Società Italiana di Diabetologia | 1964-2024

ASSOCIAZIONE MEDICI DIABETOLOGI | 1974

Riunione annuale congiunta SID-AMD 2024
Napoli (NA), 5 ottobre 2024
HOTEL ROYAL CONTINENTAL

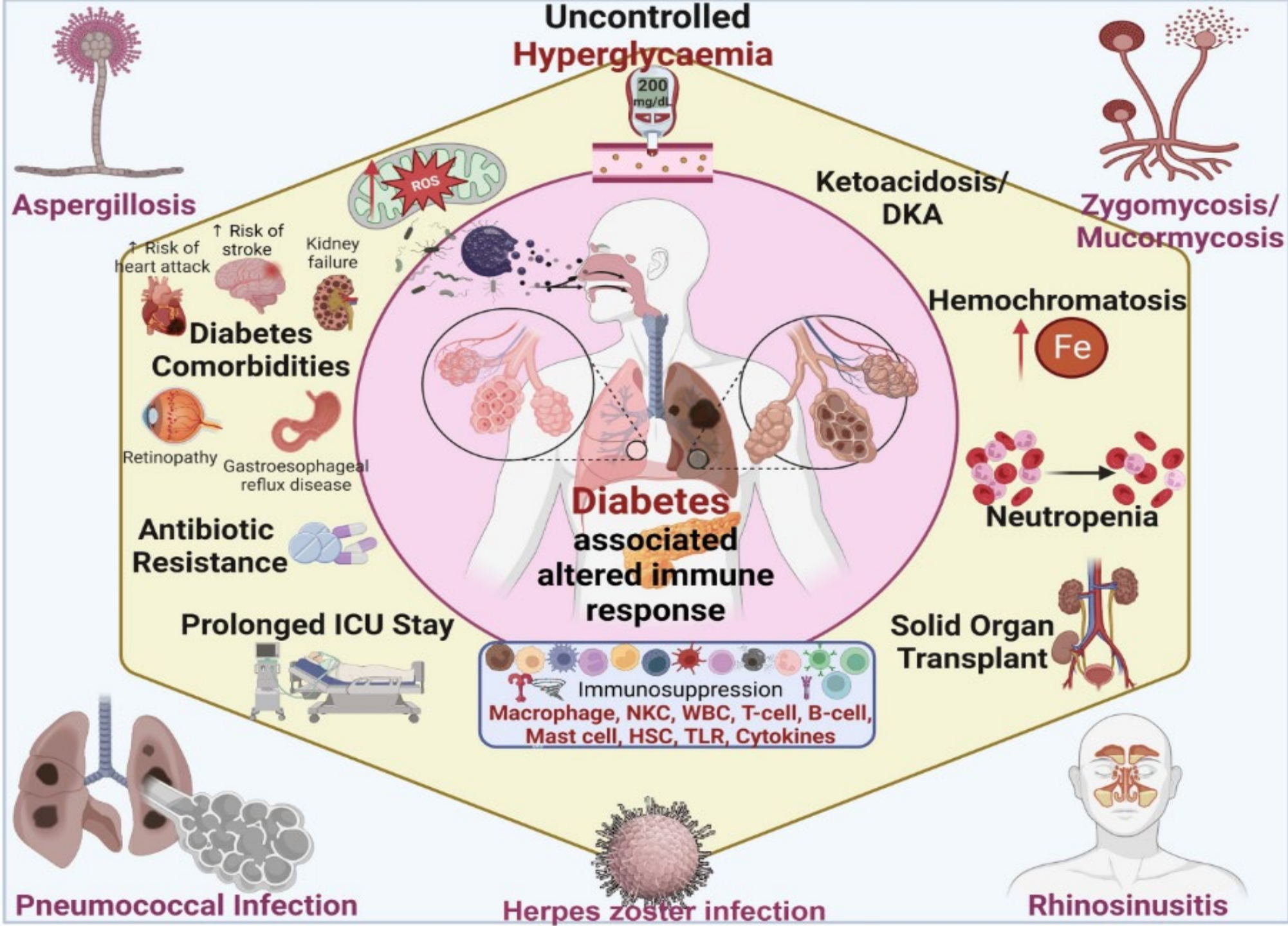
I VACCINI NEL DIABETE

Dott. Domenico La Sala
UOSD Malattie Endocrine, Nutrizione e Ricambio,
AORN S. Giuseppe Moscati, Avellino

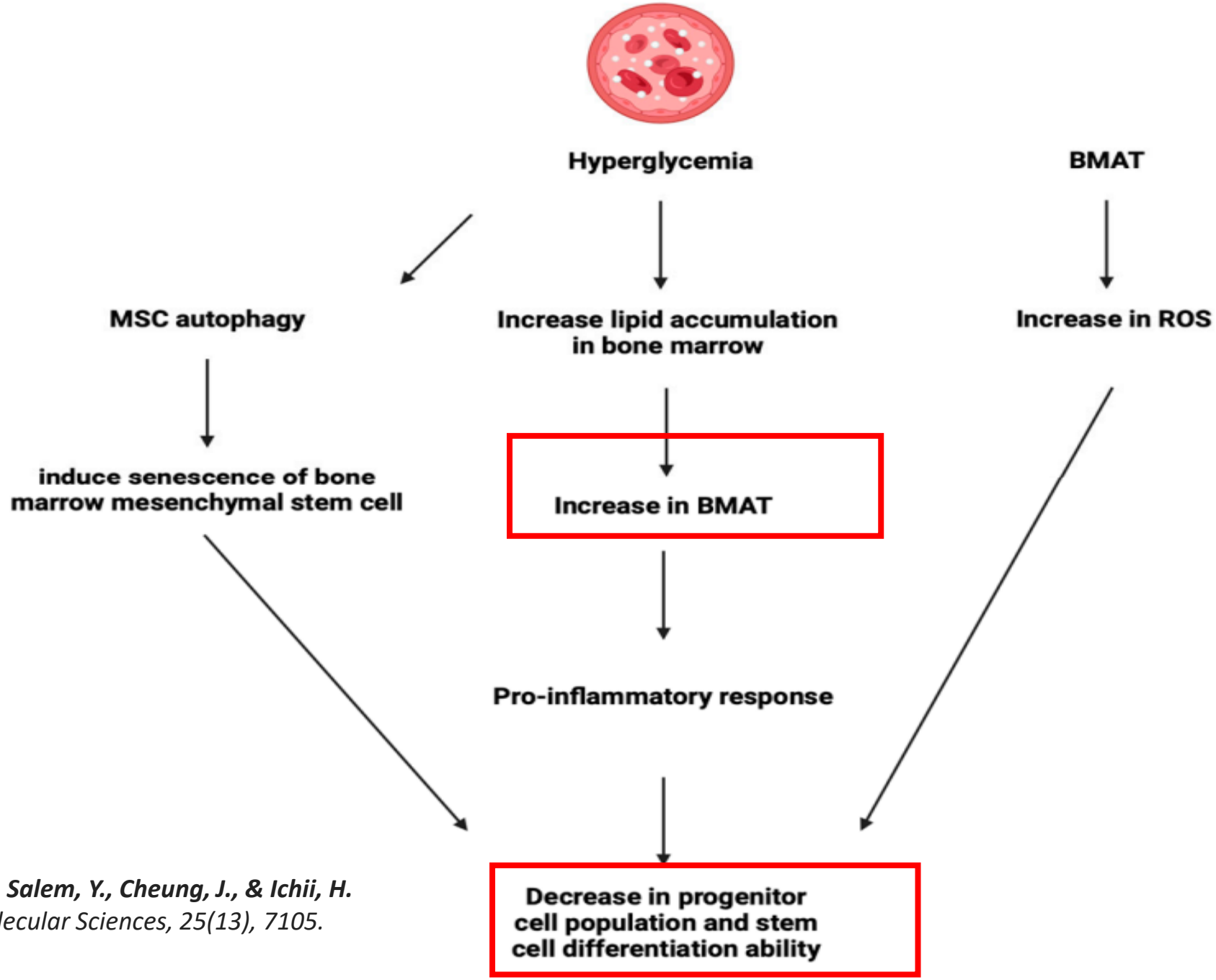
ASPETTI IMMUNOFISIOPATOLOGICI CHIAVE NELLA MALATTIA DIABETICA

biologics

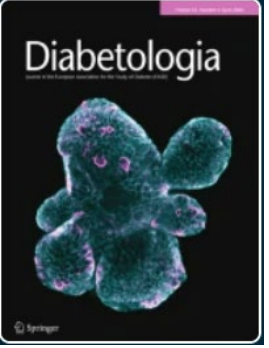
Khanam, A., Hithamani, G., Naveen, J., Pradeep, S. R., Barman, S., & Srinivasan, K. (2023). *Biologics, 3(1), 40-71.*

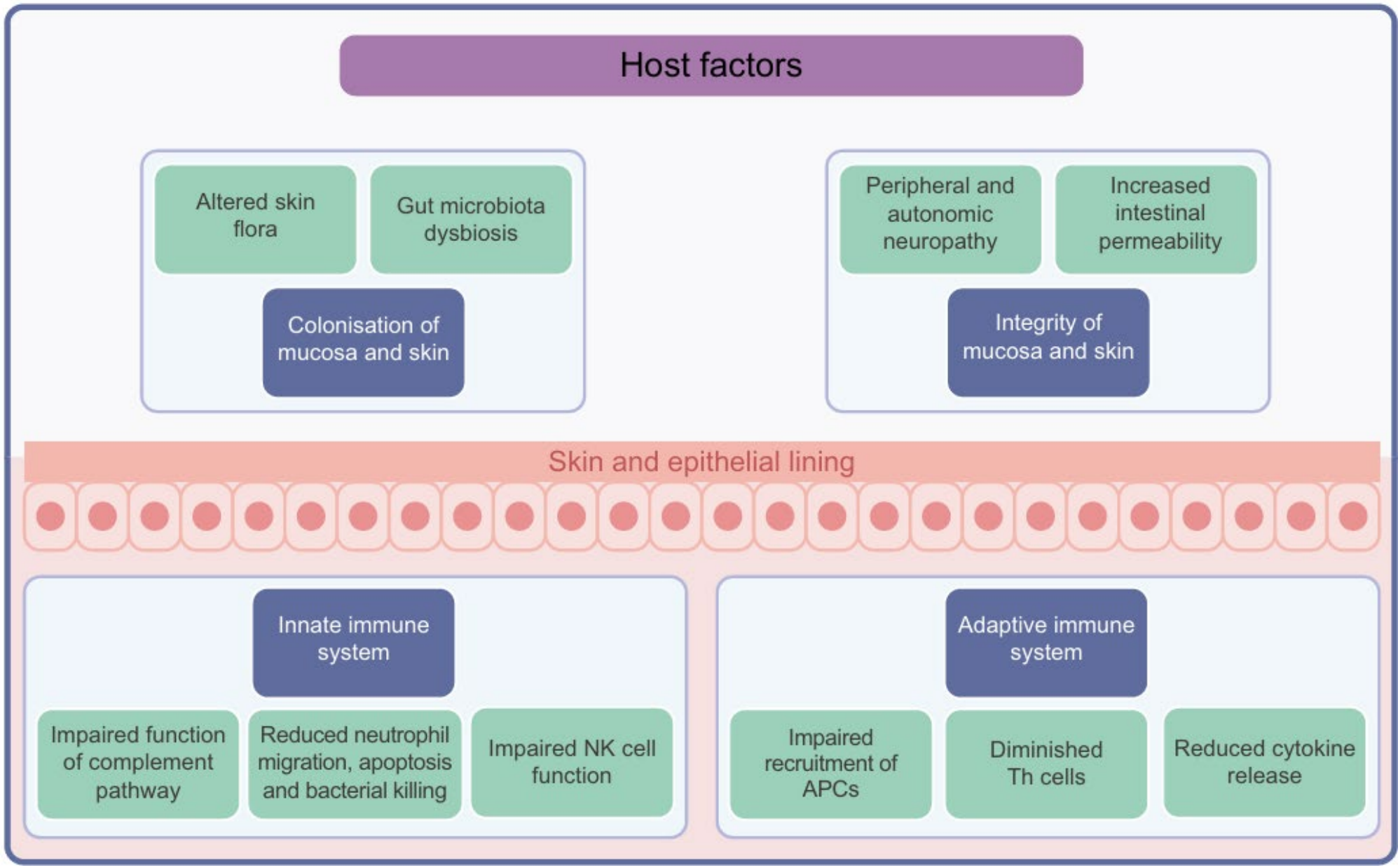


International Journal of
Molecular Sciences



Alexander, M., Cho, E., Gliozheni, E., Salem, Y., Cheung, J., & Ichii, H. (2024). *International Journal of Molecular Sciences, 25(13), 7105.*





Holt, R. I., Cockram, C. S., Ma, R. C., & Luk, A. O. (2024). *Diabetologia, 1-13.*

Table 3. Unadjusted and adjusted associations between diabetes mellitus (DM) and respiratory tract infections, determined by polytomous logistic regression analysis.

