



Pneumococcal surveillance data after PCV10: the Dutch experience

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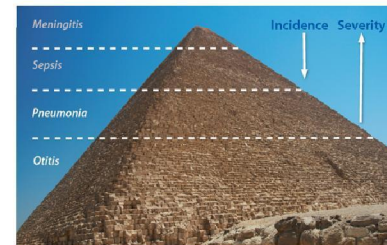
Objectives

- › Epidemiology of pneumococcal infections after PCV10
- › Role of infant vaccinations for elderly
- › Influence of the SARS-CoV2 pandemic on pneumococcal infections



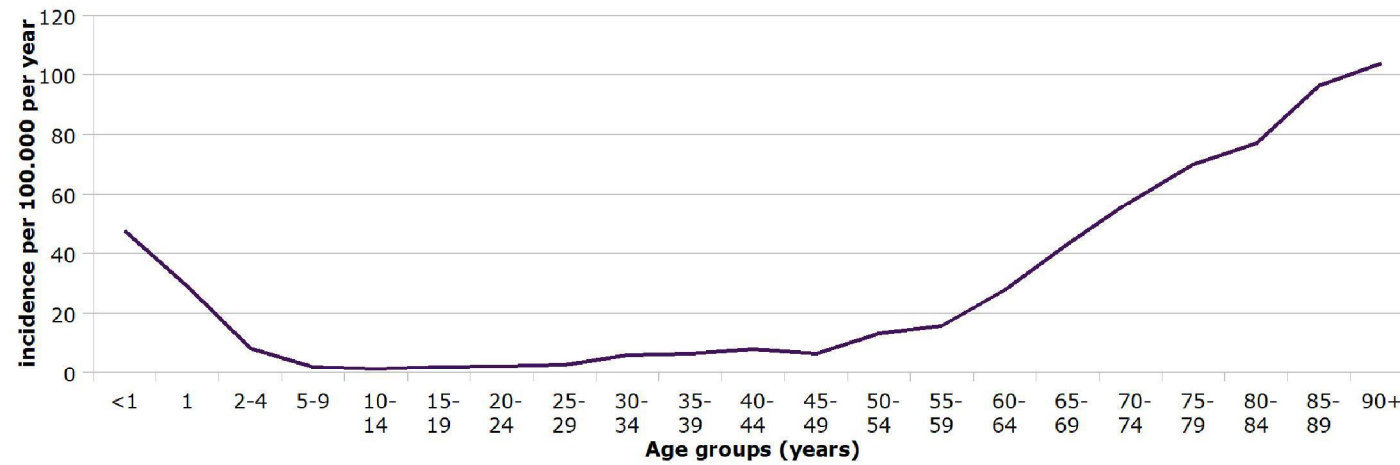
Pneumococcal disease

- > *Streptococcus pneumoniae* - gram-positive bacterium
- > Polysaccharide capsule
 - Virulence factor
 - > 90 serotypes
- > Commensal upper respiratory tract
 - Carriage prevalence: Children 60-90%; elderly 5-10%
- > Disease
 - Invasive disease (IPD) → meningitis, sepsis, invasive pneumonia
 - Non-invasive disease → pneumonia, otitis media
- > High incidence in young children and elderly





IPD by age



IPD after PCV10 | 3-12-2020



Pneumococcal vaccination

POLYSACCHARIDE VACCINES

- › Not immunogenic in children
- › No memory induced
- › No booster response
- › Short duration of protection
- › PPV23

CONJUGATE VACCINES

- › Polysaccharide conjugated to carrier protein
- › Immunogenic in children
- › Memory induced and booster response
- › Longer duration of protection
- › PCV7, PCV10, PCV13, (PCV15/20)



Pneumococcal vaccines

Vaccine	Serotypes												
PCV7	4	6B	9V	14	18C	19F	23F						
PCV10	4	6B	9V	14	18C	19F	23F	1	5	7F			
PCV13	4	6B	9V	14	18C	19F	23F	1	5	7F	3	6A	19A



