XX VOJVOĐANSKI DANI OPŠTE MEDICINE

Značaj imunizacije protiv pneumokoka

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Uvod

Da bi se sprečilo obolevanje od zaraznih bolesti **kod starijih**, potrebno ih je **vakcinisati protiv**:

- ❑ gripa,
- ❑ **pneumokokne bolesti**,
- ❑ tetanusa/difterije/velikog kašlja
- ❑ i
- ❑ herpes zostera

…i naravno protiv COVID-19!!!

Coll PP, et al. J Am Geriatr Soc. 2020;68:207-214.

Malo o patogenu…

- Gram+ diplokoka
- *Streptococcus pneumoniae* je **isključivo humani patogen**
- Infekcije izazvane pneumokokom najčešće su asimptomatske ili blage, u određenom broju slučajeva moguće su komplikacije u smislu nastanka **neinvazivnih** (sinusitisa i/ili otitisa i/ili nebakterijemijske pneumonije) ali i
- - **invazivnih** (pneumonija, meningitis, sepsa, osteomijelitis) oboljenja

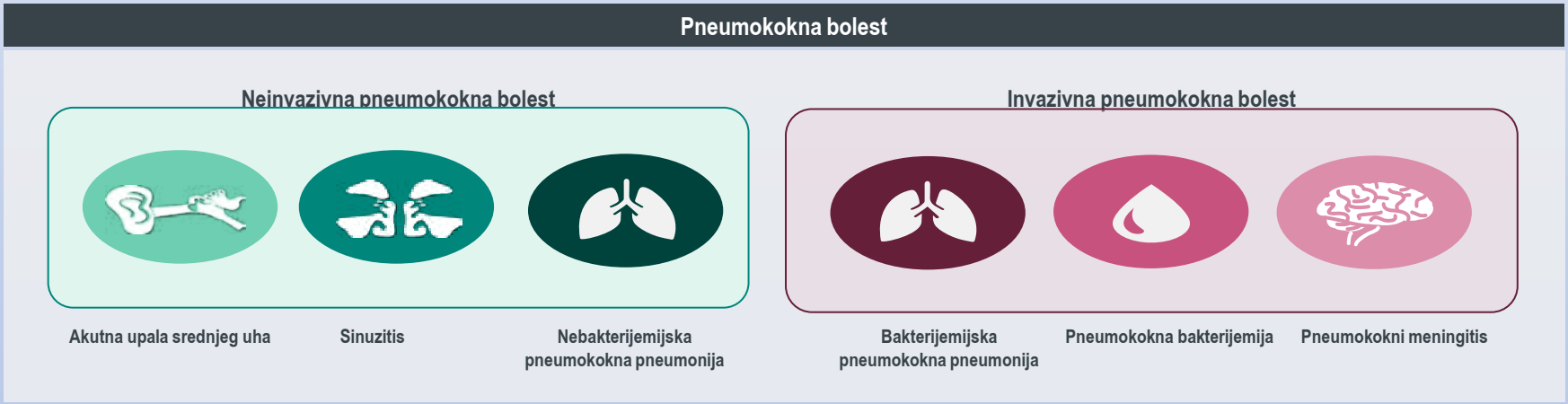
Invasive pneumococcal (Streptococcus pneumoniae) infections and bacteremia. Available from: https://www.uptodate.com/contents/invasive-pneumococcal-streptococcus-pneumoniae-infections-and-bacteremia

Malo o patogenu…

Faktori virulencije

- ❑ adherencija za ćelije domaćina
- ❑ izbegavanje imunskog odgovora
- ❑ invazija epitelnih ćelija i širenje u sterilna tkiva

- ❑ glavni faktor virulencije – polisaharidna kapsula → **100 serotipova (do 2020. godine)**



Invasive pneumococcal (Streptococcus pneumoniae) infections and bacteremia. Available from: https://www.uptodate.com/contents/invasive-pneumococcal-streptococcus-pneumoniae-infections-and-bacteremia

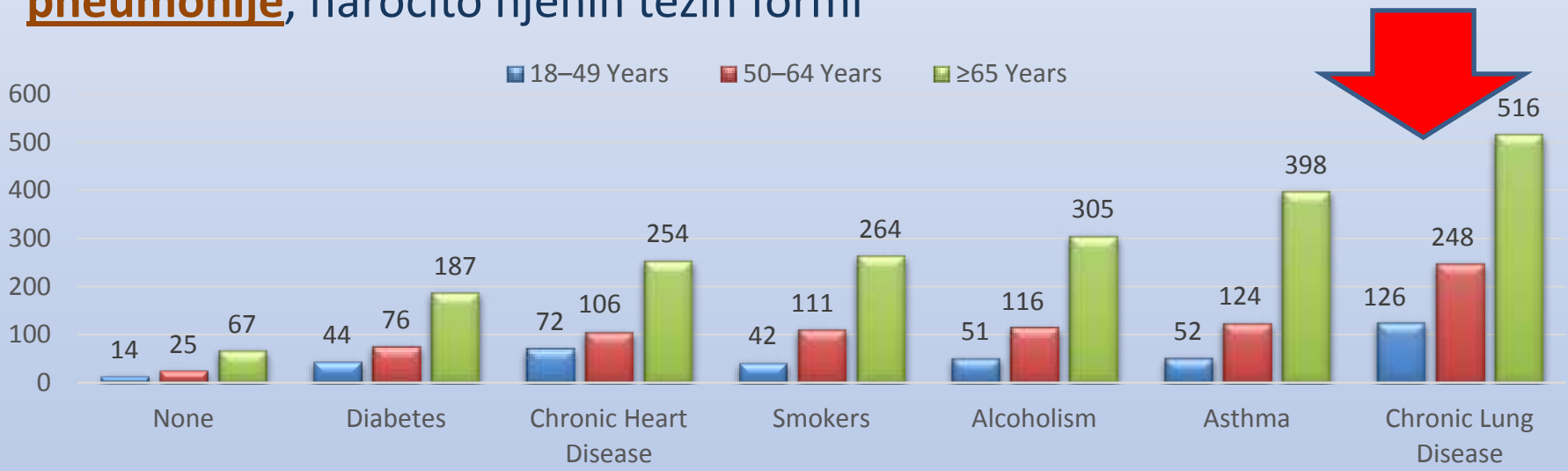
Komplikacije obolevanja od pneumokoka

- **Pneumokona pneumonija** predstavlja **50-80% svih** slučajeva pneumokokne bolesti kod odraslih
- Pneumokokna pneumonija ima visok morbiditet i mortalitet kod odraslih
- Od **12-38% svih vanbolničkih pneumonija** kod odraslih izazvano je *S. pneumoniae*
- U 2017. godini se procenjuje da je preko 200.000 ljudi uzrasta 50-69 godina i preko 450.000 ljudi starijih od 70 godine umrlo od pneumonije izazvane *S. pneumoniae*

Shea et al. Open Forum Infect Dis 2014;1:ofu024.
Pneumococcal vaccines WHO position paper--2012. Wkly Epidemiol Rec. 2012; 87(14):129-44.

Komplikacije obolevanja od pneumokoka

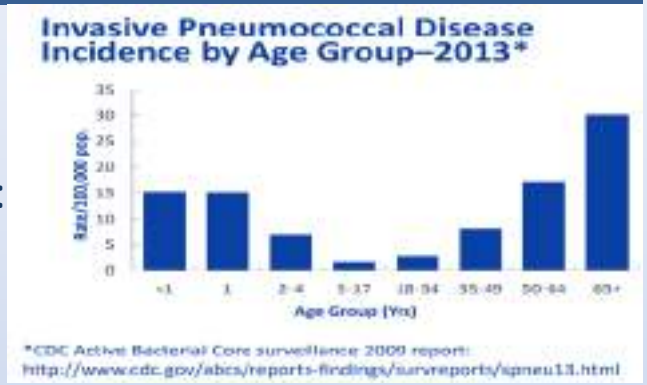
Starije životno doba i prisutni komorbiditeti (različite hronične bolesti i imunokompromitovana stanja), povećavaju rizik za razvoj **pneumokokne pneumonije**, naročito njenih težih formi



Shea et al. Open Forum Infect Dis 2014;1:ofu024.

Pneumococcal vaccines WHO position paper--2012. Wkly Epidemiol Rec. 2012; 87(14):129-44.

Invazivna pneumokokna bolest (IPB)



- Zahvatanje primarno sterilnih regija i manifestuje se kao:

pneumokokna pneumonija (sa bakterijemijom)
pneumokokna bakterijemija
pneumokokni meningitis

- **Najčešće se javlja kod male dece (< 2 god.) i starijih osoba (> 65 god.)**
- Brojna medicinska stanja kao i nemedicinski faktori dovode do povećanog rizika za razvoj teže forme bolesti:
- Hronične bolesti i stanja (plućne, alkoholizam, kardiovaskularne, bubrežne bolesti, dijabetes, …)
- Imunokompromitovana stanja (HIV, asplenija, imunospresivna tearpija, transplantacija organa…)
- Boravak u kolektivnom smeštaju

ECDC. Annual epidemiological report for 2018. Stockholm: ECDC; 2020.; CDC Pink Book: https://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html.
Pneumococcal vaccines WHO position paper--2012. Wkly Epidemiol Rec. 2012; 87(14):129-44.