Variable	Type 1 DM					Type 2 DM					No. (%) of control patients with hypertension (*n* = 18,911)
	No. (%) of patients (*n* = 705)	Unadjusted OR (95% CI)	*P*[a]	Adjusted OR (95% CI)	*P*[a]	No. (%) of patients (*n* = 6712)	Unadjusted OR (95% CI)	*P*[b]	Adjusted OR (95% CI)	*P*[b]	
URTI											
1 episode	52 (7.4)	1.13 (0.84–1.50)	.419	0.98 (0.73–1.32)	.900	432 (6.4)	0.97 (0.87–1.09)	.602	1.02 (0.91–1.14)	.790	1254 (6.6)
≥2 episodes	8 (1.1)	1.55 (0.76–3.18)	.229	1.18 (0.57–2.46)	.652	61 (0.9)	1.23 (0.91–1.66)	.184	1.32 (0.97–1.80)	.073	140 (0.7)
LRTI											
1 episode	38 (5.4)	1.46 (1.04–2.04)	.028	1.46 (0.99–2.16)	.059	327 (4.9)	1.31 (1.15–1.50)	<.001	1.30 (1.11–1.52)	.001	711 (3.8)
≥2 episodes	2 (0.3)	NA	NA	NA	NA	42 (0.6)	1.64 (1.12–2.41)	.010	1.57 (1.05–2.33)	.027	73 (0.4)

Muller, L. M. A. J., Gorter, K. J., Hak, E., Goudzwaard, W. L., Schellevis, F. G., Hoepelman, A. I. M., & Rutten, G. E. H. M. (2005). *. Clinical infectious diseases, 41(3), 281-288.*

Table 2—SMRs (95% CI) for pneumonia-, septicemia-, and osteomyelitis-related mortality in diabetes by sex and diabetes type

	Males				Females			
	Deaths				Deaths			
	Observed	Expected	SMR	95% CI	Observed	Expected	SMR	95% CI
Type 1 diabetes								
Pneumonia	28	5	6.23	4.3–9.0	13	3	5.0	2.9–8.6
Septicemia	24	2	10.0	6.7–14.9	15	2	9.7	5.9–16.1
Osteomyelitis	3	0*	16.3	5.2–50.4	5	0*	58	24.1–139.3
Type 2 diabetes								
Pneumonia	1,128	913	1.2	1.2–1.3	989	824	1.2	1.1–1.3
Septicemia	646	356	1.8	1.7–2.0	563	291	1.9	1.8–2.1
Osteomyelitis	90	16	3.5	2.9–4.3	49	17	2.9	2.2–3.9

Magliano, D. J., Harding, J. L., Cohen, K., Huxley, R. R., Davis, W. A., & Shaw, J. E. (2015). *Diabetes care, 38(7), 1274-1280.*

Diabetes, Glycemic Control, and Risk of Hospitalization With Pneumonia

Kornum, J. B., Thomsen, R. W., Riis, A., Lervang, H. H., Schønheyder, H. C., & Sørensen, H. T. (2008). *Diabetes care, 31(8), 1541-1545.*

RRs for hospitalization associated with pneumonia according to presence of diabetes (overall, type 1, and type 2), stratified by age, sex, and level of comorbidity

	Unadjusted RR (95% CI)	Adjusted RR (95% CI)*
Diabetes (overall)		
Age (years)		
15–39	3.93 (3.16–4.87)	3.21 (2.51–4.12)
40–64	2.63 (2.43–2.84)	1.65 (1.51–1.81)
65–79	1.64 (1.56–1.73)	1.22 (1.15–1.29)
≥80	1.33 (1.25–1.41)	1.11 (1.05–1.18)
Sex		
Male	1.67 (1.60–1.75)	1.25 (1.19–1.32)
Female	1.69 (1.60–1.77)	1.26 (1.20–1.33)
Comorbidity index		
Index low (0)	1.68 (1.58–1.79)	1.51 (1.41–1.61)
Index medium (1–2)	1.22 (1.15–1.30)	1.15 (1.08–1.22)
Index high (≥3)	1.15 (0.99–1.32)	1.11 (0.95–1.28)
Type 1 diabetes		
Age (years)		
15–39	6.41 (4.69–8.74)	5.15 (3.61–7.36)
40–64	4.67 (3.12–6.98)	3.43 (2.14–5.50)
65–79	—	—
≥80	—	—
Sex		
Male	5.05 (3.68–6.94)	3.97 (2.81–5.60)
Female	6.38 (4.35–9.36)	5.28 (3.49–8.00)
Comorbidity index		
Index low (0)	4.98 (3.67–6.74)	4.76 (3.43–6.61)
Index medium (1–2)	3.35 (0.88–12.78)	3.15 (0.80–12.38)
Index high (≥3)	—	—
Type 2 diabetes		
Age (years)		
15–39	2.63 (1.94–3.58)	2.15 (1.51–3.06)
40–64	2.58 (2.39–2.79)	1.62 (1.47–1.77)
65–79	1.64 (1.56–1.73)	1.22 (1.15–1.29)
≥80	1.33 (1.25–1.41)	1.11 (1.05–1.18)
Sex		
Male	1.64 (1.57–1.72)	1.23 (1.17–1.29)
Female	1.66 (1.57–1.74)	1.24 (1.17–1.31)
Comorbidity index		
Index low (0)	1.62 (1.52–1.73)	1.45 (1.36–1.55)
Index medium (1–2)	1.22 (1.15–1.29)	1.15 (1.07–1.22)
Index high (≥3)	1.15 (0.99–1.32)	1.11 (0.95–1.28)

Exposure	Case subjects	Population control subjects	Unadjusted RR (95%CI)	Adjusted RR (95% CI)*
Diabetes				
Absent	29,750 (86.9)	313,904 (91.7)	1.0 (reference)	1.0 (reference)
Present	4,489 (13.1)	28,486 (8.3)	1.68 (1.62–1.74)	1.26 (1.21–1.31)
Diabetes type				
Diabetes absent	29,750 (86.9)	313,904 (91.7)	1.0 (reference)	1.0 (reference)
Type 1 diabetes	101 (0.3)	187 (0.1)	5.55 (4.34–7.08)	4.43 (3.40–5.77)
Type 2 diabetes	4,388 (12.8)	28,299 (8.3)	1.65 (1.59–1.71)	1.23 (1.19–1.28)
Duration of diabetes				
Diabetes absent	29,750 (86.9)	313,904 (91.7)	1.0 (reference)	1.0 (reference)
<5 years	1,941 (5.7)	12,903 (3.8)	1.60 (1.53–1.68)	1.21 (1.14–1.27)
≥5 to <10 years	1,324 (3.9)	8,817 (2.6)	1.60 (1.51–1.70)	1.24 (1.16–1.32)
≥10 years	1,224 (3.6)	6,766 (2.0)	1.93 (1.81–2.06)	1.37 (1.28–1.47)
A1C				
Diabetes absent	29,750 (86.9)	313,904 (91.7)	1.0 (reference)	1.0 (reference)
Diabetes present A1C <7%	1,149 (3.4)	7,500 (2.2)	1.64 (1.54–1.74)	1.22 (1.14–1.30)
Diabetes present A1C ≥7 to <8%	607 (1.8)	3,999 (1.2)	1.62 (1.48–1.76)	1.23 (1.12–1.36)
Diabetes present A1C ≥8-<9%	407 (1.2)	2,442 (0.7)	1.77 (1.59–1.97)	1.29 (1.15–1.44)
Diabetes present A1C ≥9%	568 (1.7)	2,664 (0.8)	2.26 (2.07–2.48)	1.60 (1.44–1.76)
Diabetes present A1C unknown	1,758 (5.1)	11,881 (3.5)	1.58 (1.50–1.66)	1.21 (1.14–1.28)

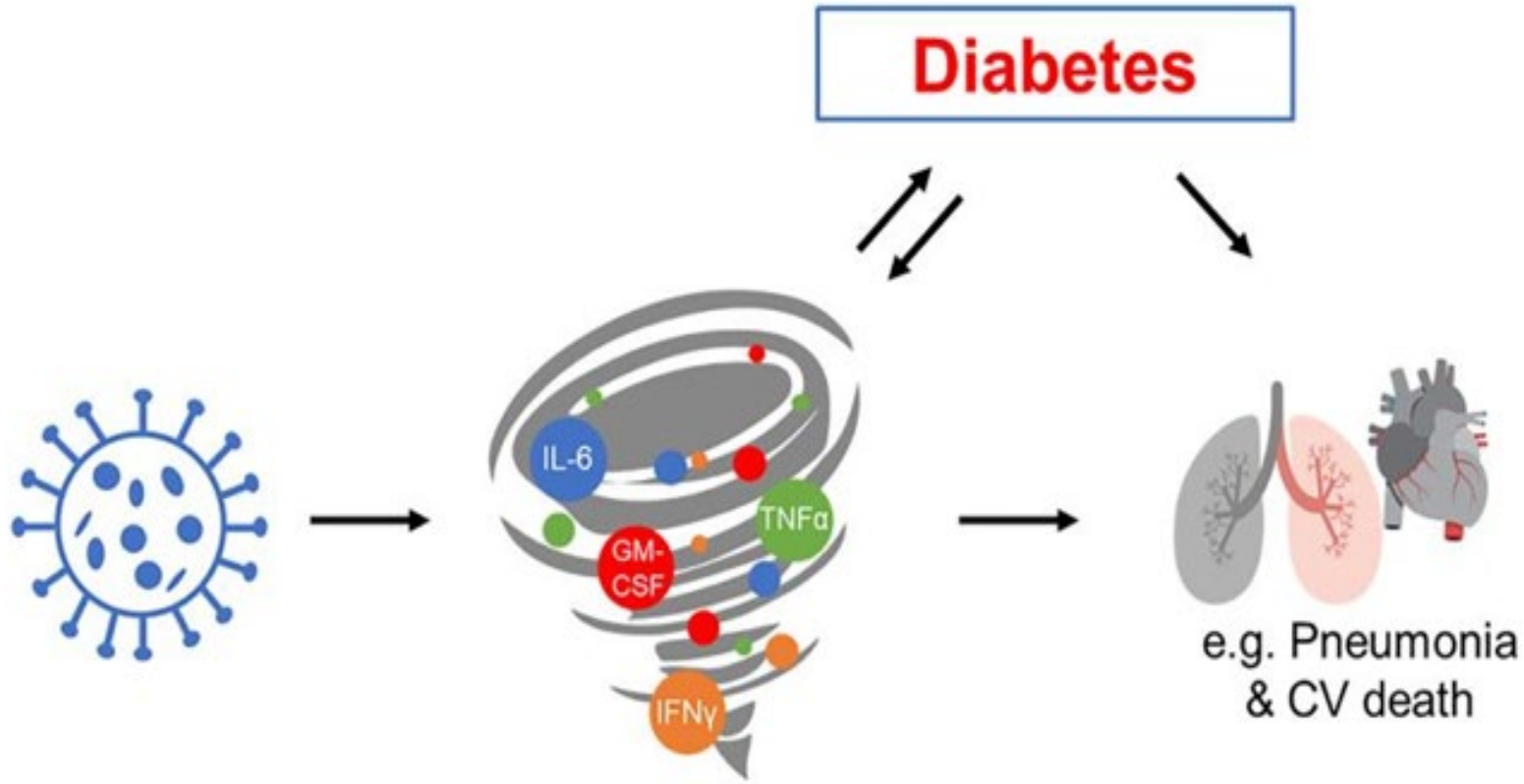
European Heart Journal Supplements (2023) **25** (Supplement A), A36–A41
The Heart of the Matter
https://doi.org/10.1093/eurheartjsupp/suac119

ESC
European Society
of Cardiology

Influenza Virus and Glycemic Variability in Diabetes: A Killer Combination?