Pneumococcal vaccination



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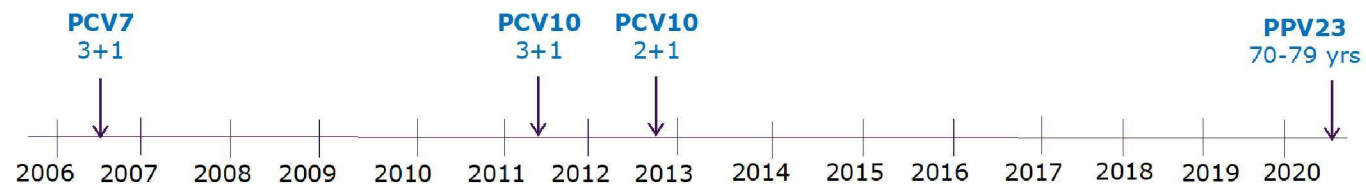
ECDC Vaccine scheduler

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- 2+1 schedule
- PCV10 or PCV13



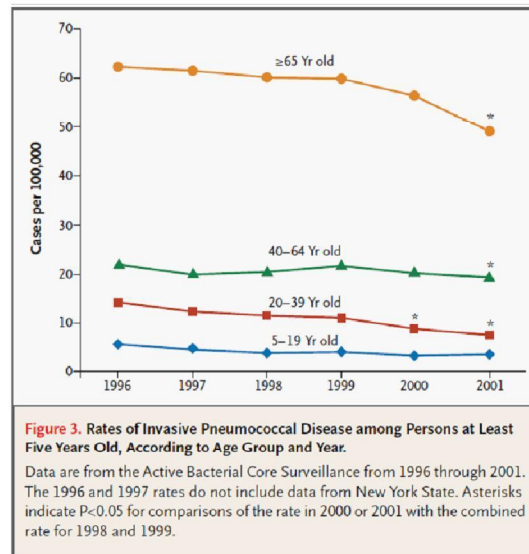
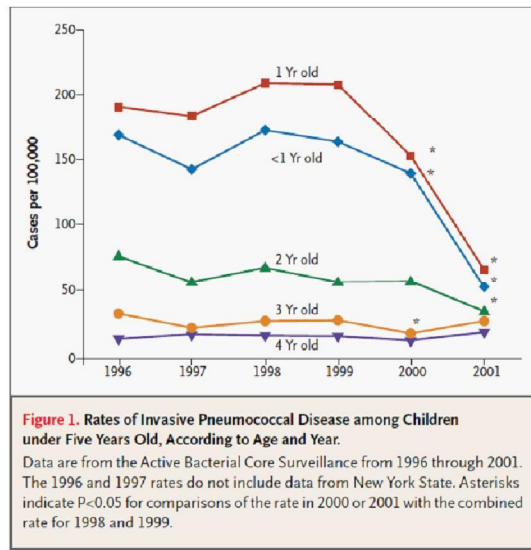
Pneumococcal vaccination in NL



- > Vaccination coverage PCV ~95% since introduction
- > No recommendation for elderly until 2020



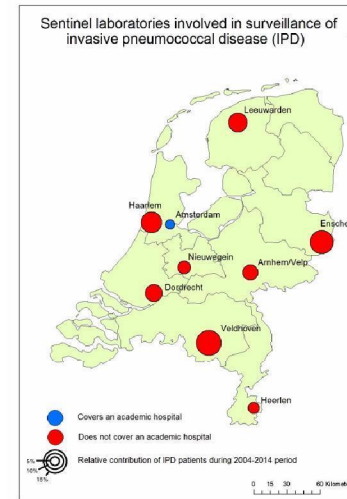
Herd effects due to PCV7





IPD surveillance

- Sentinel laboratory surveillance from 2004
 - Covering 25% of the Netherlands
 - Positive isolates from blood and/or CSF
 - Age, sex, date of material taken, serotype
- Nationwide laboratory surveillance for <5 year olds from 2008
- Notification data for children born after 2006
 - Vaccination status, clinical presentation, outcome