SPECIFIČNA PREVENCIJA-Vakcine protiv pneumokoka

- **Polisaharidna vakcina**

sadrži polisaharide kapsule dobijene izolacijom/prečišćavanjem
- protiv 23 serotipa *S. pneumoniae* (PPV-23)

- **Konjugovane vakcine**

sadrže polisaharide kapsule vezane za protein
- *protiv 7 serotipova S. pneumoniae (PCV-7)*
- protiv 10 serotipova *S. pneumoniae* (PCV-10)
- protiv 13 serotipova *S. pneumoniae* (PCV-13)

Pneumovax 23, Sažetak karakteristika leka, ALIMS, Oktobar 2019
Synflorix, Sažetak karakteristika leka, ALIMS, Maj 2015
Prevenar 13, Sažetak karakteristika leka, ALIMS, Februar 2018

Polisaharidna pneumokokna vakcina

- ***Sastav i mehanizam delovanja***:

sadrži prečišćene kapsularne polisaharide
23 najčešća serotipa
bez adjuvansa
daje se intramuskularno (preporučeno) i supkutano
može da se da i preporučuje se da se da istovremeno sa vakcinom protiv gripa
daje se odraslima i deci (> 2 godine)

- ***Bezbednost***:

odličan bezbednosni profil
lokalne reakcije (crvenilo, otok, bol…) – 30-50% – blage
sistemske reakcije (umor, bol u mišićima…) – ≈ 20% starijih – blage
češće kod ponovnog davanja

Pneumococcal vaccines WHO position paper--2012. Wkly Epidemiol Rec. 2012; 87(14):129-44.

Pneumovax® 23

1, 2, **3**, **4**, 5, **6B**, 7F, 8, 9N, 9V, 10A, 11A, 12F, **14**, 15B, 17F, 18C, **19A**, 19F, 20, 22F, **23F** i 33F

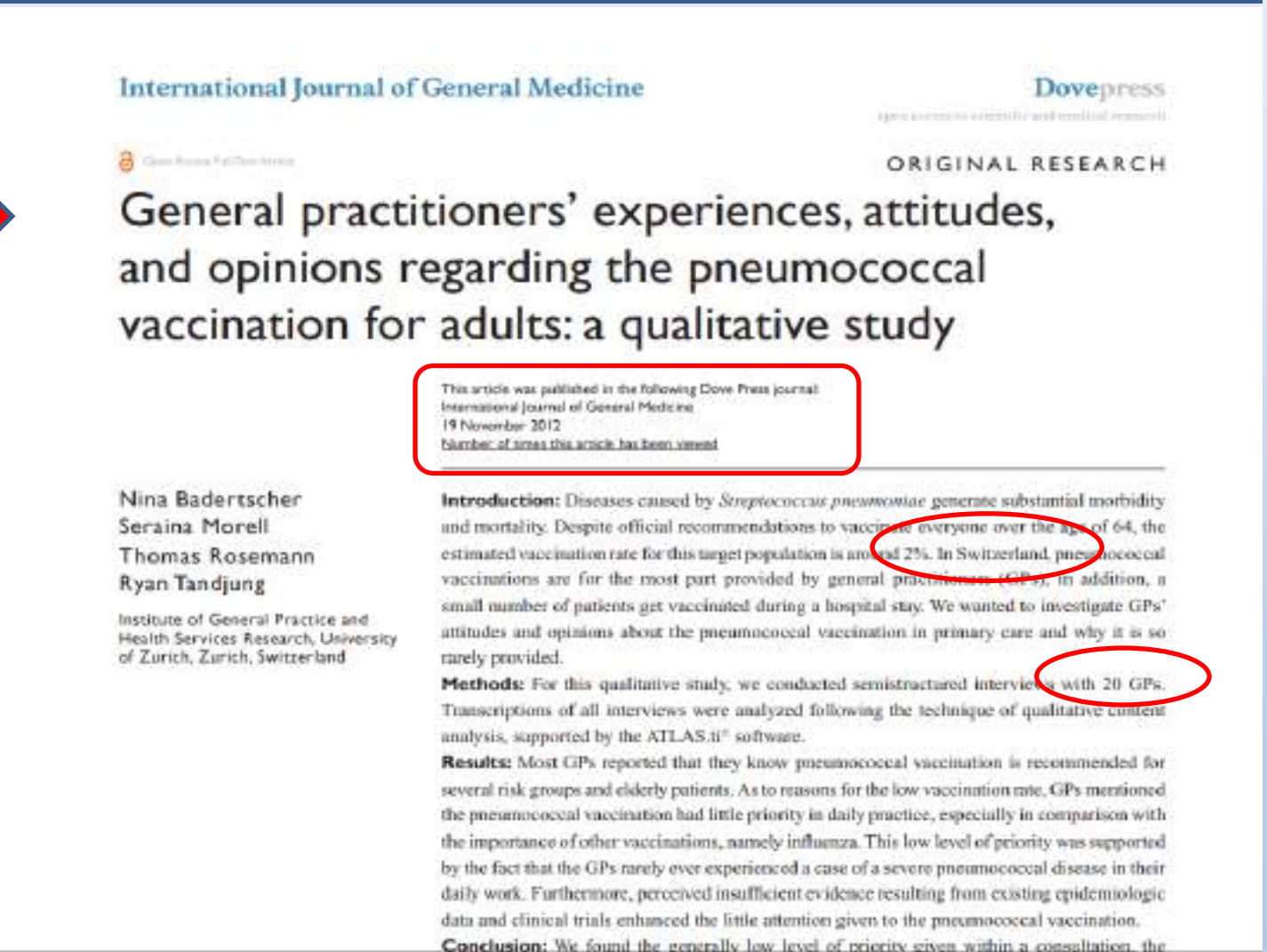
Crveno obojeni su **najinvazivniji**

Pneumovax 23, Sažetak karakteristika leka, ALIMS, Oktobar 2019.
Pneumococcal vaccines WHO position paper--2012. Wkly Epidemiol Rec. 2012; 87(14):129-44.

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

Zašto je potrebno govoriti o ovome?

PRIMER



International Journal of General Medicine

Dovepress

ORIGINAL RESEARCH

General practitioners' experiences, attitudes, and opinions regarding the pneumococcal vaccination for adults: a qualitative study

This article was published in the following Dove Press journal:
International Journal of General Medicine
19 November 2012
Number of times this article has been viewed

Nina Badertscher
Seraina Morell
Thomas Rosemann
Ryan Tandjung

Institute of General Practice and Health Services Research, University of Zurich, Zurich, Switzerland

Introduction: Diseases caused by *Streptococcus pneumoniae* generate substantial morbidity and mortality. Despite official recommendations to vaccinate everyone over the age of 64, the estimated vaccination rate for this target population is around 2%. In Switzerland, pneumococcal vaccinations are for the most part provided by general practitioners (GPs); in addition, a small number of patients get vaccinated during a hospital stay. We wanted to investigate GPs' attitudes and opinions about the pneumococcal vaccination in primary care and why it is so rarely provided.

Methods: For this qualitative study, we conducted semistructured interviews with 20 GPs. Transcriptions of all interviews were analyzed following the technique of qualitative content analysis, supported by the ATLAS.ti® software.

Results: Most GPs reported that they know pneumococcal vaccination is recommended for several risk groups and elderly patients. As to reasons for the low vaccination rate, GPs mentioned the pneumococcal vaccination had little priority in daily practice, especially in comparison with the importance of other vaccinations, namely influenza. This low level of priority was supported by the fact that the GPs rarely ever experienced a case of a severe pneumococcal disease in their daily work. Furthermore, perceived insufficient evidence resulting from existing epidemiologic data and clinical trials enhanced the little attention given to the pneumococcal vaccination.

Conclusion: We found the generally low level of priority given within a consultation, the

Glavni nalazi studije studije iz Švajcarske

- **Većina lekara** opšte medicine **zna** da se vakcinacija protiv pneumokoka preporučuje za nekoliko rizičnih grupa i za sve pacijente starijih uzrasta.
- Lekari opšte medicine navode da vakcinacija protiv pneumokoka za njih **ima mali prioritet** u svakodnevnoj praksi, posebno u poređenju sa vakcinacijom protiv gripa.
- Ovaj nizak nivo prioriteta potkrepljen je i činjenicom da su lekari opšte medicine u svakodnevnom radu **retko dijagnostikovali slučaj teške pneumokokne bolesti** i nisu se susretali sa dokazima iz studija u kojima je posvećena dodatna pažnja značaju vakcinacije protiv pneumokoka, odnosno nisu edukovani o tome!