Hulme, K. D., Gallo, L. A., & Short, K. R. (2017).
Frontiers in microbiology, 8, 861.

X3 RISCHIO DI OSPEDALIZZAZIONE
X4 PROBABILITA' DI RICOVERO IN TERAPIA INTENSIVA



Verket, M., Jacobsen, M., Schütt, K., Marx, N., & Müller-Wieland, D. (2023).
European Heart Journal Supplements, *25*(Supplement_A), A36-A41.

Laboratory-confirmed respiratory infections as triggers for acute myocardial infarction and stroke: a self-controlled case series analysis of national linked datasets from Scotland

Warren-Gash, C., Blackburn, R., Whitaker, H., McMenamin, J., & Hayward, A. C. (2018).
European Respiratory Journal, 51(3).

X10 RISCHIO DI IMA
X8 PROBABILITA' DI ICTUS

Which individuals are at increased risk of pneumococcal disease and why? Impact of COPD, asthma, smoking, diabetes, and/or chronic heart disease on community-acquired pneumonia and invasive pneumococcal disease

Torres, A., Blasi, F., Dartois, N., & Akova, M. (2015). *Thorax, 70(10), 984-989.*

Table 1 Overview of risk factors associated with community-acquired pneumonia and pneumococcal disease

Risk factor	Cohort studies		Case-control studies	
	Number of cohorts*	Risk range†	Number of cohorts*	Risk range†
Community-acquired pneumonia				
Chronic respiratory diseases	8‡	OR: 1.5 HR: 2.9 Rate ratio: 3.8–8.6	15§	OR: 1.3–13.5 RR: 1.6–2.8 HR: 1.2
Current smoking status	4	HR: 1.1 Rate ratio: 3.3–4.0	6	OR: 1.0–2.3 HR: 2.0 RR: 1.5
Diabetes mellitus	7	HR: 1.0–1.9 Rate ratio: 1.6–3.1	9	OR: 1.0–1.4 HR: 1.1 RR: 1.2–1.3
Chronic heart disease	6	HR: 1.5–3.1 Rate ratio: 3.8–4.9	17	OR: 1.0–3.3 HR: 1.3 RR: 1.3–2.6
Pneumococcal pneumonia				
Chronic respiratory diseases	6¶	Rate ratio: 3.7–9.8	0	–
Current smoking status	3	Rate ratio: 3.0–4.4	0	–
Diabetes mellitus	6	RR: 2.3 Rate ratio: 1.5–3.1	0	–
Chronic heart disease	3	Rate ratio: 3.8–5.1	0	–
Invasive pneumococcal disease				
Chronic respiratory diseases	9**	OR: 2.1–16.8 Rate ratio: 2.5–7.7	4††	OR: 1.3–4.7
Current smoking status	5	OR: 2.2 RR: 2.7 Rate ratio: 3.6–4.3	1	OR: 1.1
Diabetes mellitus	10	OR: 1.4–4.6 Rate ratio: 1.5–3.9	2	OR: 1.5–1.7
Chronic heart disease	5	OR: 3.0–6.9 Rate ratio: 2.9–3.9	4	OR: 1.7–9.9

Bacterial meningitis in diabetes patients: a population-based prospective study

van Veen, K. E., Brouwer, M. C., van der Ende, A., & van de Beek, D. (2016). Scientific reports, 6(1), 36996.

Diabetici 48 %

Characteristic	Diabetes mellitus +	Diabetes mellitus −	P-value
Age (years)	65 (25–91)	60 (17–94)	**<0.001**
Female	85/183 (46)	617/1248 (49)	0.477
Symptoms and signs on admission			
Headache	117/148 (79)	899/1089 (83)	0.304
Neck stiffness	125/173 (72)	868/1167 (74)	0.577
Temperature ≥38 °C	144/181 (80)	905/1228 (74)	0.100
Triad of fever, neck stiffness, and change in mental status	86/173 (50)	489/1190 (41)	**0.039**
Predisposing factors[b]	44/183 (24)	306/1247 (25)	0.927
Distant focus of infection	87/171 (51)	520/1201 (43)	0.070
Blood chemistry tests			
Leukocyte count (x10^9/L)	16.3 (2.5–41.9)	17.0 (0.1–99.8)	0.659
Thrombocytes (x10^{12}/L)	208 (39–868)	198 (0–955)	**0.005**
C-reactive protein (mg/L)	172 (4–736)	192 (0–752)	0.336
Glucose (mmol/L)	12.6 (1.5–30.9)	8.8 (0.1–31.3)	**<0.001**
Indexes of inflammation in CSF			
Leukocyte count (cells/mm3)	3,300 (1–75,000)	2,315 (0–463,149)	**0.005**
Leukocyte count <1000 cells/mm^3	44/177 (25)	390/1136 (34)	**0.013**
Independent CSF predictors present	160/183 (87)	1071/1248 (86)	0.648
CSF/blood glucose ratio	0.16 (0.00–1.55)	0.03 (0.00–1.67)	**<0.001**
Causative organism			
Streptococcus pneumoniae	139/183 (76)	876/1248 (70)	0.117
Neisseria meningitidis	10/183 (5)	137/1248 (11)	**0.019**
Listeria monocytogenes	11/183 (6)	68/1248 (5)	0.729
Outcome			
Unfavorable outcome	82/183 (45)	449/1248 (36)	**0.022**
Mortality	43/183 (23)	198/1248 (16)	**0.015**
Neurological sequelae	49/122 (40)	326/925 (35)	0.315
Hearing loss	16/124 (13)	118/1047 (11)	0.553

Pneumococco e Listeria Monocytogenes i patogeni piu' frequentemente isolati nel diabete mellito.

Diabete fattore di rischio per insufficienza cardiorespiratoria e outcome sfavorevole.

Characteristics and outcome of spontaneous bacterial meningitis in patients with diabetes mellitus

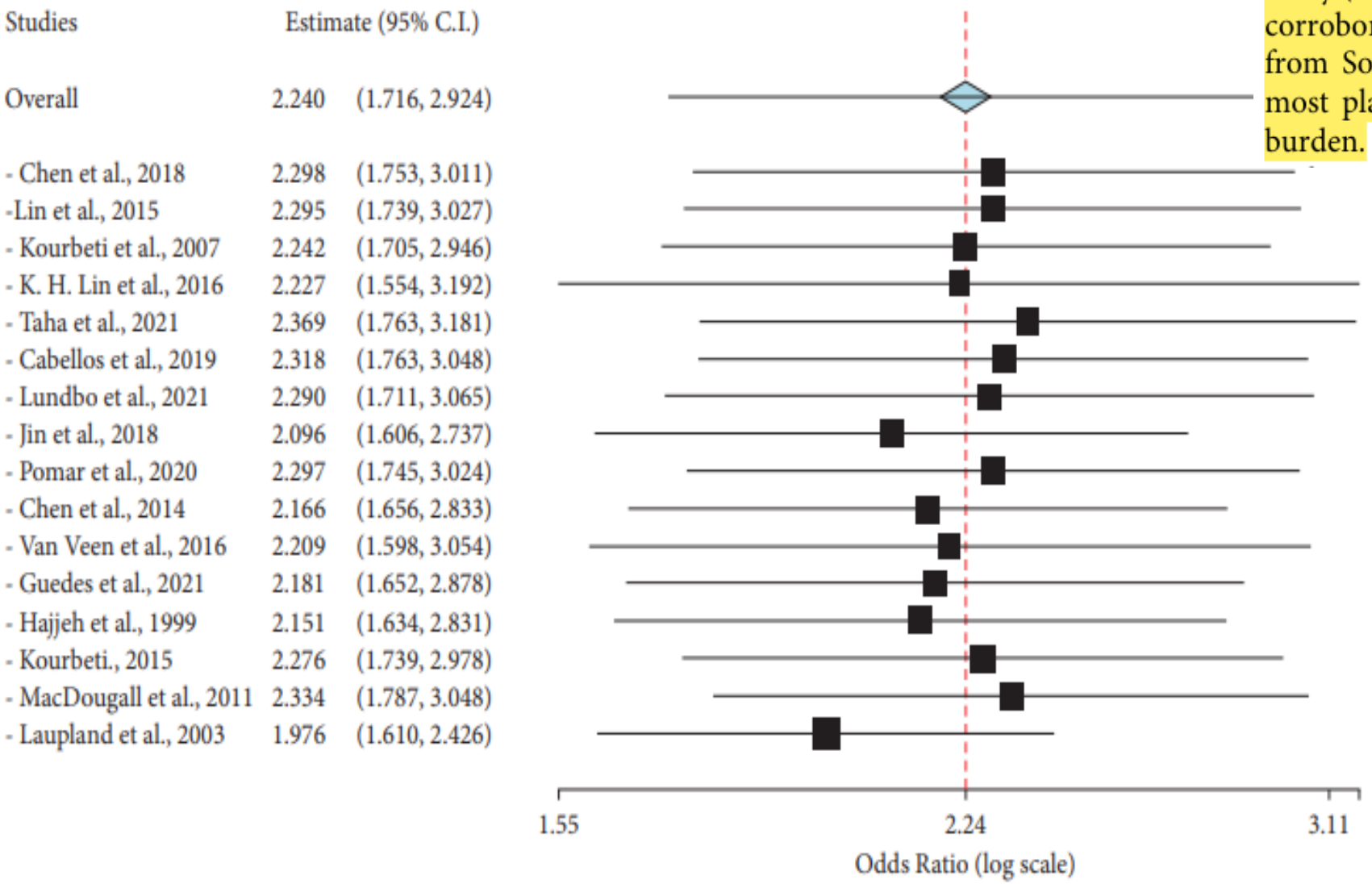
Pomar, V., De Benito, N., Mauri, A., Coll, P., Gurguí, M., & Domingo, P. (2020). *BMC infectious diseases, 20, 1-9.*

Characteristics	Diabetic Patients (*n* = 106)	Other Patients (*n* = 609)	*P* value
Neurological complications	31 (29.2)	123 (20.2)	0.210
• Coma	21 (19.8)	94 (15.4)	0.254
• Seizures	18 (17)	70 (11.5)	0.148
• Focal neurological deficits	8 (7.5)	19 (3.1)	0.046
• Cranial palsies	7 (6.6)	28 (4.6)	0.337
Systemic complications	48 (45.3)	184 (30.2)	0.024
• Acute respiratory failure	28 (26.4)	103 (16.9)	0.029
• Acute kidney failure	27 (25.5)	72 (11.8)	< 0.001
• Septic shock	19 (17.9)	88 (14.4)	0.376
• Disseminated intravascular coagulation	11 (10.4)	47 (7.7)	0.677
• Rhabdomyolysis	6 (5.7)	22 (3.6)	0.286
Therapeutics			
• Adequate empiric antibiotic therapy	93 (87.7)	568 (93.3)	0.109
• Dexamethasone therapy	39 (36.8)	220 (36.1)	0.910
• Vasoactive drugs	17 (16)	77 (12.6)	0.350
• Mechanical ventilation	17 (16)	88 (14.4)	0.839
• Dialysis	3 (2.8)	15 (2.5)	0.895
Outcome			
• Neurological sequelae	8 (7.5)	19 (3.1)	0.046
• In-hospital mortality	27 (25.5)	97 (15.9)	0.025

Review Article

Association of Diabetes with Meningitis Infection Risks: A Systematic Review and Meta-Analysis

We conducted a meta-analysis involving 16847 cases to investigate the relationship between diabetes and the risk of developing meningitis. Our study indicated that diabetes increased meningitis risks by more than two-fold. This risk is very significant across all global regions included in the study (North America, Europe, and Asia). While this finding corroborates with some other studies, no research was found from South America and Africa, which obviously are the most plagued in terms of meningitis and diabetes disease burden.