Evaluation of vaccination program

Impact

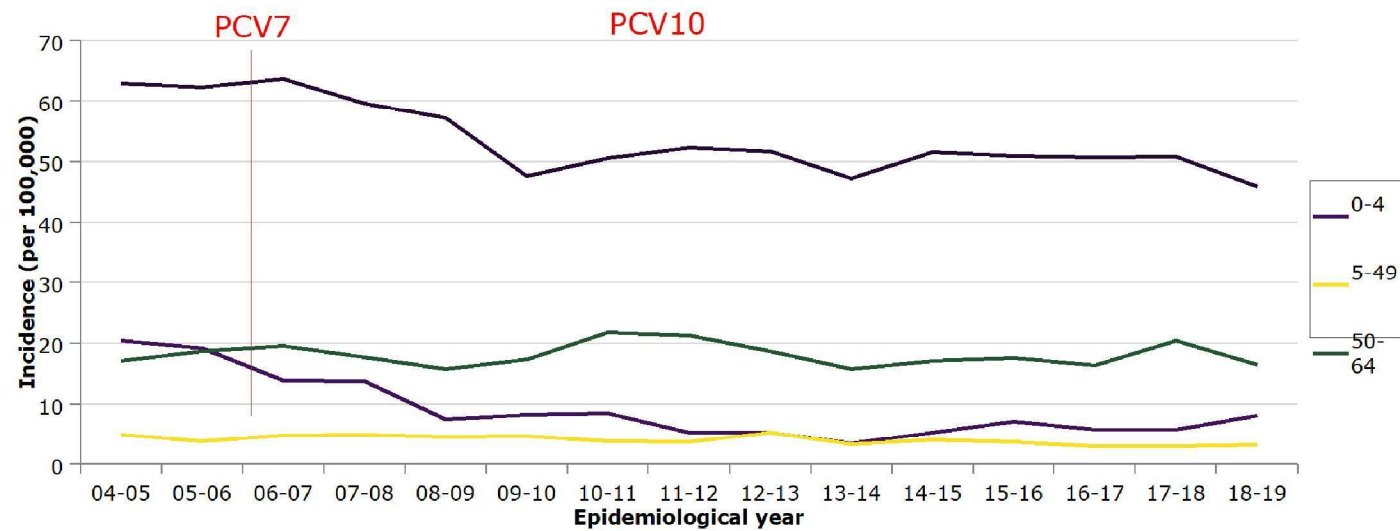
- › Before – after analysis
- › By age group
- › By serotype (vaccine types and non-vaccine types)
- › Direct and indirect (herd) effects
- › Dependent on vaccination coverage and effectiveness

Effectiveness

- › Vaccine eligible children
- › Compare vaccination status in vaccine type IPD cases and non-vaccine type IPD cases
- › Direct effect of vaccination
- › Real world evidence