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

Ima li opravdanja za davanje Pneumovax® 23 i kod nas?

Izolati sakupljeni 2009-2016.

Streptococcus pneumoniae serotype distribution in Vojvodina before the introduction of pneumococcal conjugate vaccines into the National Immunization Program

IMA opravdanja!

Vladimir Petrović[1,2], Zorica Šeguljev[1,2], Miloljub Ristić
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[3]Institute for Pulmonary Diseases of Vojvodina, Sremska
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ence Laboratory for Streptococci, Belgrade, Serbia

SUMMARY

Introduction *Streptococcus pneumoniae* is the most common causative agent of bacterial pneumonia and meningitis. Mandatory childhood immunization against pneumococcal diseases is introduced in the new Law on Protection of Population against Communicable Diseases in Serbia.

Objective The objective of this study was to determine the prevalence of pneumococcal serotype distribution in Vojvodina region before routine use of pneumococcal conjugate vaccine in Serbia.

Methods A total of 105 isolates of *Streptococcus pneumoniae* were collected in the period from January 2009 to April 2016. Based on the results of serotyping in the National Reference Laboratory, we analyzed distribution of circulating serotypes and coverage of conjugate and 23-valent polysaccharide pneumococcal vaccines in different age groups.

Results Among 105 isolates, a total of 21 different serotypes of *Streptococcus pneumoniae* were determined. The most frequent serotypes were 3 (21.9%), 19F (20.0%), and 14 (10.5%). The serotype coverage of pneumococcal conjugate vaccines (PCV7, PCV10, and PCV13) was 48.6%, 54.3%, and 84.8%, respectively, while pneumococcal polysaccharide vaccine (PPV23) covered 89.5% of the total number of isolates in all age groups. Serotypes included in PCV7, PCV10, and PCV13 represented 72.0%, 76.0%, and 88.0% of the total number of isolates in children ≤5 years, respectively. Vaccine serotype coverage of PCV13 and PPV23 ranged from 87.1% to 90.3% in adults 50–64 years of age, and 77.8% to 85.2% in adults ≥65 years old.

Conclusion Serotype distribution of *Streptococcus pneumoniae* in the population fairly overlaps with the serotypes contained in pneumococcal vaccines, so that implementation of childhood immunization is justified. The study was done in the Province of Vojvodina but the findings may be applied to Serbia as a whole.

Table 1. Type and number of examined specimens

Type of specimens	Number (%)
Blood	48 (45.7)
Cerebrospinal fluid	17 (16.2)
Blood and cerebrospinal fluid	2 (1.9)
Pleural fluid	17 (16.2)
Pericardijal punctate	1 (1.0)
Middle ear aspirate	14 (13.3)
Bronchial aspirate or bronchial lavage	4 (3.8)
Tissue bioptate	1 (1.0)
Wound swab	1 (1.0)
Total	105 (100)

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

Ima li opravdanja za davanje Pneumovax® 23 i kod nas?

Utvrđeno je da je zastupljenost svih serotipova u izolatima bila takva da je **90%** njih bilo u sastavu PPV23 u svim dobnim grupama ukupno.
U odnosu na sastav PPV23, **90.3%** serotipova u uzrastu **50–64**, **85.2%** u uzrastu **≥65** godina.

Izolati sakupljeni 2009-2016.

IMA opravdanja!

Table 2. Circulating serotypes of *Streptococcus pneumoniae* by age groups for immunization in Vojvodina in the period from January 2009 until April 2016 and coverage by conjugate vaccines and PPV23

Vaccine	Serotype	Isolates in children 2 years of age		Isolates in children 2–5 years of age		Isolates in children ≤5 years of age		Isolates in adults 50–64 years of age		Isolates in elderly ≥65 years of age		All isolates	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
PPV23 serotypes, PCV13 serotypes, PCV10 serotypes, PCV7 serotypes	4	0	0.0	0	0.0	0	0.0	4	12.9	1	3.7	6	5.7
	6B	2	8.0	0	0.0	2	8.0	1	3.2	0	0.0	4	3.8
	9V	0	0.0	0	0.0	0	0.0	1	3.2	1	3.7	3	2.9
	14	1	4.0	3	12.0	4	16.0	3	9.7	1	3.7	11	10.5
	18C	0	0.0	0	0.0	0	0.0	1	3.2	0	0.0	2	1.9
	19F	10	40.0	1	4.0	11	44.0	2	6.5	5	18.5	21	20.0
	23F	1	4.0	0	0.0	1	4.0	2	6.5	1	3.7	4	3.8
	Subtotal (PCV7 serotypes)	14	56.0	4	16.0	18	72.0	14	45.2	9	33.3	51	48.6
	1	1	4.0	0	0.0	1	4.0	0	0.0	0	0.0	1	1.0
	5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	7F	0	0.0	0	0.0	0	0.0	2	6.5	1	3.7	3	4.8
	Subtotal (PCV10 serotypes)	**15**	60.0	**4**	16.0	19	76.0	16	51.6	10	37.0	57	54.3
	3	1	4.0	0	0.0	1	4.0	10	32.3	7	25.9	23	21.9
	6A	1	4.0	0	0.0	1	4.0	1	3.2	3	11.1	6	5.7
	19A	1	4.0	0	0.0	1	4.0	0	0.0	1	3.7	3	2.9
	Subtotal (PCV13 serotypes)	18	72.0	4	16.0	22	88.0	27	87.1	21	77.8	89	84.8
PPV23 serotypes	2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	8	0	0.0	0	0.0	0	0.0	1	3.2	2	7.4	3	2.9
	9N	0	0.0	0	0.0	0	0.0	1	3.2	1	3.7	2	1.9
	10A	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	12F	0	4.0	0	0.0	1	4.0	0	0.0	1	3.7	2	1.9
	15B	0	0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	17F	0	0.0	0	0.0	0	0.0	0	0.0	1	3.7	2	1.9
	20	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	22F	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	1.0
	33F	0	0.0	1	4.0	1	4.0	0	0.0	0	0.0	1	1.0
Subtotal (PPV23 serotypes) (6A excluded)		18	72.0	5	20.0	23	92.0	28	90.3	23	85.2	94	89.5

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

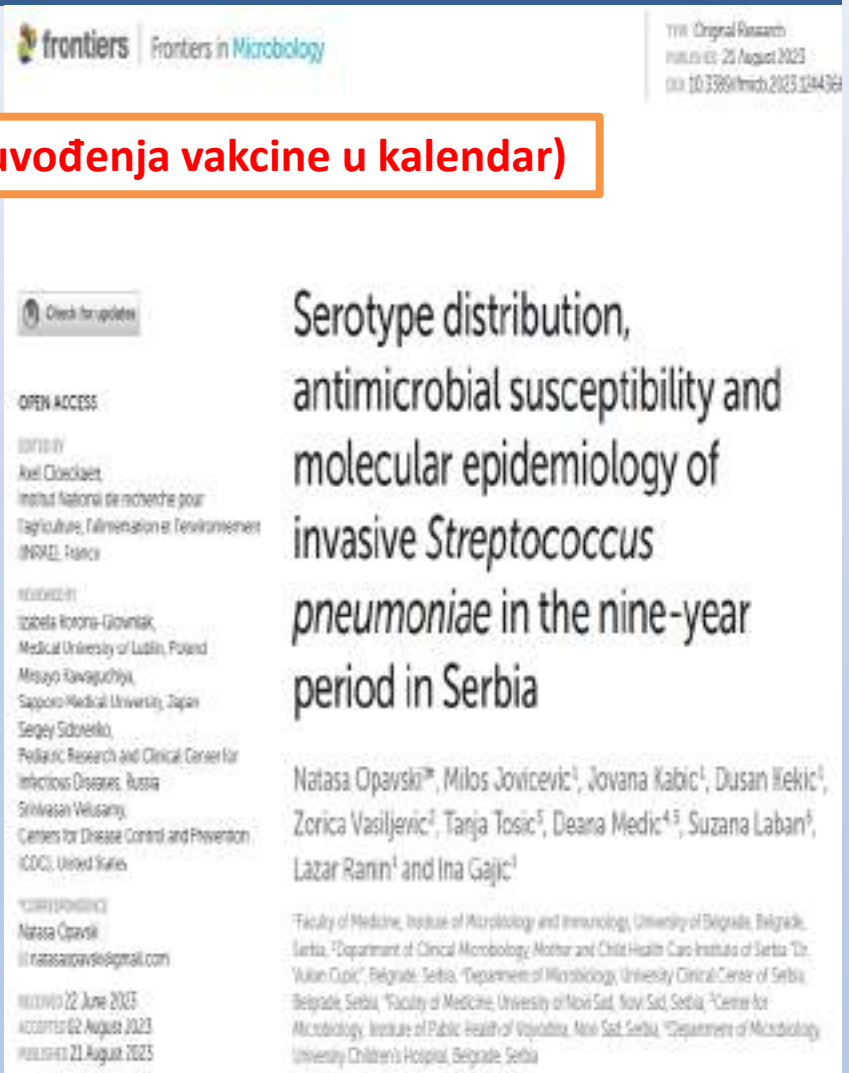
Ima li opravdanja za davanje Pneumovax® 23 i kod nas?