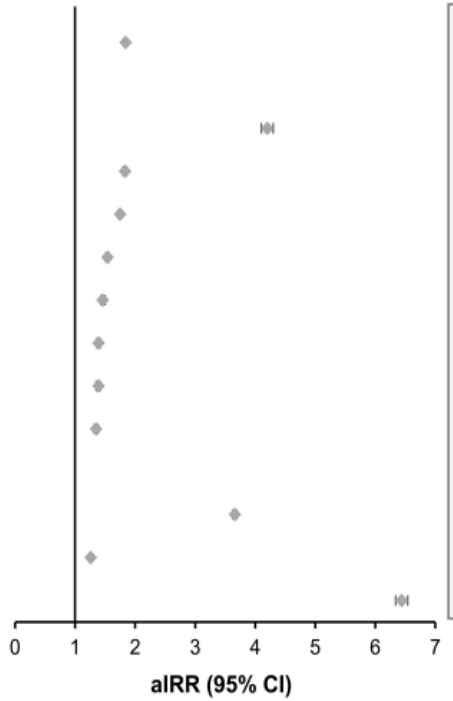


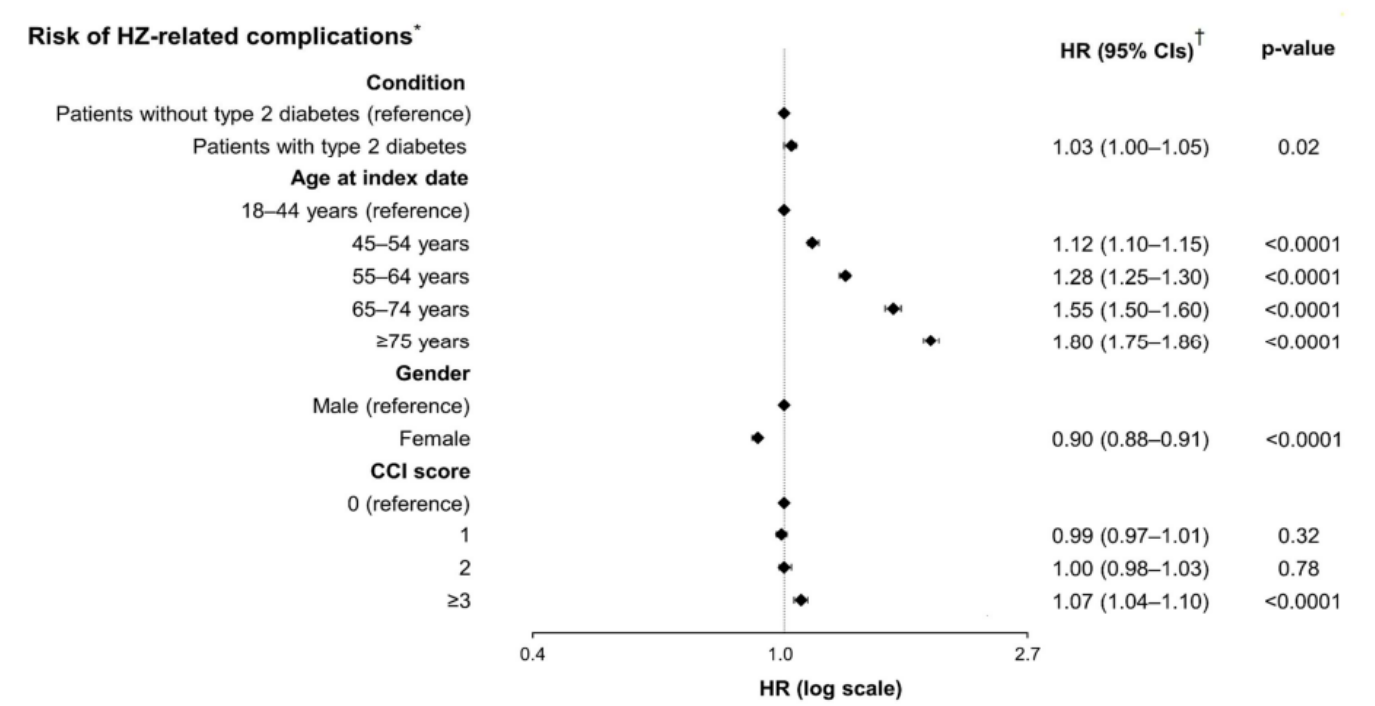
Herpes Zoster Incidence and Burden in Adults With Type 2 Diabetes in the U.S.: A Retrospective Database Analysis

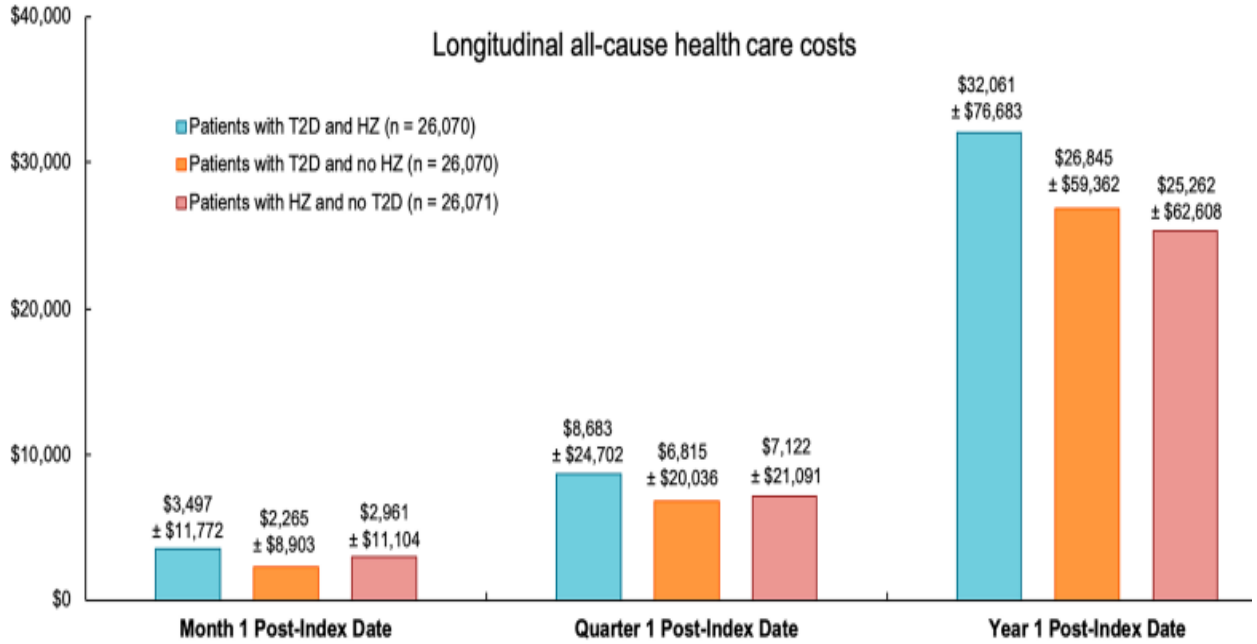
Jean-Etienne Poirrier,[1] Juliana L. Meyers,[2] Saurabh P. Nagar,[2] Brandon J. Patterson,[1] Lisa I. Glasser,[1] and Serge A. Jabbour[3]

Diabetes Care 2022;45:2585–2593 | https://doi.org/10.2337/dc21-2053

	HZ incidence per 1,000 PY*		Adjusted incidence rate ratio
	With T2D	Without T2D	aIRR (95% CIs)†,**
Overall	9.8	2.6	1.84 (1.82–1.85)
Age			
18–49 years	6.4	1.6	4.20 (4.10–4.30)
50–54 years	9.0	5.2	1.83 (1.80–1.86)
55–59 years	10.3	6.2	1.75 (1.72–1.77)
60–64 years	10.6	7.4	1.54 (1.51–1.56)
65–69 years	11.2	9.4	1.46 (1.43–1.50)
70–74 years	12.4	9.7	1.39 (1.36–1.42)
75–79 years	13.5	10.5	1.39 (1.35–1.42)
≥80 years	14.6	12.1	1.35 (1.32–1.38)
Insurance type			
Commercial	8.9	2.6	3.66 (3.63–3.69)
Medicare	13.7	13.0	1.26 (1.24–1.27)
Medicaid	8.7	1.3	6.44 (6.34–6.54)





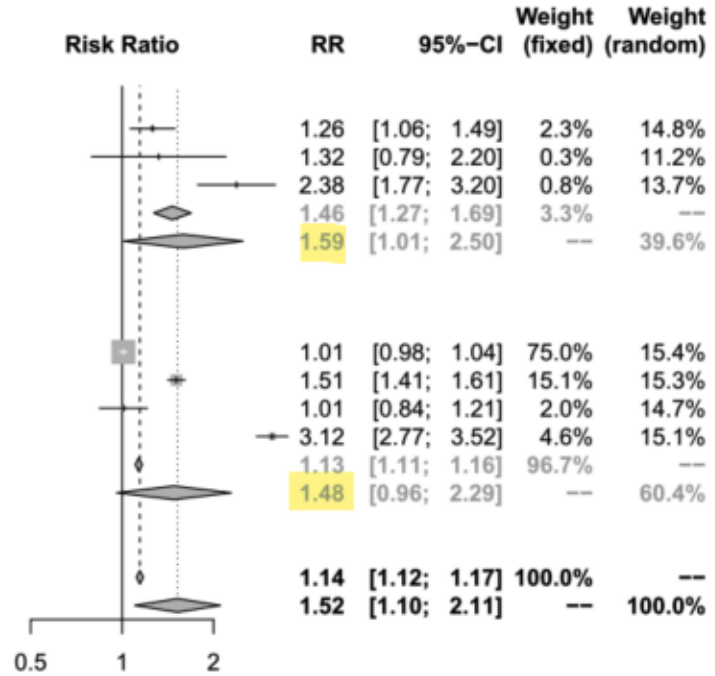


The Journal of Clinical Endocrinology & Metabolism, 2022, Vol. 107, No. 2, 586–597
https://doi.org/10.1210/clinem/dgab675
Meta-Analysis

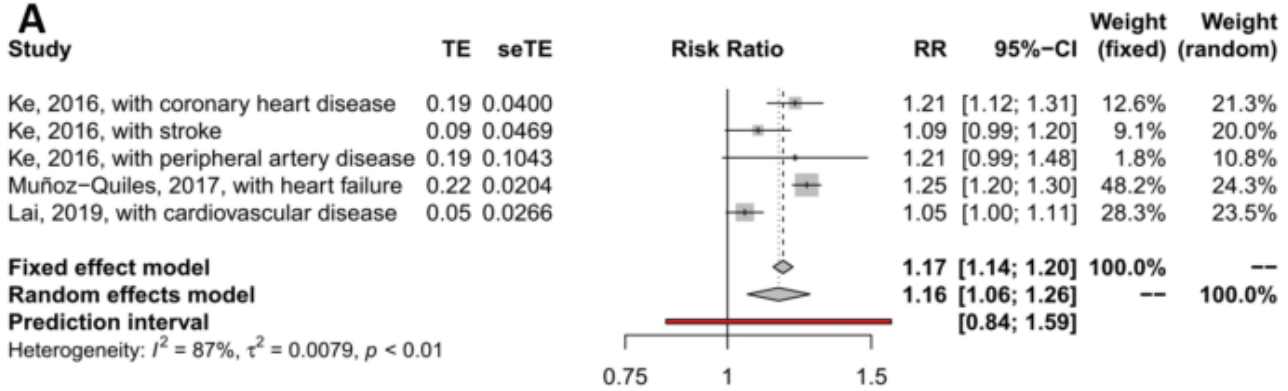
Meta-Analysis

Association Between Diabetes Mellitus and the Risk of Herpes Zoster: A Systematic Review and Meta-analysis