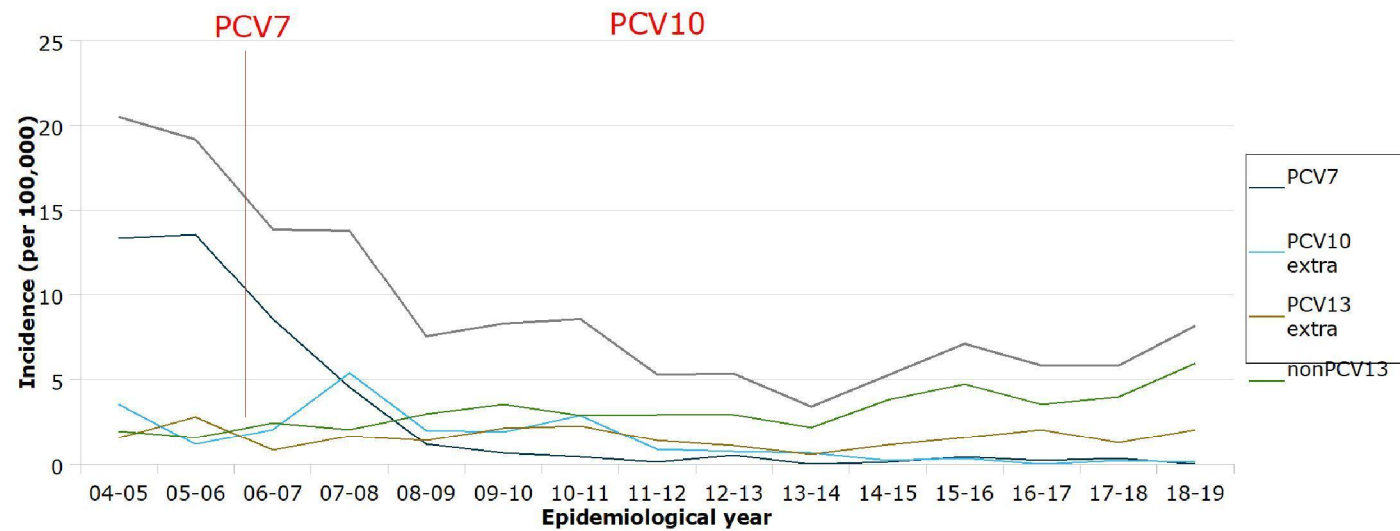


Overall IPD by age group





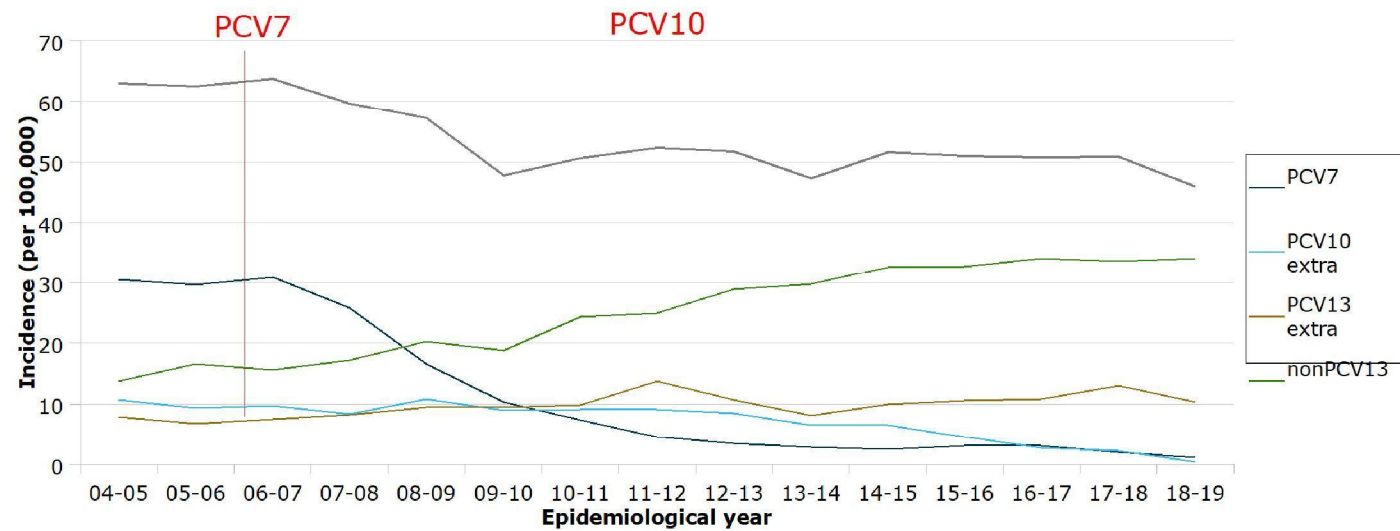
IPD in <5 year olds



IPD after PCV10 | 3-12-2020



IPD in 65+ year olds



IPD after PCV10 | 3-12-2020



Vaccine effectiveness

Table 3

Number of invasive pneumococcal disease (IPD) cases and controls vaccinated and vaccines effectiveness (VE) of PCV10.