Streptococcus pneumoniae is one of the leading bacterial pathogens that can cause severe invasive diseases. The aim of the study was to characterize invasive isolates of *S. pr*

Izolati sakupljeni 2010-2018. (takođe pre uvođenja vakcine u kalendar)

the introductio
vaccination programs by determining: serotype distribution, the prevalence and genetic basis of antimicrobial resistance, and genetic relatedness of the circulating pneumococcal clones. A total of 490 invasive *S. pneumoniae* isolates were included in this study. The serotype, antimicrobial susceptibility, and ST of the strains were determined by the Quellung reaction, disk- and gradient-diffusion methods, and multilocus sequence typing (MLST), respectively. The most common serotypes in this study were 3, 19F, 14, 6B, 6A, 19A, and 23F. The serotype coverages of PCV10 and PCV13 in children less than 2 years were 71.3 and 86.1%, respectively, while PPV23 coverage in adults was in the range of 85-96%, depending on the age group. Penicillin and ceftriaxone-non-susceptible isolates account for 47.6 and 16.5% of all isolates, respectively. Macrolide non-susceptibility was detected in 40.4% of isolates, while the rate of multidrug- and extensive-drug resistance was 20.0 and 16.9%, respectively. The MLST analysis of 158 pneumococci identified 6 16 Clonal Complexes (CCs) (consisting of 42 S t common CC/ST were ST1377, CC320, CC15, C d CC180. Results obtained in this study indicate th cal population in Serbia is characterized by high pe ceptibility, worrisome rates of MDR and XDR, as w versity. These findings provide a basis for further in erotypes and genotypes that can be expected after the routine introduction of PCVs.

IMA opravdanja!



frontiers | Frontiers in Microbiology

Original Research
25 August 2023
10.3389/fmicb.2023.1244364

Check for updates

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RECEIVED 22 June 2023
ACCEPTED 02 August 2023
PUBLISHED 21 August 2023

Serotype distribution, antimicrobial susceptibility and molecular epidemiology of invasive *Streptococcus pneumoniae* in the nine-year period in Serbia

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Simultana aplikacija

Emerging Microbes & Infections
2020, VOL. 9
https://doi.org/10.1080/22221751.2020.1854624

EMi Taylor & Francis

OPEN ACCESS Check for updates

Dual influenza and pneumococcal vaccination was associated with lower short-term risks of all-cause and acute respiratory hospitalizations among the elderly in Shenzhen, China: a retrospective cohort study

Yawen Jiang [a]*, Zhaojia Ye [b]*, Daqin Chen [a] and Yuelong Shu [a]

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ABSTRACT

The present study evaluated the real-world effectiveness of influenza and pneumococcal dual-vaccination among Chinese elderly, the evidence on which was absent. Outpatient and inpatient claims databases from Jan 1, 2015 to Apr 1, 2017 of persons at least 60 years old in Shenzhen, China were merged with electronic records of influenza vaccines and 23-valent pneumococcal polysaccharide vaccines (PPSV23) from Oct 1, 2016 - May 31, 2017. Individuals who were vaccinated with influenza between Nov 1 and Dec 31, 2016 and received PPSV23 30 days within the date of influenza vaccination were defined as the vaccinated group. A control group consisted of individuals that received neither of the vaccines was constructed by matching on year of birth, sex, and district. The two outcomes were all-cause and acute respiratory hospitalizations. Difference-in-difference (DiD) logistic regressions that were preceeded with an entropy balancing (EB) process were used to analyse the effectiveness of dual-vaccination. A total of 48,116 eligible individuals were identified in the vaccinated group, which were matched by 93,692 individuals in the control group. The EB-DiD analyses estimated that dual-vaccination was associated with lower short-term risks of all-cause (odds ratio: 0.59, CI: 0.55-0.63) and acute respiratory (odds ratio: 0.49, CI: 0.41-0.59) hospitalizations.

ARTICLE HISTORY Received 23 September 2020; Revised 17 November 2020; Accepted 18 November 2020

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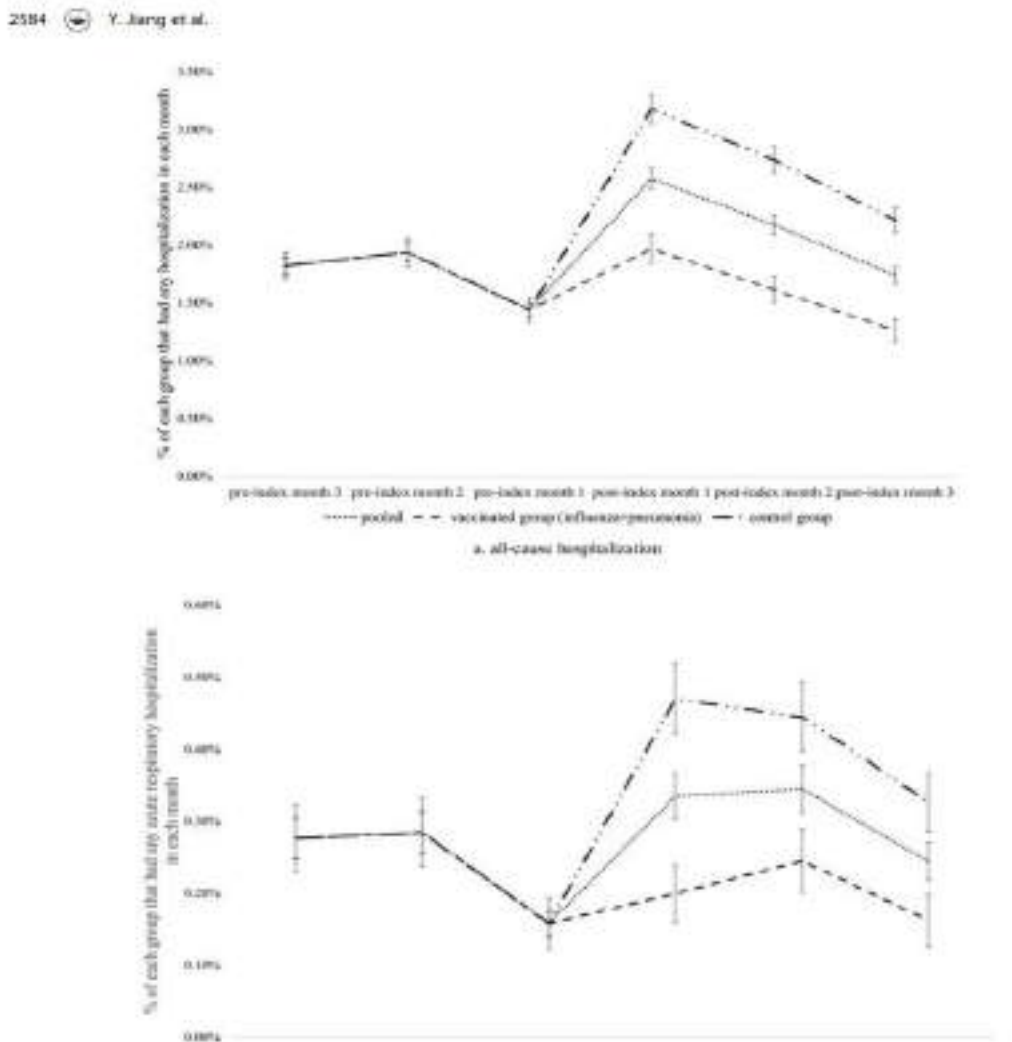
Simultana aplikacija



Rezultati studije sugeriše da je **simultano davanje** trovalentne vakcine protiv gripa i PPV23 bilo povezano sa **41% nižim rizikom** od **svih uzroka hospitalizacije** i sa **51% nižim rizikom** od **hospitalizacije zbog akutne respiratorne infekcije.**

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

SIMULTANA VERSUS SEKVENCIJALNA APLIKACIJA

HUMAN VACCINES & IMMUNOTHERAPEUTICS
2018, VOL. 14, NO. 8, 1923–1930
https://doi.org/10.1080/21645515.2018.1455476

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Immunogenicity of simultaneous versus sequential administration of a 23-valent pneumococcal polysaccharide vaccine and a quadrivalent influenza vaccine in older individuals: A randomized, open-label, non-inferiority trial