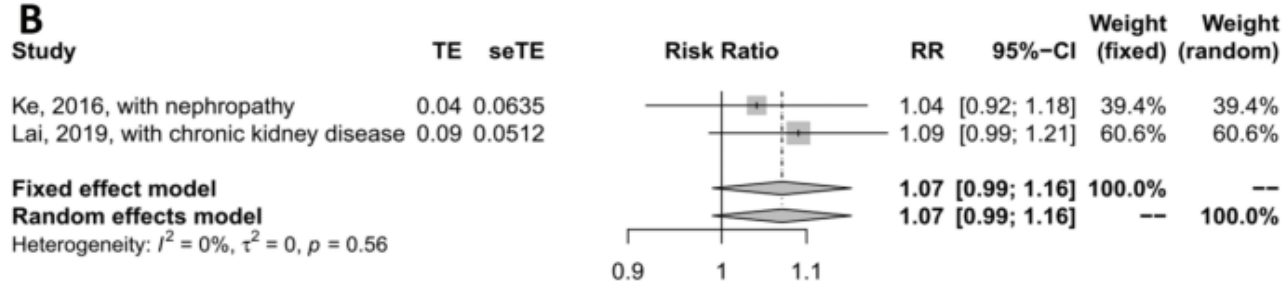
Rischio incrementato in tutti i sottogruppi di età di regione di provenienza, indipendentemente dal tipo di diabete.



A



B



La CVD costituisce un ulteriore elemento aggiuntivo di suscettibilità

diabetesresearchandclinicalpractice210 (2024) 111603

Contents lists available at ScienceDirect

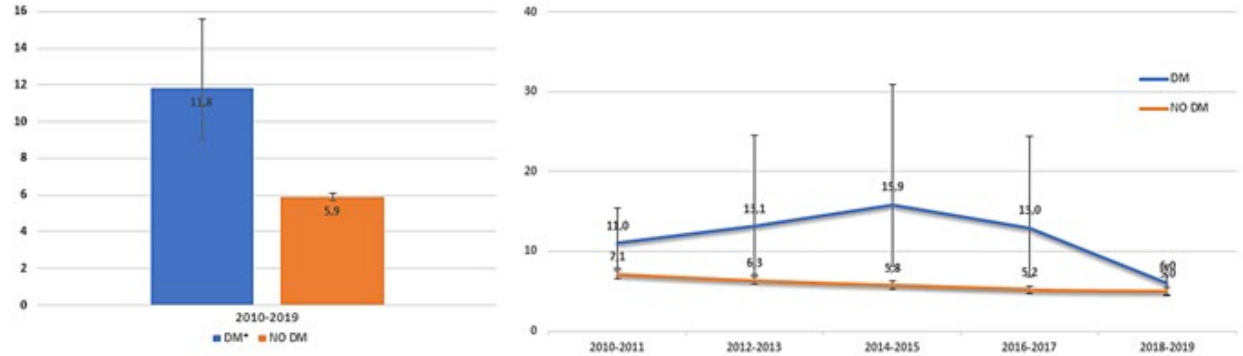
Diabetes Research and Clinical Practice

journal homepage: www.journals.elsevier.com/diabetes-research-and-clinical-practice

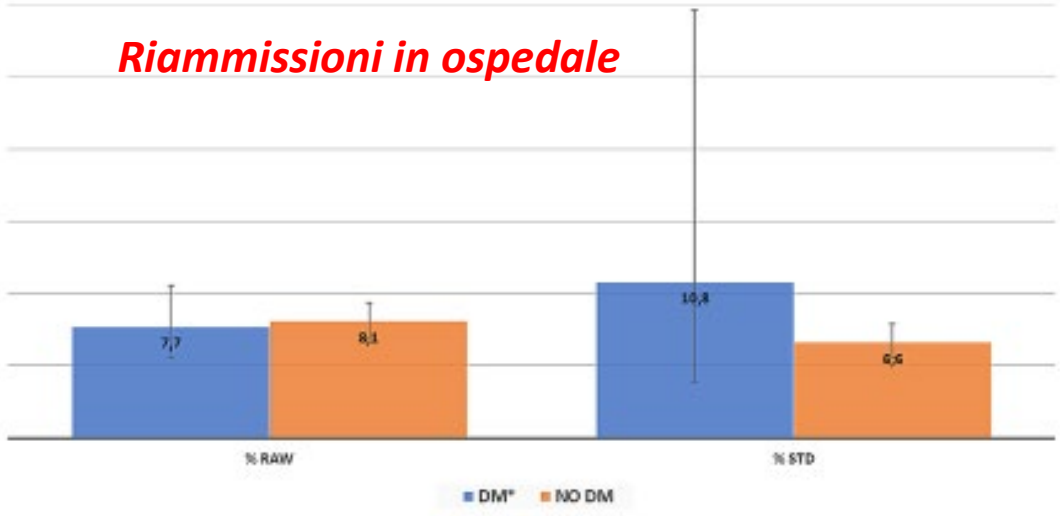
Giorda, C. B., Picariello, R., Tartaglino, B., Nada, E., Romeo, F., Costa, G., & Gnavi, R. (2024). *Diabetes Research and Clinical Practice, 210, 111603.*

Hospitalisation for herpes zoster in people with and without diabetes: A 10-year-observational study

Ospedalizzazioni



Riammissioni in ospedale

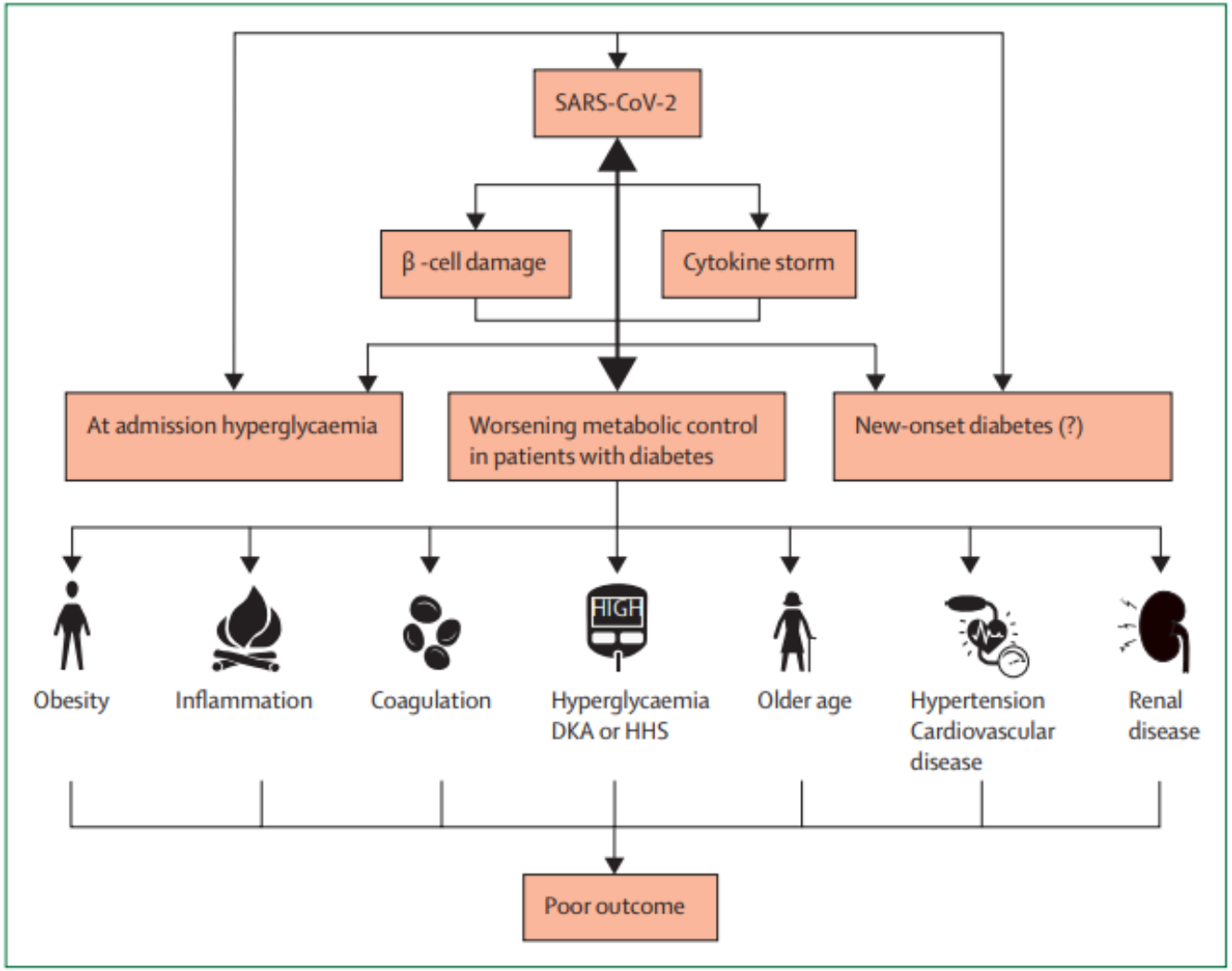


Results: Of 3,423 HZ hospitalizations in 2010–2019, 17.9 % (613 cases) were diabetic patients, who exhibited higher hospitalization rates (15.9 to 6.0 per 100,000) compared to non-diabetese individuals. Among diabetics subjects risk factors for HZ hospitalization included age over 65, obesity (BMI > 30), and poor glycemic control (HbA1c > 8.0 %). These patients had a 40 % increased rehospitalization risk and a 25 % higher risk of severe complications, such as stroke and myocardial infarction, post-HZ.

Conclusions: Diabetes markedly increases HZ hospitalization rates, rehospitalization, and complication risks. These findings underscore the need for preventive strategies, especially improved glycemic control among high-risk diabetic patients, to inform public health policies and clinical practices aimed at mitigating HZ's impact on this population.

COVID-19 in people with diabetes: understanding the reasons for worse outcomes

Apicella, M., Campopiano, M. C., Mantuano, M., Mazoni, L., Coppelli, A., & Del Prato, S. (2020). *The lancet Diabetes & endocrinology, 8(9), 782-792.*



	Article type	Study population	Prevalence of diabetes	Outcome	Risk
Zhang et al[3]	Retrospective	258	24%	Mortality	3·64 (1·08–12·21)*
Kumar et al[4]	Meta-analysis	16 003	9·8%	Severe disease	2·75 (2·09–3·62)*
Kumar et al[4]	Meta-analysis	16 003	9·8%	Mortality	1·90 (1·37–2·64)*
Guan et al[10]	Retrospective	1590	NA	Composite†	1·59 (1·03–2·45)‡
Li et al[11]	Meta-analysis	1525	9·7%	ICU admission§	2·21 (0·88–5·57)¶
Fadini et al[12]	Meta-analysis	1687	NA	Severe disease	2·26 (0·98–4·82)‖
Fadini et al[12]	Meta-analysis	355	35·5%	Mortality	1·75‖
Petrilli et al[13]	Retrospective	5279	22·6%	Hospital admission	2·24 (1·84–2·73)*
Roncon et al[14]	Meta-analysis	1382	NA	ICU admission	2·79 (1·85–4·22)*
Roncon et al[14]	Meta-analysis	471	NA	Mortality	3·21 (1·82–5·64)*
Zhou et al[15]	Retrospective	191	19%	Mortality	2·85 (1·35–6·05)*
Zhu et al[16]	Retrospective	7337	13%	Mortality	1·49 (1·13–1·96)‡
Yan et al[17]	Retrospective	193	25%	Mortality	1·53 (1·02–2·3)‡
Sardu et al[18]	Retrospective	59	44%	Survival	0·172 (0·051–0·576)‡
Yang et al[19]	Meta-analysis	4648	NA	Severe disease	2·07 (0·88–4·82)*
Barron et al[20]	Cohort study	61 414 470	0·4% type 1 diabetes	Mortality	3·50 (3·15–3·89)*
Barron et al[20]	Cohort study	61 414 470	4·7% type 2 diabetes	Mortality	2·03 (1·97–2·09)*

ICU=intensive care unit. NA=not given. *Odds ratio (95% CI). †ICU admission, or invasive ventilation, or death. ‡Hazard ratio (95% CI). §Calculated for 1056 patients (in three of six studies). ¶Risk ratio (95% CI). ‖Rate ratio (95% CI not given).

