)	**0.020784**	0.61 (0.52-0.73)	**<0.0001**	0.74 (0.62-0.9)	**0.00179**
	SIMD4	0.76 (0.64-0.91)	**0.00245**	0.64 (0.53-0.76)	**<0.0001**	0.61 (0.5-0.75)	**<0.0001**
	SIMD5	0.78 (0.66-0.92)	**0.003065**	0.45 (0.37-0.54)	**<0.0001**	0.43 (0.34-0.53)	**<0.0001**

Table 1: Relative risk of CIN 1, 2 and 3 by number of doses of HPV vaccine received adjusted by birth cohort year and deprivation

So why is it successful?

- Local implementation group

  Collaboration with the national project to lead and co-ordinate the local implementation of HPV vaccine programme by:

  – monitoring the introduction of the programme and provision of reports to the National Project Manager as appropriate

  – local implementation of scheduling of appointments

  – ensuring the dissemination of publicity and that information resources are available locally for young people, parents and professionals

  – advising local services and professionals on the evidence base for the HPV vaccine programme

  – ensuring that local teaching/training is provided to those providing immunisation

  – ensuring infrastructure is in place to order, store and distribute HPV vaccine in accordance with legislation and manufacturers recommended storage requirements

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Good communication with Local Boards

Example presentation

together we can
fight cervical cancer

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There is a now a vaccine to help protect against **cervical cancer**

Together we can fight cervical cancer

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From 1 September 2008 girls aged 12 to 17 will be offered the Human Papilloma Virus (HPV) vaccine

Together we can fight cervical cancer

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Most girls will hear more about the HPV immunisation programme through their school

Together we can fight cervical cancer

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Girls who have already left school will be contacted later in the year by their local NHS

Together we can fight cervical cancer

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Girls will hear more about it through TV, radio, cinema, press and online advertising during August and September

The 'Hero Girl' features in the TV advertising, posters and leaflets

Together we can fight cervical cancer

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One-day **roadshows** will also take place throughout Scotland

The Public Health Minister with girls from the TV advert and girls who will be immunised this year, at the first roadshow in Paisley

Why not go along to the [city] roadshow at [venue] on [date] to find out more about the HPV immunisation programme…

Together we can fight cervical cancer

Find out more at

www.fightcervicalcancer.org.uk

or call the NHS helpline

0800 22 44 88

together we can fight cervical cancer

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Choice of vaccine

- Cervarix chosen as ‘cancer vaccine’
- Avoided sexualisation i.e. no discussion relating to genital warts
- Fears of reduced uptake in Catholic schools not realised
- BUT
- Many girls not sure what HPV is and how relates to screening

Jade Goody effect

Top 25 of most influential people, Heat magazine (2007)

Told of diagnosis in Big Brother house in August 2008

Metastasis Feb 2009

Married partner 22 Feb 2009

Died March 2009
Aged 27

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Strengths:

Coordination

Communication

Local buy-in

Scottish Immunisation Programme (SIP)

Weaknesses:

Better catch-up uptake – GP services not effective (30%)

Opportunities:

Project and programme management key to success

Collaboration

SHINe

Threats:

Adverse events

Anti-vax campaigners

Conclusions

- Government support
- Importance of local implementation groups
- Importance of school-based programme
  - Teacher buy-in
  - School nurses
- Considered communication plan
- ‘Cancer vaccine’
  - Cervical, vulval, penile, anal and oropharyngeal
- Raised awareness of disease
- Dissemination of impact across all media

By
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HPV vaccine 'reduces cervical cancer symptoms'

A young girl receives the HPV vaccine. Picture: Sanofi Pasteur MSD/PA

A young girl receives the HPV vaccine. Picture: Sanofi Pasteur MSD/PA