Kei Nakashima[a], Masahiro Aoshima[a], Satoko Ohfuji[b], Satoshi Yamawaki[a], Masahiro Nemoto[a], Shinya Hasegawa[c], Satoshi Noma[a], Masafumi Misawa[a], Naoto Hosokawa[d], Makito Yaegashi[c], and Yoshihito Otsuka[e]

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ABSTRACT

It is unclear whether simultaneous administration of a 23-valent pneumococcal polysaccharide vaccine (PPSV23) and a quadrivalent influenza vaccine (QIV) produces immunogenicity in older individuals. This study tested the hypothesis that the pneumococcal antibody response elicited by simultaneous administration of PPSV23 and QIV in older individuals is not inferior to that elicited by sequential administration of PPSV23 and QIV. We performed a single-center, randomized, open-label, non-inferiority trial comprising 162 adults aged ≥65 years randomly assigned to either the simultaneous (simultaneous injections of PPSV23 and QIV) or sequential (control; PPSV23 injected 2 weeks after QIV vaccination) groups. Pneumococcal immunoglobulin G (IgG) titers of serotypes 23F, 3, 4, 6B, 14, and 19A were assessed. The primary endpoint was the serotype 23F response rate (a ≥2-fold increase in IgG concentrations 4–6 weeks after PPSV23 vaccination). With the non-inferiority margin set at 20% fewer patients, the response rate of serotype 23F in the simultaneous group (77.8%) was not inferior to that of the sequential group (77.6%; difference, 0.1%; 90% confidence interval, −10.8% to 11.1%). None of the pneumococcal IgG serotype titers were significantly different between the groups 4–6 weeks after vaccination. Simultaneous administration did not show a significant decrease in seroprotection odds ratios for H1N1, H3N2, or B/Phuket influenza strains other than B/Texas. Additionally, simultaneous administration did not increase adverse reactions. Hence, simultaneous administration of PPSV23 and QIV shows an acceptable immunogenicity that is comparable to sequential administration without an increase in adverse reactions. (This study was registered with ClinicalTrials.gov [NCT02592486]).

ARTICLE HISTORY
Received 22 December 2017
Accepted 9 March 2018

KEYWORDS
23-valent pneumococcal polysaccharide vaccine; Quadrivalent influenza vaccine; Immunogenicity; Simultaneous administration; Elderly population

Glavni nalazi studije ove Japanske studije

- Pre izvođenja ove studije nije bilo dovoljno dokaza da li **istovremeno davanje** PPV23 i četvorovalentne vakcine protiv gripa daju **neki imuni odgovor** kod starijih.
- Urađeno je **poređenje nivoa imunog odgovora** nakon simultane imunizacije i sekvencijalno-odvojeno (PPV23 i dve nedelje posle davanja četvorovalentne vakcine protiv gripa).
- Procenjivani su nivoi IgG na šest NAJINVAZIVNIJIH serotipova za pneumokoknu bolest iz PPV23: **3, 4, 6B, 14, 19A, 23F**.
- Nijedan od merenih nivoa IgG pneumokoknih serotipova **nije se razlikovao** nakon 4-6 nedelja nakon vakcinacije u obe grupe niti je nivo seroprotekcije bio niži za viruse gripa tipa A(H1N1), A(H3N2) ili B / Yamagatu sojeve, osim za Tip B /Victoria.
- Dodatni nalaz: Istovremena administacija ove dve vakcine **nije povećala stopu neželjenih reakcija**.
- **ZAKLJUČAK**: Istovremeno davanje PPV23 i četvorovalentne vakcine protiv gripa ima prihvatljivu imunogenost koja je uporediva sa njihovom sekvencijalnom primenom, bez porasta stopa neželjenih reakcija.

Simultana aplikacija

Effects of a large-scale intervention with influenza and 23-valent pneumococcal vaccines in adults aged 65 years or older: a prospective study

Brith Christenson, Per Lundbergh, Jonas Hedlund, Åke Örtqvist

Summary

Background The effectiveness of influenza and pneumococcal vaccination in the prevention of hospital admissions and death has not been assessed prospectively. We have therefore examined the effects of influenza and pneumococcal vaccination in individuals aged 65 years and older in a 3-year prospective study, between Dec 1, 1998 and May 31, 1999.

Methods All individuals in Stockholm County aged 65 years or older (259 627) were invited to take part in a vaccination campaign against influenza and pneumococcal infection. We recorded for all vaccine recipients (100 242) name, and date of birth, and whether they had been given both or one of the vaccines. All individuals (≥65 years) admitted to hospital in Stockholm County with influenza and pneumonia related diagnoses were identified between Dec 1, 1998, and May 31, 1999.

Findings The incidence (per 100 000 inhabitants per year) of hospital treatment was lower in the vaccinated than in the unvaccinated cohort for all diagnoses: 283 versus 484 (−46% [95% CI 34–56]) for influenza; 2199 versus 3097 (−29% [24–34]) for pneumonia; 64 versus 100 (−36% [3–58]) for pneumococcal pneumonia; and 20 versus 40 (−52% [1–77]) for invasive pneumococcal disease. The total mortality was 57% (55–60) lower in vaccinated than in unvaccinated individuals (15·1 *vs* 34·7 deaths per 1000 inhabitants).

Interpretation These findings show that general vaccination leads to substantial health benefits and to a reduction of mortality from all causes in this age group.

Lancet 2001; **357:** 1008–11

Introduction

Influenza and pneumonia, the latter often caused by *Streptococcus pneumoniae*, are major causes of morbidity and mortality in elderly people, especially in those with chronic medical conditions.[1,2] However, influenza and pneumococcal vaccines have been little used in many countries, which may partly be a result of the uncertain benefits of vaccination.

Although findings from a prospective randomised trial have shown that influenza vaccination lowers the risk of clinically confirmed and laboratory-confirmed influenza in elderly people,[3] a reduction in the frequency of more severe disease such as influenza or pneumonia requiring hospital admissions has been shown only by findings from case control and retrospective cohort studies.[4–8] Prospective vaccination trials with the 23-valent, pneumococcal polysaccharide vaccine in preventing pneumonia in elderly people are inconclusive.[9–13] However, Nichol and colleagues[11] showed in a retrospective cohort study that pneumococcal vaccination of elderly people with chronic lung disease was associated with reduced hospital admissions for pneumonia. This protective effect was additional to that of influenza vaccination during the influenza season. A 50% to 70% effectiveness of pneumococcal vaccine in prevention of invasive pneumococcal disease in elderly people has been shown in case-control studies and indirect cohort studies.[14–16] In prospective studies,[9,11] protection by the vaccine proved the same as in these less powerful studies. Thus, the efficacy of both these vaccines in the prevention of severe influenza, pneumonia, and invasive pneumococcal disease in elderly people needs to be confirmed by prospective intervention studies.

The population of Sweden is about 9 million, 1·8 million of whom live in Stockholm County. Between 1990 and 1995, only 40–80 per 1000 individuals, of all ages, received influenza vaccination, and only 2000 pneumococcal vaccinations were given yearly. The low rate of vaccination was probably a result of the recommendation that vaccinations should be given mainly to people with chronic respiratory and heart conditions

Glavni nalazi studije ove Švedske studije

- Vakcinacija **protiv gripa i sa PPV23**
- Bilo oko 260 hiljada kandidata ≥65 godina, **uključeno njih 100 hiljada** - 39% targetiranih

Findings The incidence (per 100 000 inhabitants per year) of hospital treatment was lower in the vaccinated than in the unvaccinated cohort for all diagnoses: 263 versus 484 (−46% [95% CI 34–56]) for influenza; 2199 versus 3097 (−29% [24–34]) for pneumonia; 64 versus 100 (−36% [3–58]) for pneumococcal pneumonia; and 20 versus 40 (−52% [1–77]) for invasive pneumococcal disease. The total mortality was 57% (55–60) lower in vaccinated than in unvaccinated individuals (15·1 vs 34·7 deaths per 1000 inhabitants).

Diagnosis	Incidence*		Reduction in hospital admission (95% CI)	p
	Vaccinated	Unvaccinated		
Influenza with or without pneumonia	263	484	46% (34–56)	<0·0001
Pneumonia	2199	3097	29% (24–34)	<0·0001
Pneumococcal pneumonia	64	100	36% (3–58)	0·0290
Invasive pneumococcal infection	20	41	52% (1–77)	0·0386

*Incidence per 100 000 inhabitants per year.