	Number of PCV10 cases vaccinated /total cases (%)	Number of non-PCV10 cases vaccinated /total controls (%)	OR (95%CI)	VE % (95%CI)
Overall	8/13 (62)	206/218 (94)	0.09 [0.03; 0.32]	91 [67; 97]
Before October 2013 3 + 0/3 + 1 schedule	5/6 (83)	63/70 (90)*	0.24 [0.02; 2.73]	76 [-173; 98]
After October 2013 2 + 0/2 + 1 schedule	3/7 (43)	138/148 (93)*	0.05 [0.01; 0.25]	95 [75; 99]
Sex				
Male	4/7 (57)	122/126 (97)	0.04 [0.007; 0.26]	96 [74; 99]
Female	4/6 (67)	84/92 (91)	0.19 [0.03; 1.21]	81 [-21; 97]
Age (in year)				
0-1	2/4 (50)	150/157 (96)	0.05 [0.006; 0.38]	95 [62; 99]
2-4	6/9 (67)	56/61 (92)	0.18 [0.03; 0.94]	82 [6; 97]

* The comparison here is made between cases respecting the vaccine schedule and cases receiving no dose of IPD vaccine (dose = 0).

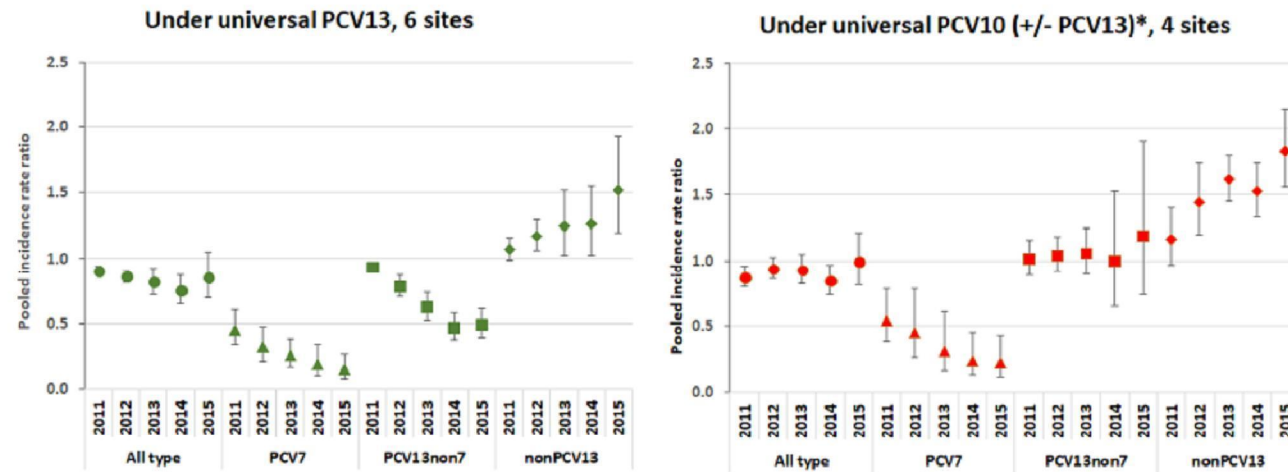


Summary IPD after PCV10

- › Good effectiveness of PCV10
- › Reduction in IPD in children <5 yrs and elderly
- › IPD caused by serotypes included in PCV10 nearly disappeared
 - Also in carriage
- › Increasing IPD incidence due to serotypes not included in PCV10
- › Impact on overall IPD is decreasing due to replacement
 - Higher valent vaccines?



PCV10 or PCV13?