Table 1: **COVID-19 outcomes according to pre-existing diabetes**

RUOLO DEI VACCINI
NELLA MALATTIA DIABETICA

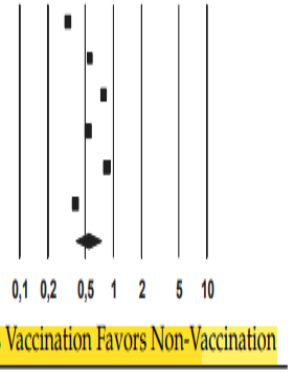
Review

Impact of Influenza Vaccination on All-Cause Mortality and Hospitalization for Pneumonia in Adults and the Elderly with Diabetes: A Meta-Analysis of Observational Studies

Angela Bechini [1], Alessandra Ninci [1], Marco Del Riccio [1,*], Ilaria Biondi [1], Jacopo Bianchi [1], Paolo Bonanni [1], Edoardo Mannucci [2] and Matteo Monami [2]

Table 4. Forest plot of the meta-analysis of all cause-mortality rate.

Study Name	Statistics for Each Study				
	Rate Ratio	Lower Limit	Upper Limit	Z-Value	*p*-Value
Heymann, 2004 [19]	0.33	0.25	0.43	−8.41	0.00
Looijmans, 2006 [23]	0.56	0.32	0.97	−2.06	0.04
Rodriguez-Blanco, 2012 [20]	0.78	0.53	1.15	−1.24	0.21
Shade, 2000 [21]	0.54	0.50	0.58	−16.08	0.00
Vamos, 2016 [22]	0.85	0.80	0.90	−5.13	0.00
Wang, 2013 [24]	0.39	0.32	0.48	−9.10	0.00
Overall	0.54	0.40	0.74	−3.84	0.00

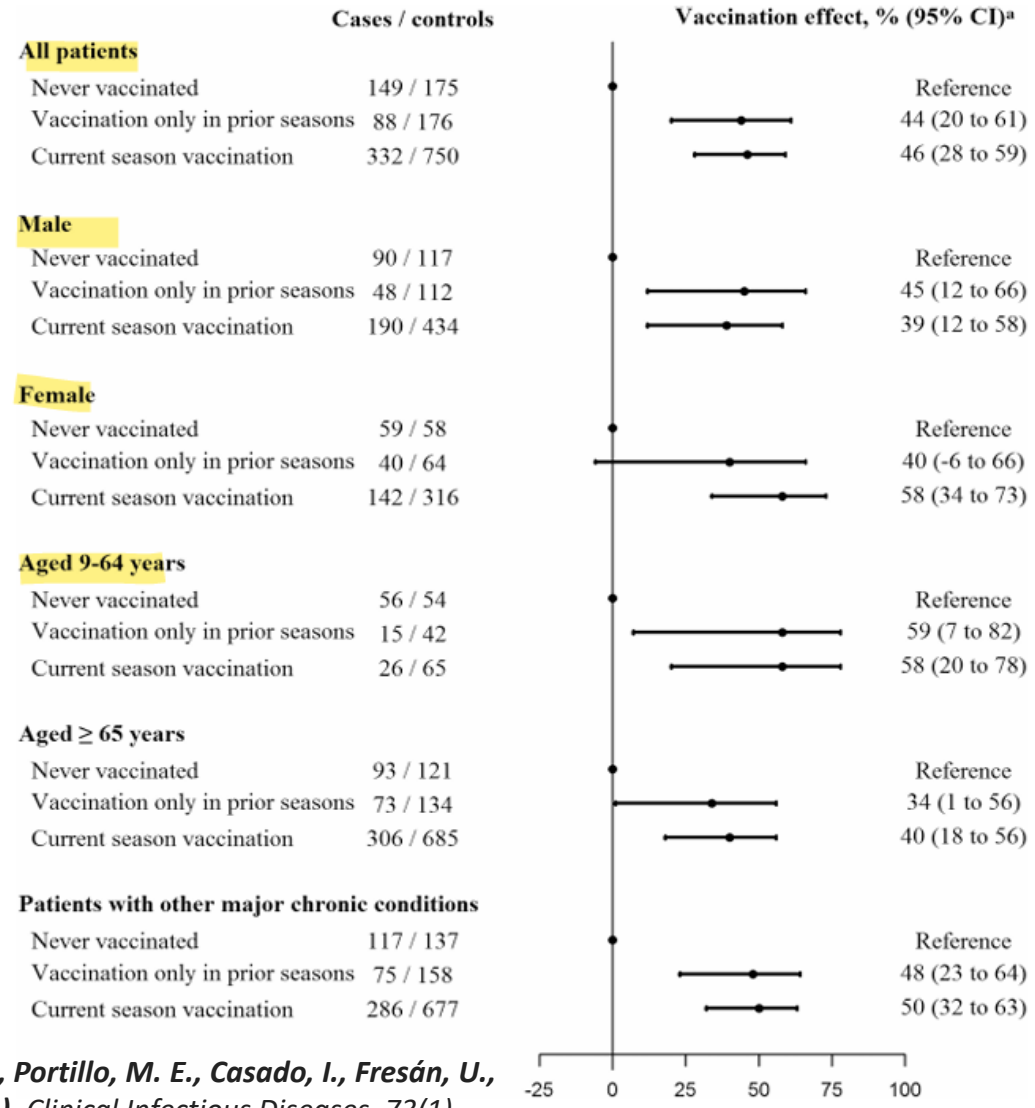


-50 %

Clinical Infectious Diseases

MAJOR ARTICLE

Effect of Influenza Vaccination in Preventing Laboratory-Confirmed Influenza Hospitalization in Patients With Diabetes Mellitus



Martínez-Baz, I., Navascués, A., Portillo, M. E., Casado, I., Fresán, U., Ezpeleta, C., & Castilla, J. (2021). *Clinical Infectious Diseases, 73(1), 107-114.*

Clinical Infectious Diseases
MAJOR ARTICLE

Effect of Influenza Vaccination in Preventing Laboratory-Confirmed Influenza Hospitalization in Patients With Diabetes Mellitus

Iván Martínez-Baz,[1,2] Ana Navascués,[3] María Eugenia Portillo,[3] Itziar Casado,[1,2] Ujué Fresán,[1,2] Carmen Ezpeleta,[3] and Jesús Castilla[1,2]

[1]Instituto de Salud Pública de Navarra - IdiSNA, Pamplona, Spain, [2]Centro de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid, Spain, and [3]Clinical Microbiology Department, Complejo Hospitalario de Navarra - IdiSNA, Pamplona, Spain

Table 2. Effect of Influenza Vaccination in the Current and 5 Prior Seasons in Preventing Laboratory-Confirmed Influenza Hospitalization by (Sub)type Among Diabetic Patients—Combined Analysis of the 2013–2014 to 2018–2019 Influenza Seasons

Influenza (Sub)type	Cases/Controls	Vaccination Effect, % (95% CI)[a]	*P* Value
A(H1N1) subtype[b]			
Never vaccinated	52/136	Reference	
Vaccination in prior seasons only	26/124	32 (−24 to 62)	.211
Current season vaccination	64/572	57 (32–73)	<.001
A(H3N2) subtype[c]			
Never vaccinated	57/152	Reference	
Vaccination in prior seasons only	37/156	41 (2–64)	.039
Current season vaccination	193/661	21 (−16 to 46)	.227
B type[d]			
Never vaccinated	39/69	Reference	
Vaccination in prior seasons only	22/87	61 (23–81)	.007
Current season vaccination	64/336	71 (50–84)	<.001

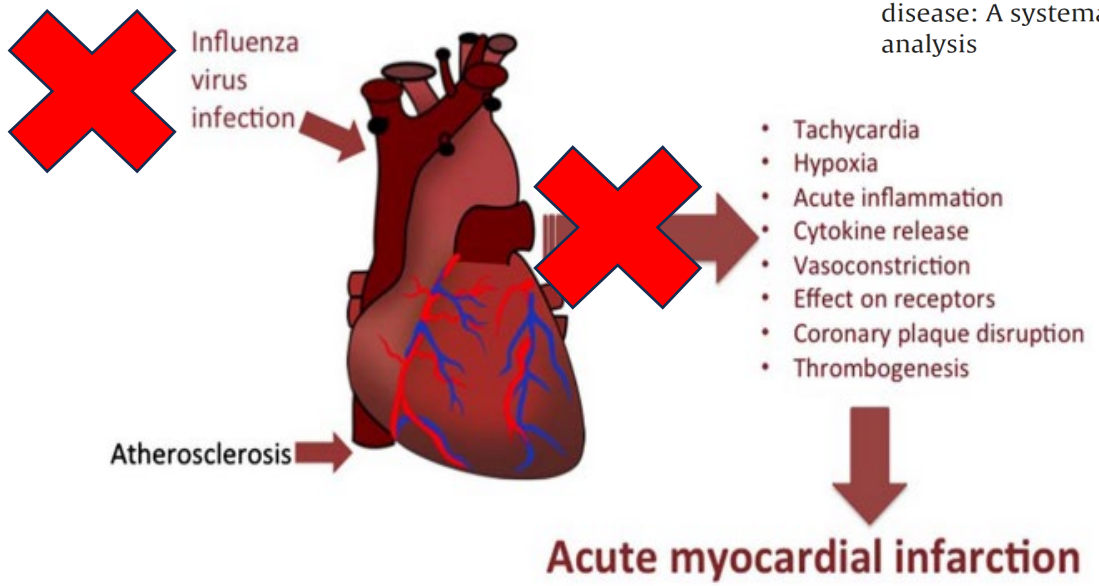
Population	Cases/Controls	Adjusted OR (95% CI)[b]	*P* Value
All patients			
Nondiabetic target population unvaccinated	393/578	Reference	
Diabetic patients unvaccinated	149/175	1.20 (.92–1.55)	.184
Nondiabetic target population vaccinated in prior seasons only	178/333	Reference	
Diabetic patients vaccinated in prior seasons only	88/176	0.86 (.62–1.19)	.355
Nondiabetic target population vaccinated in the current season	674/1345	Reference	
Diabetic patients vaccinated in the current season	332/750	0.89 (.76–1.05)	.163
Aged 9–64 y			
Nondiabetic target population unvaccinated	168/268	Reference	
Diabetic patients unvaccinated	56/54	1.55 (.98–2.44)	.062
Nondiabetic target population vaccinated in prior seasons only	45/89	Reference	
Diabetic patients vaccinated in prior seasons only	15/42	0.78 (.37–1.64)	.510
Nondiabetic target population vaccinated in the current season	63/176	Reference	
Diabetic patients vaccinated in the current season	26/65	1.12 (.63–1.99)	.694
Aged ≥ 65 y			
Nondiabetic target population unvaccinated	225/310	Reference	
Diabetic patients unvaccinated	93/121	1.07 (.77–1.49)	.693
Nondiabetic target population vaccinated in prior seasons only	133/244	Reference	
Diabetic patients vaccinated in prior seasons only	73/134	0.91 (.63–1.30)	.592
Nondiabetic target population vaccinated in the current season	611/1169	Reference	
Diabetic patients vaccinated in the current season	306/685	0.86 (.72–1.02)	.084

In conclusion, influenza vaccination reduces the risk of laboratory-confirmed influenza hospitalizations among patients with diabetes mellitus by about half on average of several influenza seasons. As IVE in people with diabetes was similar to that in people with chronic conditions other than diabetes, the estimates obtained for all chronic patients may be valid for the diabetic population. Influenza vaccines received in recent seasons may retain some protective effect in people who were not vaccinated in the current season. When influenza vaccination fails to prevent influenza disease in diabetic patients, it can still reduce the probability of hospitalization. Our results reinforce the recommendations of annual vaccination for influenza in patients with diabetes.