Table 3: **Incidence of admission for endpoint diagnoses**

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

Bezbednost vakcine

[Safety evaluation of mass inoculation of 23 valent pneumococcal polysaccharide vaccine among elderly people aged 60 and above in Shanghai from 2013 to 2017]

[Article in Chinese]
X Guo [1], J Qiu [1], J Ren [1], J C Liu [1], X D Sun [1]

Affiliations + expand

PMID: 32907280 DOI: 10.3760/cma.j.cn112150-20191011-00779

Abstract in English, Chinese

Objective: To evaluate the safety of 23 Valent Pneumococcal Polysaccharide Vaccine (PPV23) among eldly people aged 60 and above in Shanghai. **Methods:** A total of 1 310 660 monitoring data of adverse events following immunization (AEFI) of PPV23 among people aged 60 and above were collected through the National AEFI Surveillance System from September 14, 2013 to December 31, 2017 in Shanghai. And the descriptive epidemiological methods were used for analysis. **Results:** 433 cases of AEFI were reported from September 14, 2013 to December 31, 2017, with the incidence rate of AEFI was 33.04/100 000 doses. The general reactions were reported as 392 cases (90.53%), with 17 cases of abnormal reactions (3.93%), 23 cases of coincidences (5.31%) and 1 case of psychogenic reactions (0.23%). The reported incidence rates of general reactions and abnormal reactions of free PPV23 inoculation among elderly people in urban areas were 41.31 per 100 000 doses and 1.91/100 000 doses, respectively, which were higher than those in suburban areas (24.18/100 000 doses, 1.32/100 000 doses) and exurban areas (27.84/100 000 doses, 0.59/100 000 doses). The reported incidence rate of general reaction in females (35.38/100 000 doses) was higher than that in males (24.06/100 000 doses), and the reported incidence rate of abnormal reaction in males (1.58/100 000 doses) was higher than that in females (1.08/100 000 doses). The reported incidence rates of general and abnormal reactions were the highest in 60-64 years old group (62.65/100 000 doses and 4.87/100 000 doses, respectively). In addition, all patients with general reactions or abnormal reactions were better or cured. **Conclusion:** PPV23 vaccination is safe among people aged 60 and above in Shanghai.

Keywords: 23 valent pneumococcal polysaccharide vaccine; Aged; Safety evaluation; Surveillance.

- **1 310 660** osoba ≥60 godina **u Šangaju**.
- Od 14. septembra **2013**. do 31. decembra **2017**. Prijavljeno je 433 neželjena događaja, sa stopom od 33,04/100 000 doza.
- Opšte reakcije su prijavljene kod 392 slučaja (90,53%), 17 slučajeva težih reakcija (3,93%), 23 slučaja koincidentalnih (5,31%) i 1 slučaj psihogenih reakcija (0,23%).
- Prijavljene stopa opštih reakcija kod žena (35,38/100 000 doza) bila je veća od one kod muškaraca (24,06/100 000 doza).
- Prijavljene stope incidencije neželjenih reakcija bile su najveće u grupi od 60-64 godine.
- Svi pacijenti sa opštim reakcijama ili težim reakcijama **bili su izlečeni**.
- **Zaključak**: **PPV23 vakcinacija je bezbedna među osobama ≥60 godina**.

Bezbednost vakcine

Post-licensure safety surveillance of 23-valent pneumococcal polysaccharide vaccine in the Vaccine Adverse Event Reporting System (VAERS), 1990–2013

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ARTICLE INFO

Article history:
Received 25 November 2015
Received in revised form 6 April 2016
Accepted 7 April 2016
Available online 15 April 2016

Keywords:
23-Valent pneumococcal polysaccharide vaccine
Vaccines
Immunizations
Vaccine safety
Surveillance
Vaccine Adverse Event Reporting System (VAERS)

ABSTRACT

Background: 23-Valent pneumococcal polysaccharide vaccine, trade name Pneumovax®23 (PPSV23), has been used for decades in the United States and has an extensive clinical record. However, limited post-licensure safety assessment has been conducted.

Objective: To analyze reports submitted to the Vaccine Adverse Event Reporting System (VAERS) following PPSV23 from 1990 to 2013 in order to characterize its safety profile.

Methods: We searched the VAERS database for US reports following PPSV23 for persons vaccinated from 1990 to 2013. We assessed safety through: automated analysis of VAERS data, crude adverse event (AE) reporting rates based on PPSV23 doses distributed in the US market, clinical review of death reports and reports involving vaccine administered to pregnant women, and empirical Bayesian data mining to assess for disproportional reporting.

Results: During the study period, VAERS received 25,168 PPSV23 reports; 92% were non-serious, 67% were in females and 86% were in adults aged ≥19 years. When PPSV23 was administered alone, fever (43%), injection site erythema (28%) and injection site pain (25%) were the most commonly reported non-serious AEs in children. Injection site erythema (32%), injection site pain (27%) and injection site swelling (23%) were the most commonly reported non-serious AEs in adults. Of serious reports (2120, 8% of total), fever was most commonly reported in both children (69%) and adults (39%). There were 66 reports of death, four in children and 62 in adults. Clinical review of death reports did not reveal any concerning patterns that would suggest a causal association with PPSV23. No disproportional reporting of unexpected AEs was observed in empirical Bayesian data mining.

Conclusions: We did not identify any new or unexpected safety concerns for PPSV23. The VAERS data are consistent with safety data from pre-licensure clinical trials and other post-licensure studies.

Published by Elsevier Ltd.

- Analizirana je učestalost neželjenih događaja od 1990. do 2013. godine (**SAD**) na **25.168** vakcinisanih sa **PPV23**.
- Groznica (43%), eritem (28%) i bol na mestu injekcije (25%) bili su najčešće prijavljeni neželjeni efekti **kod dece**.
- Eritem (32%), bol (27%) i otok na mestu injekcije (23%) bili su najčešće prijavljeni neželjeni efekti **kod odraslih**.
- Bilo je 66 prijava smrti, četiri kod dece i 62 kod odraslih. Naknadni uvid u dokumentaciju izveštaja o smrti nije otkrio nikakve dokaze koji bi ukazivali na uzročnu povezanost sa davanjem PPV23.
- **Zaključak**: Nisu identifikovani nikakvi novi ili neočekivani bezbednosni problemi u vezi sa davanjem PPV23.

Bezbednost vakcine-neželjene reakcije

Pneumococcal Vaccines Adverse Reactions

	PPSV23	PCV
Local reactions	30%-50%	5%-49%
Fever, myalgia	<1%	24-35%
Febrile seizures	---	Rare: 1-14/100,000; with IIV 4 -45/ 100,000
Severe adverse reactions	rare	8% (local)

CDC. Pneumococcal Disease and Pneumococcal Vaccines. Pink Book Webinar Series September 24, 2018

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

Imunogenost vakcine

Evaluation of antibody levels over 3 years after 23-valent pneumococcal polysaccharide vaccination in patients with pulmonary diseases receiving steroids and immunosuppressive agents

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Affiliations + expand

PMID: 25448831 DOI: 10.1016/j.clinbiochem.2014.11.005

Abstract

Objectives: Pneumococcal capsular polysaccharide vaccine is a mainstay for prevention of Streptococcus pneumoniae infection in adults. There is the possibility that this vaccine is less effective in patients undergoing immunosuppressive therapy. In the present study, we aimed to evaluate the immune response following 23-valent pneumococcal polysaccharide vaccination in pulmonary disease patients receiving steroids and immunosuppressive agents (immunosuppressive group).

Design and methods: Antibody levels were measured over 3 years in the immunosuppressive group (median age: 68.5 years) and in aged match pulmonary disease patients not being treated with immunosuppressive therapy (control group) using enzyme-linked immunosorbent assays.

Results: The geometric mean antibody levels were significantly increased after vaccination in both groups ($p < 0.05$) and remained above baseline for 3 years. The fold increases 1 month after vaccination were 9.4 (95% confidence interval [CI]: 5.7-15.6) and 8.8 (95% CI: 5.8-13.2) in the immunosuppressive and control groups, respectively ($p = 0.810$). There was no significant difference in the proportion of subjects with a ≥ two-fold increase of antibody level between the immunosuppressive and control groups at any point.

Conclusions: These results suggest that immunization with the 23-valent pneumococcal polysaccharide vaccine was effective, even in patients undergoing immunosuppressive therapy and should be recommended for such patients.

- Pošlo se **od pretpostavke da je ova vakcina manje efikasna kod pacijenata koji su na imunosupresivnoj terapiji**.
- Decembar 2009-April 2010. godine, **Japan**
- **Cilj**: da se proceni imuni odgovor nakon vakcinacije sa **PPV23 kod pacijenata sa oboljenjima pluća koji su primali steroide i imunosupresivnu terapiju**.
- Nivoi antitela su mereni tokom 3 godine u imunosupresivnoj grupi (prosečan uzrast: 68,5 godina) i kod pacijenata sa oboljenjima pluća sa odgovarajućim uzrastom koji nisu lečeni imunosupresivnom terapijom (kontrolna grupa).
- **Geometrijski srednji nivoi antitela su značajno povećani posle vakcinacije u obe grupe** ($p < 0,05$) **i ostali su iznad početnih vrednosti 3 godine**. **Nije bilo značajne razlike** u proporciji ispitanika sa dvostrukim povećanjem nivoa antitela između grupe na imunosupresivnoj terapiji i kontrolne grupe u bilo kom trenutku.
- **Zaključak**: Ovi rezultati sugerišu da je imunizacija sa PPV23 vakcinom bila efikasna, čak i kod pacijenata koji su podvrgnuti imunosupresivnoj terapiji i da je i takvim pacijentima treba preporučiti.