Elderly

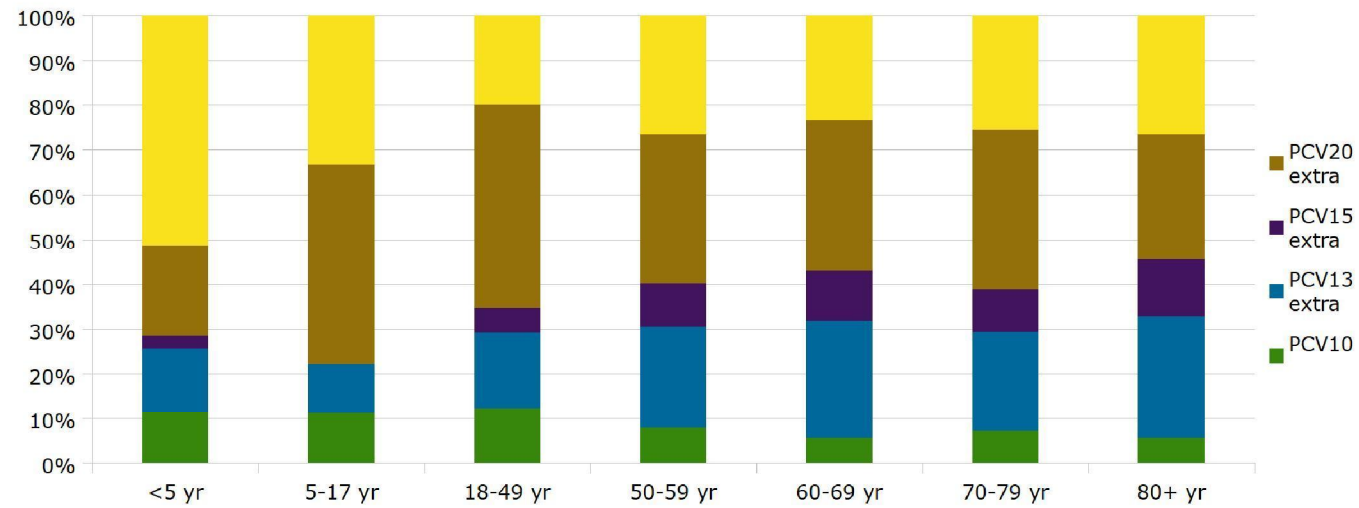
IPD after PCV10 | 3-12-2020

Hanquet et al, Thorax 2019

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PCV15/PCV20?