Martínez-Baz, I., Navascués, A., Portillo, M. E., Casado, I., Fresán, U., Ezpeleta, C., & Castilla, J. (2021). *Clinical Infectious Diseases, 73(1), 107-114.*

BMJ Journals

Influenza vaccine as a coronary intervention for prevention of myocardial infarction



Coronary intervention	Prevention	Intervention efficacy/effectiveness against acute myocardial infarction (%)
Smoking cessation[4 23–25]	Secondary	32–43
Statins[38]	Secondary	19–30
Antihypertensive drugs[26–29 32]	Secondary	17–25
Influenza vaccine[5 9 18]	Secondary	15–45

Travel Medicine and Infectious Disease
Volume 47, May–June 2022, 102311

Influenza vaccine improves cardiovascular outcomes in patients with coronary artery disease: A systematic review and meta-analysis

Diaz-Arocutipa, C., Saucedo-Chinchay, J., Mamas, M. A., & Vicent, L. (2022). *Travel Medicine and Infectious Disease, 47, 102311.*

DOCUMENTO SIPREC 2023

INFLUENZA E MALATTIE CARDIOVASCOLARI: IL RUOLO DELLE STRATEGIE DI PREVENZIONE E PROTEZIONE CARDIOVASCOLARE DELLA VACCINAZIONE

NNT vaccino antinfluenzale stimato tra 19 e 48

vs

ASA: 50
Statine: 61
Beta Bloccanti 48
SRA 20

Ministero della Salute
EX DIREZIONE GENERALE DELLA PREVENZIONE SANITARIA
UFFICIO 5 PREVENZIONE DELLE MALATTIE TRASMISSIBILI E PROFILASSI INTERNAZIONALE
Viale Giorgio Ribotta, 5 - 00144 Roma

Tabella 2. Tipologie di vaccino, modalità di somministrazione dosi per fascia di età secondo RCP (*)

	Vaccino	Descrizione	Dosi e modalità di somministrazione
VIQ	Vaccino Inattivato Quadrivalente, o sub-unità, o split	I vaccini antinfluenzali inattivati attualmente autorizzati per l'uso in Italia sono vaccini split e a subunità.I vaccini influenzali inattivati possono essere impiegati in tutte le fasi della gravidanza. Attualmente in Italia sono disponibili vaccini antinfluenzali quadrivalenti (VIQ) che contengono 2 virus di tipo A (H1N1 e H3N2) e 2 virus di tipo B. Se non altrimenti specificato (vedi sotto), i vaccini inattivati sono prodotti con virus replicato in uova embrionate di pollo.	6 mesi – 9 anni: 2 dosi (0,50ml): ripetute a distanza di almeno 4 settimane ai bambini vaccinati per la prima volta; 1 dose (0,50ml) se già vaccinati negli anni precedenti > 9 anni. 1 dose (0,50ml)
LAIV	Vaccino vivo attenuato	Il vaccino LAIV trivalente è un vaccino antinfluenzale vivo attenuato somministrato con spray intranasale e autorizzato per l'uso in persone di età compresa tra 2 e 18 anni. I ceppi influenzali contenuti nel vaccino sono attenuati in modo da non causare influenza. Per la stagione 2024-2025 è, al momento, previsto l'utilizzo della formulazione trivalente.	2 anni – 9 anni: 2 dosi (0,2 ml) ripetute a distanza di almeno 4 settimane per bambini che vengono vaccinati per la prima volta; 1 dose (0,2 ml) se già vaccinati negli anni precedenti 10-17 anni: 1 dose (0,2 ml)
VIQcc	Vaccino inattivato quadrivalente su colture cellulari	Il vaccino VIQCC è un vaccino antinfluenzale quadrivalente che contiene 2 virus di tipo A (H1N1 e H3N2) e 2 virus di tipo B cresciuti su colture cellulari, ed autorizzato per l'uso in bambini e adulti di età superiore ai 2 anni.	2 anni – 9 anni: 2 dosi (0,50ml): ripetute a distanza di almeno 4 settimane ai bambini vaccinati per la prima volta; 1 dose (0,50ml) se già vaccinati negli anni precedenti ≥10 anni: 1 dose (0,50ml)
VIQr	Vaccino quadrivalente a DNA ricombinante	Il vaccino quadrivalente ricombinante è prodotto tramite la tecnologia del DNA ricombinante che si basa sulla produzione di una proteina di un agente infettivo senza utilizzare il microrganismo selvaggio, mediante tecniche di ingegneria genetica che frammentano il DNA corrispondente e lo esprimono in diversi vettori di espressione "in vitro". È indicato dai 18 anni di età.	≥18 anni:1 dose (0,50 ml)
VIQa	Vaccino inattivato quadrivalente adiuvato [9]	Uno dei vaccini quadrivalenti inattivati contiene l'adiuvante MF59, un'emulsione olio-in-acqua composta da squalene come fase oleosa. L'adiuvante ha lo scopo di facilitare l'adeguata risposta immunitaria partendo da una minore quantità di antigene. Gli altri prodotti inattivati non contengono un adiuvante. È indicato nelle persone di età pari o superiore a 50 anni.	≥50 anni: 1 dose (0,50 ml)
VIQhd	Vaccino inattivato quadrivalente ad alto dosaggio	Il vaccino ad alto dosaggio è un vaccino split quadrivalente che contiene due virus di tipo A(H1N1 e H3N2) e due virus di tipo B contenente 60 mcg di emoagglutinina (HA) per ciascun ceppo virale per garantire una maggiore risposta immunitaria e quindi una maggiore efficacia. È indicato nelle persone di età pari o superiore a 60 anni.	≥60 anni: 1 dose (0,50 ml)

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

QUALE VACCINO ?

Review

Efficacy and effectiveness of high-dose influenza vaccine in older adults by circulating strain and antigenic match: An updated systematic review and meta-analysis ☆

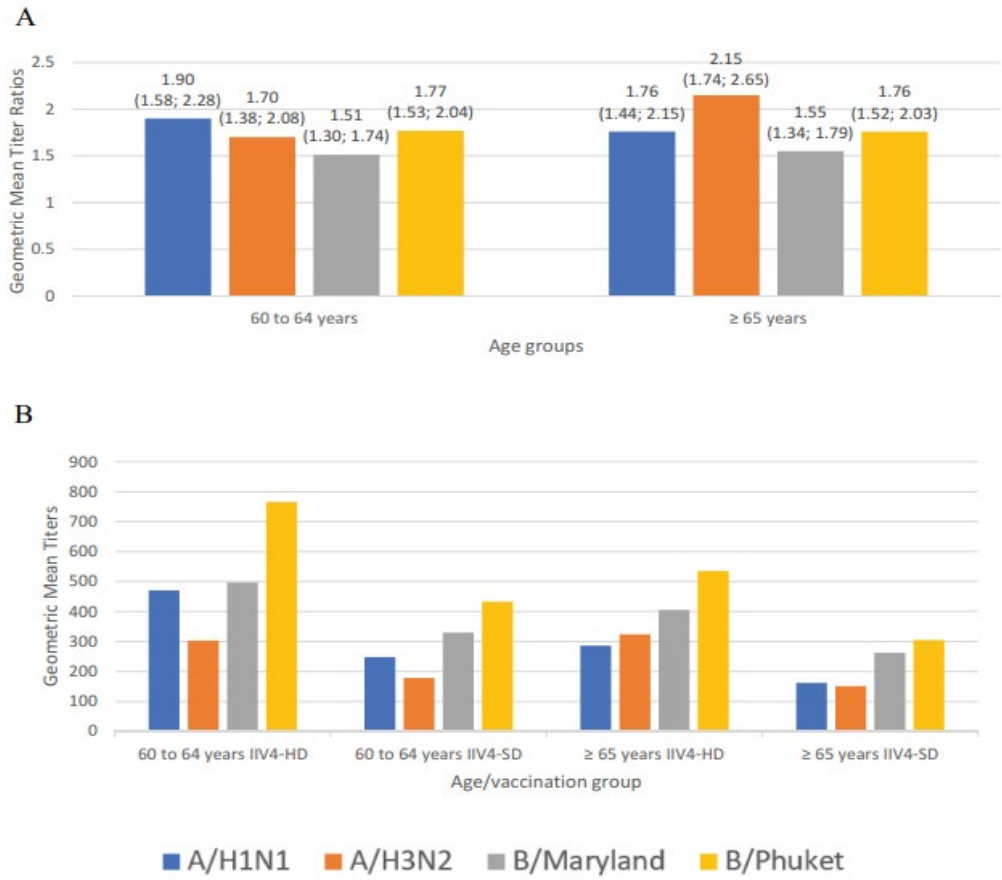
Pooled relative vaccine efficacy/effectiveness of HD-IIV3 vs. SD-IIV against influenza-related outcomes.

Outcome	All Seasons			Predominant Circulating Strain[a]						Antigenic Similarity with Predominant Circulating Strain[b]					
				A/H3N2-predominant Seasons			A/H1N1-predominant Seasons			Matched Seasons			Mismatched Seasons		
	n	rVE[c] (95%CI)	p-value	n	rVE (95%CI)	p-value	n	rVE (95%CI)	p-value	n	rVE (95%CI)	p-value	n	rVE (95%CI)	p-value
Influenza-like Illness[d]	7	**15.9%** (4.1–26.3%)	0.01	4	**18.3%** (0.8–32.7%)	0.041	3	10.7% (-6.1–24.8%)	0.199	3	27.0% (-6.8–50.1%)	0.105	4	14.3% (-2.4–29.0%)	0.107
Influenza Hospitalization[e]	10	**11.7%** (7.0 – 16.1%)	<0.001	7	**12.1%** (6.3 – 17.6%)	<0.001	3	**9.6%** (2.1–18.9%)	<0.001	3	**10.9%** (2.1–18.9%)	0.016	7	**12.1%** (6.3 – 17.6%)	<0.001
Pneumonia Hospitalization[f]	4	**27.3%** (15.3–37.6%)	<0.001	2	**39.9%** (19.3–55.3%)	<0.001	2	**22.0%** (6.7–34.8%)	<0.001	3	**28.9%** (10.1–43.8%)	0.004	1	–	–
Pneumonia/Influenza Hospitalization[g]	7	**13.4%** (7.3–19.2%)	<0.001	5	**12.4%** (5.7–18.7%)	<0.001	2	**19.6%** (3.0–33.4%)	0.023	5	**13.5%** (5.0–21.3%)	0.002	2	**13.3%** (4.1–21.6%)	0.005
Cardiorespiratory Hospitalization	7	**17.9%** (15.0–20.8%)	<0.001	6	**17.7%** (14.5–20.8%)	<0.001	1	–	–	4	**17.4%** (13.5–21.1%)	<0.001	3	**18.6%** (14.1–22.9%)	<0.001
All-cause Hospitalization	11	**8.4%** (5.7–11.0%)	<0.001	8	**8.3%** (4.5–12.0%)	<0.001	3	**8.9%** (5.4–12.2%)	<0.001	7	**6.4%** (4.1–8.6%)	<0.001	4	**12.6%** (7.8–17.2%)	<0.001
Post-influenza Mortality	2	22.2% (-18.2–48.8%)	0.240	1	–	–	1	–	–	1	–	–	1	–	–
Pneumonia/Influenza Mortality	3	**39.9%** (18.6–55.6%)	<0.001	2	**43.2%** (18.1 – 60.6%)	0.002	1	–	–	1	–	–	2	**43.2%** (18.1 – 60.6%)	0.002
Cardiorespiratory Mortality	3	**27.7%** (13.2–32.0%)	<0.001	2	**27.3%** (20.3 – 33.6%)	<0.001	1	–	–	1	–	–	2	**27.3%** (20.3 – 33.6%)	<0.001
All-cause Mortality	5	2.5% (-5.1–9.5%)	0.514	4	4.6% (-12.6–19.3%)	0.575	1	–	–	3	0.7% (-4.3–5.6%)	0.768	2	**17.3%** (0.2–31.5%)	0.048

Lee, J. K., Lam, G. K., Shin, T., Samson, S. I., Greenberg, D. P., & Chit, A. (2021). *Vaccine, 39, A24-A35.*

Pepin, S., Nicolas, J. F., Szymanski, H., Leroux-Roels, I., Schaum, T., Bonten, M., ... & QHD00011 study team. (2021). . *Human Vaccines & Immunotherapeutics*, *17*(12), 5475-5486.