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

Efektivnost vakcine

Meta-Analysis · Eur Heart J Qual Care Clin Outcomes. 2021 Jan 25;7(1):97-106.
doi: 10.1093/ehjqcco/qcaa030.

Pneumococcal vaccination in adults at very high risk or with established cardiovascular disease: systematic review and meta-analysis

Miguel Marques Antunes [1], Gonçalo S Duarte [2,3], Dulce Brito [4], Margarida Borges [2,3], João Costa [2,3,5], Joaquim J Ferreira [2,3,6], Fausto J Pinto [4], Daniel Caldeira [2,3,4]

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PMID: 32259237 DOI: 10.1093/ehjqcco/qcaa030

Abstract

Aims: There are several guidelines that recommend pneumococcal vaccination (PPSV23 and/or PCV13) in adults with a history of cardiovascular disease (established heart failure, coronary disease and cerebrovascular disease) or at a very high risk of cardiovascular disease. However, there is no randomized controlled trial (RCT) systematic review that evaluates the impact of vaccination on all-cause mortality compared to no vaccination in this particular population. Our objective is to conduct a systematic review and meta-analysis of the impact of pneumococcal vaccination in the referred population.

Methods and results: We searched CENTRAL and MEDLINE for relevant RCTs and observational studies. Data were screened, extracted, and appraised by two independent reviewers. We pooled results using a random effects model, and used hazard ratios (HRs) with 95% confidence intervals (CIs) to assess measure of effect. The primary outcome was all-cause mortality and we assessed the confidence in the evidence using the GRADE framework. No RCTs were found. Seven observational studies were included for analyses. Pooled results from five studies enrolling a total of 163 756 participants showed a significant decrease in all-cause mortality (HR 0.78, 95% CI 0.73-0.83, very low confidence), without statistically significant heterogeneity (χ^2 test P = 0.21; I2 = 32%).

Conclusions: Pneumococcal vaccination was associated with a 22% decrease of all-cause mortality in patients with cardiovascular disease or at a very high cardiovascular risk. However, limitations due to study design and the serious risk of bias in three of the included studies leads to a decreased level of result confidence.

- Postoji nekoliko smernica koje preporučuju vakcinaciju protiv pneumokoka (PPV23 i/ili PCV13) kod odraslih sa kardiovaskularnim bolestima (**srčana insuficijencija, koronarna bolest i cerebrovaskularna bolest**) ili onih sa veoma visokim rizikom od kardiovaskularnih bolesti.
- **Cilj: sistematski pregled i meta-analiza** uticaja vakcinacije protiv pneumokoka na pomenutu osetljivu populaciju.
- **Metode i rezultati**: Objedinjeni rezultati iz **pet studija** koje su uključivale ukupno **163 756** učesnika pokazali su **značajno smanjenje mortaliteta od svih gore navedenih uzroka** (HR 0,78, 95% CI 0,73-0,83).
- **Zaključak**: Vakcinacija protiv pneumokoka je bila povezana sa smanjenjem mortaliteta od svih uzroka za 22% kod pacijenata sa kardiovaskularnim oboljenjima ili onih sa veoma visokim kardiovaskularnim rizikom.

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

Ostale publikacije na temu…

Specijalne populacije

Renal (Kidney failure)

23-valent pneumococcal polysaccharide vaccine improves survival in dialysis patients by preventing cardiac events - PubMed (nih.gov)

Long-term response to vaccination against pneumococcal antigens in kidney transplant recipients. - Abstract - Europe PMC

Hepatic

Immunogenicity of the 23-valent pneumococcal polysaccharide vaccine in Alaska Native chronic alcoholics compared with nonalcoholic Native and non-Native controls - PubMed (nih.gov)

Respiratory

Immunogenicity of 23-Valent Pneumococcal Polysaccharide Vaccine in Patients with Chronic Obstructive Pulmonary Disease - Hebei Province, China, September-December, 2019 - PubMed (nih.gov)

Effectiveness of a 23-valent pneumococcal polysaccharide vaccine for the prevention of pneumococcal pneumonia in the elderly with chronic respiratory diseases: a case-control study of a single center - PubMed (nih.gov)

Evaluation of antibody levels over 3 years after 23-valent pneumococcal polysaccharide vaccination in patients with pulmonary diseases receiving steroids and immunosuppressive agents - PubMed (nih.gov)

Cardiovascular

Pneumococcal vaccination in adults at very high risk or with established cardiovascular disease: systematic review and meta-analysis - PubMed (nih.gov)

Prevention of acute myocardial infarction and stroke among elderly persons by dual pneumococcal and influenza vaccination: a prospective cohort study - PubMed (nih.gov)

Elderly

Effectiveness of Pneumococcal Vaccination Against Pneumococcal Pneumonia Hospitalization in Older Adults: A Prospective, Test-Negative Study - PubMed (nih.gov)

Pneumococcal vaccine uptake and vaccine effectiveness in older adults with invasive pneumococcal disease in Germany: A retrospective cohort study - The Lancet Regional Health – Europe

Impact of 23-valent pneumococcal polysaccharide vaccination on the frequency of pneumonia-related hospitalization and survival in elderly patients with prostate cancer: A seven-year nationwide matched cohort study - PubMed (nih.gov)

[Efficacy evaluation after 5 years of inoculation of 23 valent pneumococcal polysaccharide vaccine for the elderly aged 60 years old and above in Shanghai during 2013-2018] - PubMed (nih.gov)

The estimated impact of the 5-year national vaccination program on the trend of 23-valent pneumococcal polysaccharide vaccine vaccination rates in the elderly in Japan, 2009-2018 - PubMed (nih.gov)

Revaccination with 23-valent pneumococcal polysaccharide vaccine in the Japanese elderly is well tolerated and elicits immune responses - PubMed (nih.gov)

Effectiveness of 23-valent pneumococcal polysaccharide vaccine in adults aged 60 years and over in the Region of Madrid, Spain, 2008-2011 - PubMed (nih.gov)

Impact of pneumococcal polysaccharide vaccine in people aged 65 years or older - PubMed (nih.gov)

Effectiveness of the 23-Valent Pneumococcal Polysaccharide Vaccine (PPV23) against Pneumococcal Disease in the Elderly: Systematic Review and Meta-Analysis - PubMed (nih.gov)

Protective effects of the 23-valent pneumococcal polysaccharide vaccine in the elderly population: the EVAN-65 study - PubMed (nih.gov)

Effectiveness of the 23-valent pneumococcal polysaccharide vaccine against invasive pneumococcal disease among 948,263 individuals ≥ 65 years of age: a Danish cohort study | SpringerLink

Kome dati Pneumovax® 23 U SRBIJI

Zakon o zaštiti stanovništva od zaraznih bolesti, Službeni Glasnik Republike Srbije br. 15/2016, 68/2020, 136/2020. Dostupno na: https://www.paragraf.rs/propisi/zakon_o_zastiti_stanovnistva_od_zaraznih_bolesti.html .
Pravilnik o imunizaciji i načinu zaštite lekovima, Službeni Glasnik Republike Srbije br. 88/2017, 11/2018, 14/1018, 48/2018, 58/2018, 104/2018, 6/2021, 52/2021 i 66/2022. Dostupno na: https://www.paragraf.rs/propisi/pravilnik_o_imunizaciji_i_nacinu_zastite_lekovima.html.
Pravilnik o programu obavezne i preporučene imunizacije stanovništva protiv određenih zaraznih bolesti, Službeni Glasnik Republike Srbije br. 65/2020. Dostupno na: https://www.paragraf.rs/propisi/pravilnik-o-programu-obavezne-i-preporucene-imunizacije-stanovnistva-protiv-odredjenih-zaraznih-bolesti.html.

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

Obavezan program imunizacije-poseban rizik-GRIP

Vakcina protiv gripa	Indikacije	Broj obveznika	Broj doza za vakcinaciju	Broj doza za revakcinaciju	Potreban broj doza
KLINIČKE INDIKACIJE	SVE TRUDNICE i STARIJI od 6 meseci :				
	oboleli od hroničnih plućnih bolesti + astma		1		
	oboleli od hroničnih kardiovaskularnih bolesti – isključujući hipertenziju!		1		
	oboleli od metaboličkih poremećaja + DM + BMI>40		1		
	osobe sa bubrežnom disfunkcijom		1		
	osobe sa neurološkim poremećajima		1		
	osobe sa hemoglobinopatijom		1		
	osobe sa imunosupresijom (HIV+/AIDS) + asplenija		1		
	lica sa malignim oboljenjima, bez obzira na trenutni terapijski status		1		
	primaoci transplantata		1		
	zdrave osobe starije od 65 godina		1		
	članovi porodice bolesnika u riziku kod koga je vakcinacija protiv gripa kontraindikovana		1		
EPIDEMIOLOŠKE INDIKACIJE	štićenici i zaposleni u gerontološkim centrima		1		
	štićenici i zaposleni u ustanovama socijalne zaštite		1		

Ako je prvi put vakcinacija, mlađi od 9 godina = dve doze u razmaku od mesec dana!