IPD after PCV10 | 3-12-2020

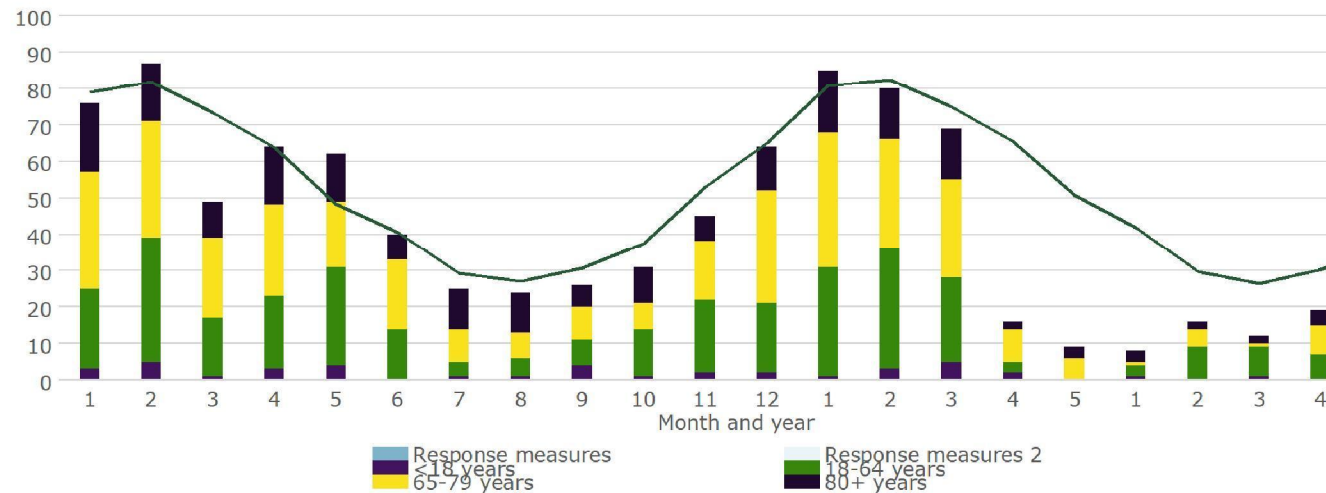
Knol et al, RIVM report 2020-0168

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Impact COVID-19 pandemic

Q2: 80% reduction
Q3: 40% reduction



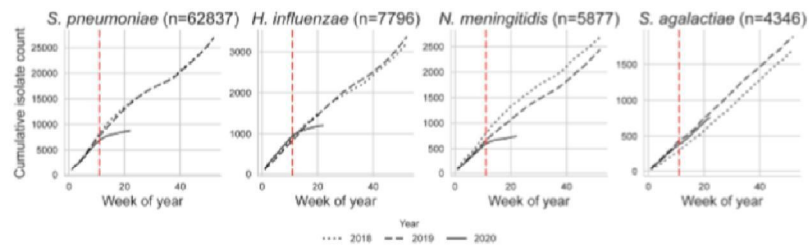
IPD after PCV10 | 3-12-2020

Middeldorp et al, submitted

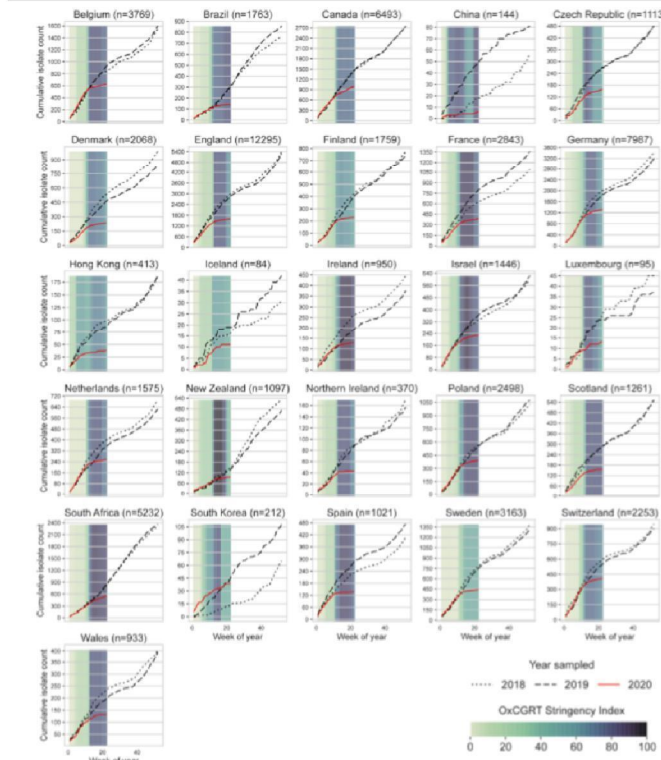
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Impact COVID-19 pandemic - worldwide



IPD after PCV10 | 3-12-2020



Brueggemann et al, MedRxiv 2020



Impact COVID-19 pandemic

- › Currently reduction in IPD
 - Less transmission due to measures (social distancing, hand hygiene, school closure)
 - Less health care seeking behaviour, less diagnostics, less reporting
- › COVID-19 risk factor for IPD?
 - Bacterial superinfection → antibiotic use
 - Increased susceptibility due to lung damage
- › Rebound effect?
- › Vaccination coverage?



Take home message

- › PCV7/PCV10 have reduced overall IPD in children and elderly
 - › Maximum vaccine effects have been reached
 - › Overall impact is reduced by ongoing serotype replacement
 - › Higher valent PCV may be the solution
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- › Currently reduced IPD incidence due to COVID-19 measures
 - › Ongoing surveillance essential to monitor long term trends