XIX VOJVOĐANSKI DANI OPŠTE MEDICINE

Obavezan program imunizacije-poseban rizik-PNEUMOKOK

PNEUMOKOKNA vakcina	Indikacije	Broj obveznika	Vrsta vakcine	Broj doza za vakc. (PCV13+PPV23)	Broj doza za revakc.	Potreban broj doza
asplenija - anatomska i funkcionalna i srpasta anemija		STARIJI od 2 godine	PCV13+PPV23	2	1	
nefrotski sindrom		STARIJI od 2 godine	PCV13+PPV23	2	1	
simptomatska i asimptomatska HIV infekcija		STARIJI od 2 godine	PCV13+PPV23	2	1	
transplantacija organa i tkiva		STARIJI od 2 godine	PCV13+PPV23	2	1	
maligna oboljenja		STARIJI od 2 godine	PCV13+PPV23	2		
stanja koja dovode do isticanja likvora		STARIJI od 2 godine	PCV13+PPV23	2		
ugradnja kohleranih implantata		STARIJI od 2 godine	PCV13+PPV23	2		
stanja oslabljenog imuniteta		STARIJI od 2 godine	PCV13+PPV23	2	1	
deca u kolektivnom smeštaju		2-5 godina= PCV13		1		
hronične kardiovaskularne i plućne bolesti				1		
šećerna bolest				1		
hronična oboljenja jetre i/ili bubrega				1		
osoba sa multiplom sklerozom koje započinju proceduru lečenja određenim lekom, po mišljenju specijaliste neurologa				1		
česte respiratorne infekcije i otitisi!!!		Stariji od 5 godina= PPV23		1		
neimunizovane dece od navršene dve godine do navršenih pet godina, koja pohađaju predškolsku ustanovu				1		
stariji od 65 godina u kolektivnom smeštaju				1		
nepokretni štićenici u ustanovama socijalne zaštite				1		

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Obavezna aktivna imunizacija primalaca transplantata hematopoetskih matičnih ćelija (THMĆ)

Vrsta vakcine	Vreme posle transplantacije	Broj doza	Vremenski razmak između doza
PCV13	3-6 meseci	3	1-2 meseca
PPV23	12 meseci	1	Najmanje **dva meseca posle** kompletiranja serije sa PCV13
Menactra	6 meseci	1 ili 2 zavisno od uzrasta	
Hib	3-6 meseci	3	1-2 meseca
DTaP-IPV-Hib/DTaP-IPV-dT	6 meseci	3	2 meseca
Protiv gripa	6 meseci	1 ili 2 zavisno od uzrasta	Jednom godišnje
HB (kod seronegativnih)	6 meseci	3	0, 1 i 6 meseci
MMR*	24 meseca	2	4 nedelje
Protiv varičele*	24 meseca	2	6 nedelja

*Kod seronegativnih imunokompetentnih osoba, koje nemaju graft versus host disease koje posle seroloških testiranja nemaju antitela na morbile i/ili zauške i/ili rubeolu ili varičelu

Pacijenti sa multiplom sklerozom

- Hep B vakcina (Anti-HBs negativni): 0, 1 i 6 meseci-kompletnu vakcinaciju treba završiti pre uvođenja lekova koji modifikuju prirodni tok bolesti – DMT (engl. disease modifying therapy). Nije potrebno praviti razmak između poslednje doze vakcine i prve doze leka.

- **Pneumokokna vakcina**: kod osoba sa multiplom sklerozom koje započinju terapiju lekom okrelizumab. Imunizacija se sprovodi davanjem **jedne doze pneumokokne konjugovane polisahridne vakcine** (PCV13, Prevenar 13), **nakon koje se daje jedna doza pneumokokne polisaharidne vakcine** (PPV23, Pneumovax 23) **sa razmakom od najmanje 8 nedelja**. Imunizaciju treba završiti četiri nedelje pre uvođenja leka. **Revakcinacija jednom dozom PPV23 sprovodi se nakon pet godina od vakcinacije ukoliko osoba i dalje prima lek**.

- Imunizacija protiv varičele se sprovodi kod osoba sa multiplom sklerozom (IgG negativni) koje započinju terapiju svim lekovima koji pripadaju grupi DMT, osim preparata interferona beta i glatiramer acetata. Imunizacija se sprovodi davanjem dve doze vakcine protiv varičele (Varilrix), sa razmakom od najmanje šest nedelja između doza i treba je završiti četiri nedelje pre uvođenja leka.

- Lekovi iz grupe DMT: interferon beta 1b, interferon beta 1a s.c., interferon beta 1a i.m., glatiramer acetat, teriflunomid, dimetil-fumarat, natalizumab, fingolimod, alemtuzumab, kladribin tablete, okrelizumab, siponimod.

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Preporučena imunizacija protiv pneumokoka

Vrsta vakcine	Uzrast	Vakcinacija
GRIP-osobe bez posebnog rizika	*od šest meseci do 8 godina*	2
	devet godina i stariji	1
PNEUMOKOKNA	*stariji od 65 godina, bez posebnog rizika - pneumokokna polisaharidna PPV23 (Pneumovax® 23)*	1
HERPES ZOSTER	*u skladu sa uzrastom, primenom vakcine u skladu sa sažetkom karakteristika leka*	1

VAKCINA/ STANJE	Indikacije	Broj doza za vakcinaciju	Broj doza za revakcinaciju
Hepatitis A			
negativan anti HAV	*Hronična oboljenja koja nisu obuhvaćena aktivnom sistematskom imunizacijom*	1	1 (6-12 meseci)-najkasnije posle 3 godine
Hepatitis B			
negativan anti HBs	*Hronična oboljenja koja nisu obuhvaćena aktivnom sistematskom imunizacijom*	3	
PNEUMOKOKNA			
	Hronična oboljenja koja nisu obuhvaćena aktivnom sistematskom imunizacijom	1 Pneumovax® 23	

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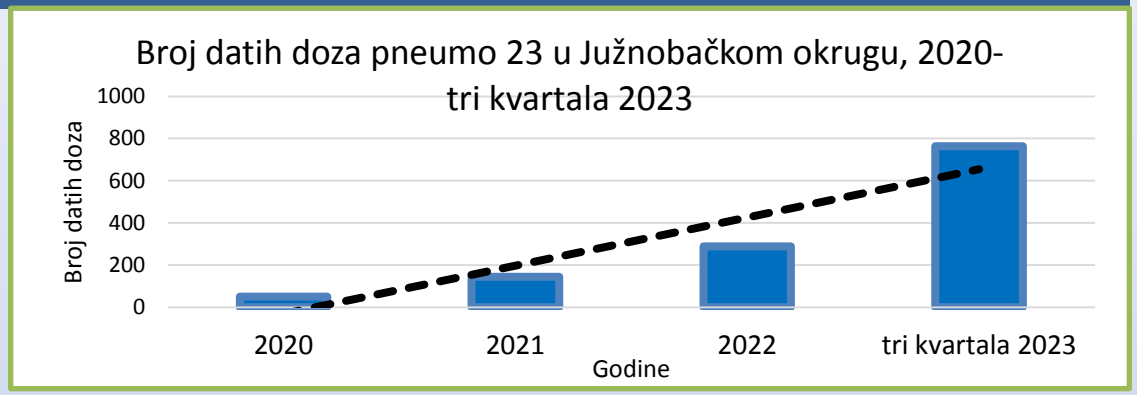
Južnobački okrug: broj datih vakcina PNEUMO 23



2020: 50 doza
2021: 144 doze
2022: 389 doza
I kvartal 2023: 112 doza
II kvartal 2023: 208 doza
III kvartal 2023: 444 doze

Ukupno 764 doze

Četvorovalentna vakcina protiv gripa: sezona 2022/23: Južnobački okrug **30 000 doza (NOVI SAD - oko 12 000 za uzrast ≥65 godina)**

Centar za kontrolu i prevenciju bolesti Instituta za javno zdravlje Vojvodine, Novi Sad. Godišnji izveštaj o sprovedenoj imunizaciji na teritoriji Južnobačkog okruga, 2020-2022.
Centar za kontrolu i prevenciju bolesti Instituta za javno zdravlje Vojvodine, Novi Sad. Devetomesečni izveštaj o sprovedenoj imunizaciji na teritoriji Južnobačkog okruga, 2023.

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HVALA NA PAŽNJI!