Immunogenicity and safety of a quadrivalent high-dose inactivated influenza vaccine compared with a standard-dose quadrivalent influenza vaccine in healthy people aged 60 years or older: a randomized Phase III trial



Contents lists available at ScienceDirect

International Journal of Infectious Diseases

journal homepage: www.elsevier.com/locate/ijid

Review

Comparative effectiveness of adjuvanted versus high-dose seasonal influenza vaccines for older adults: a systematic review and meta-analysis

Domnich, A., & de Waure, C. (2022) *International Journal of Infectious Diseases*, *122*, 855-863.

A B S T R A C T

Objectives: MF59-adjuvanted standard-dose and nonadjuvanted high-dose seasonal influenza vaccines have been developed to protect the elderly at high risk of severe complications. This study aimed to summarize the available evidence on the comparative efficacy/effectiveness of these two vaccines.

Methods: A systematic literature review of experimental and observational studies were conducted according to the preferred reporting items for systematic reviews and meta-analyses guidelines. When possible, the extracted effect sizes were pooled in random-effects meta-analyses.

Results: Ten studies were identified. Of these, no head-to-head randomized controlled trials were identified. All available studies had retrospective cohort design and large sample sizes, were conducted in the United States between the 2016-2017 and 2019-2020 seasons, and were at moderate risk of bias. Relative effectiveness estimates were limited to nonlaboratory-confirmed clinical end points, such as medical encounters including hospitalizations. Although most pooled relative effectiveness estimates were close to null, few statistically significant pooled effect sizes were small in magnitude, moved in opposite directions, and depended on the study sponsor and specificity of influenza-related outcomes.

Conclusion: At present, MF59-adjuvanted standard-dose and nonadjuvanted high-dose vaccines appear to have similar effectiveness in preventing seasonal influenza in the elderly, and no conclusive recommendations on the preference of one vaccine over another could be drawn.

QUADERNI dell' ITALIAN JOURNAL OF PUBLIC HEALTH

QIJPH - 2021, Volume 10, Number 2

TABELLA 2

QUALITÀ DELLE EVIDENZE SECONDO L'ANALISI CONDOTTA DAL NACI

Riduzione di:	Vaccino HD vs Vaccino SD	Vaccino Adiuvato vs Non Vaccinazione	Vaccino Adiuvato vs Vaccino SD	Vaccino HD vs Vaccino Adiuvato
ILI (Influenza-like illness)	✓✓ Good evidence	Non rilevabile	Non rilevabile	Evidenze non disponibili
Morti correlate ad influenza	✓✓ Good evidence	Non rilevabile	Non rilevabile	
Ospedalizzazioni	✓✓ Good evidence for all-cause hospitalisation	✓ Fair evidence for hospitalisation for influenza and influenza complications	? Insufficient evidence for hospitalisation for influenza and influenza complications	

✓✓ = good evidence (Grade A); ✓ = fair evidence (Grade B); ? = insufficient evidence (either quantity and/or quality; Grade I)

AIFA and the European Medicines Agency (EMA) have authorised eight vaccines for seasonal influenza immunisation. As every year, the virus strains were updated according to World Health Organization (WHO) recommendations, based on the antigenic characteristics of the virus strains circulating in the last season.

The vaccines authorised by AIFA with mutual recognition and decentralised procedures (AIFA Resolution No 710/2024, published in the Italian Official Gazette on 13 September 2024) are as follows:

- **EFLUELDA TETRA** (SANOFI PASTEUR), suspension for injection, indicated for the active immunisation of adults aged 60 years and over.
- **FLUARIX TETRA** (GLAXOSMITHKLINE BIOLOGICALS S.A.), suspension for injection, indicated for the active immunisation of adults and children from 6 months of age.
- **INFLUVAC S** (VIATRIS HEALTHCARE Limited), suspension for injection, indicated for the active immunisation of adults and children from 6 months of age.
- **INFLUVAC S TETRA** (VIATRIS HEALTHCARE Limited), suspension for injection, indicated for the active immunisation of adults and children from 6 months of age.
- **VAXIGRIP TETRA** (SANOFI PASTEUR EUROPE), suspension for injection, indicated for the active immunisation of adults, including pregnant women, and children from 6 months of age. Maternal vaccination of pregnant women extends protection to infants from birth and up to 6 months of age (passive protection).

The vaccines authorised through centralised procedure (coordinated by EMA) are as follows:

- **FLUAD TETRA** (Seqirus Netherlands B.V.), adjuvanted, suspension for injection, indicated for the active immunisation of adults (50 years and older).
- **FLUCELVAX TETRA** (Seqirus Netherlands B.V.), suspension for injection, indicated for the active immunisation of adults and children from 24 months of age.
- **FLUENZ** (Astrazeneca AB) nasal spray, indicated for active immunisation in children and adolescents aged 24 months to 18 years.

AGENZIA ITALIANA DEL FARMACO

Raccomandazione:
è opportuno che il soggetto diabetico riceva la vaccinazione antinfluenzale ogni anno, nel periodo compreso tra ottobre e dicembre.

Ministero della Salute

EX DIREZIONE GENERALE DELLA PREVENZIONE SANITARIA
Ufficio 5 Prevenzione delle Malattie Trasmissibili e Profilassi Internazionale

Prevenzione e controllo dell'influenza: raccomandazioni per la stagione 2024-2025

TARGET	Tipologie di vaccini antinfluenzali					
	VIQ	VIQa	VIQr	VIQhd	LAIV	VIQcc
Persone di età pari o superiore a 65 anni	S	R	S	R		S
Persone nella fascia di età 60 - 64 anni	S	S	S	S		S
Persone nella fascia di età 50 - 59 anni che rientrano nelle categorie riportate in tabella 3	S	S	S			S
Adulti di età compresa tra i 18 anni e i 49 anni che rientrano nelle categorie riportate in tabella 3	S		S			S
Bambini di età compresa tra i 7 anni e i 17 anni che rientrano nelle categorie riportate in tabella 3	S				S	S
Bambini nella fascia di età 2 – 6 anni	S				S	S
Bambini nella fascia di età 6 mesi - 2 anni	S					
Donne che all'inizio della stagione epidemica si trovano in qualsiasi trimestre della gravidanza e nel periodo "postpartum"	S		S			S

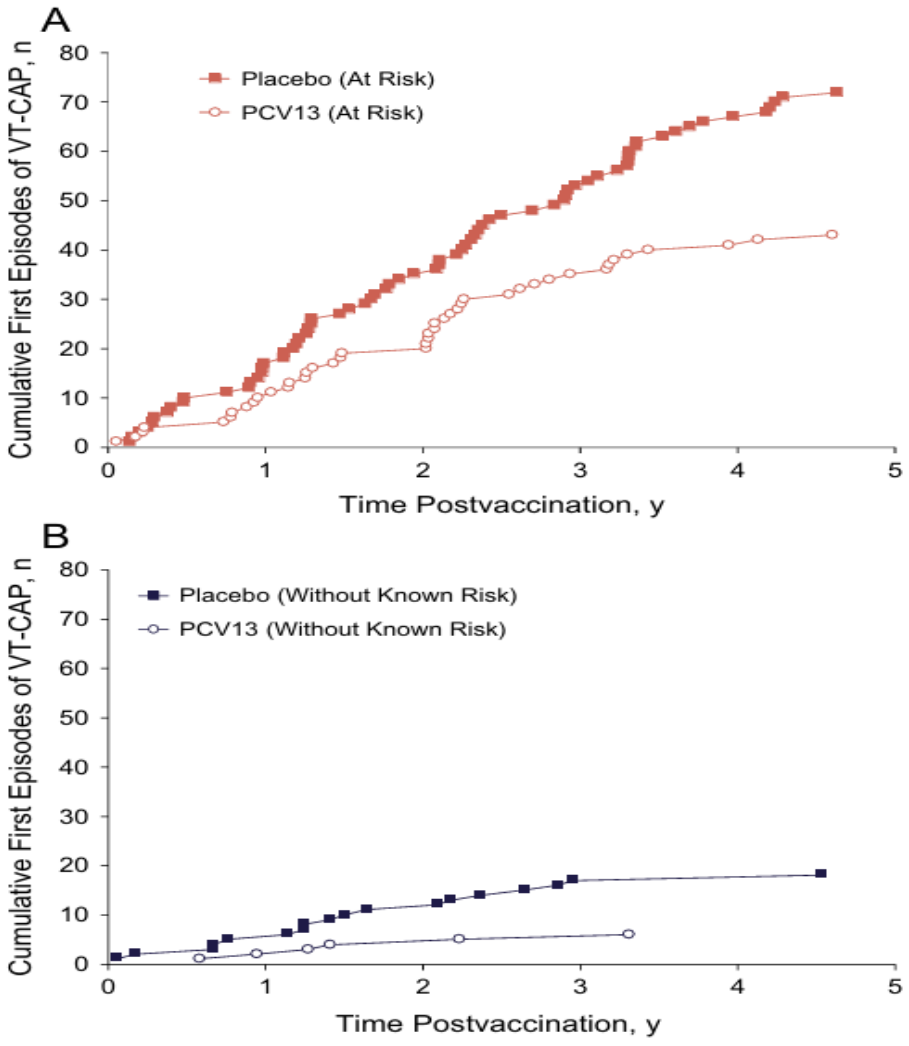
S: Somministrabile come da Riassunto delle caratteristiche del prodotto.
R: Prodotto Raccomandato tra i somministrabili

VIQ - Vaccino Inattivato Quadrivalente sub-unità, split
VIQa -Vaccino inattivato quadrivalente adiuvato
VIQr -Vaccino quadrivalente a DNA ricombinante
VIQhd - Vaccino inattivato quadrivalente ad alto dosaggio
LAIV- Vaccino vivo attenuato trivalente
VIQcc - Vaccino inattivato quadrivalente coltivato su colture cellulari

Fatte salve specifiche indicazioni d'uso, è possibile altresì la co-somministrazione di tutti i vaccini antinfluenzali anche con i vaccini anti-SARS-CoV-2/COVID-19[15 16] e i vaccini anti RSV[17 18].

Contents lists available at ScienceDirect
Vaccine
journal homepage: www.elsevier.com/locate/vaccine

Post hoc analysis of the efficacy of the 13-valent pneumococcal conjugate vaccine against vaccine-type community-acquired pneumonia in at-risk older adults



Suaya, J. A., Jiang, Q., Scott, D. A., Gruber, W. C., Webber, C., Schmoele-Thoma, B., ... & Isturiz, R. E. (2018). *Vaccine, 36(11), 1477-1483.*

Contents lists available at ScienceDirect
Vaccine
journal homepage: www.elsevier.com/locate/vaccine

Post-hoc analysis of a randomized controlled trial: Diabetes mellitus modifies the efficacy of the 13-valent pneumococcal conjugate vaccine in elderly

Vaccine efficacy stratified by ICPC defined comorbidities at enrolment in GP-dataset.

	PCV13		Placebo							
	VT-CAP	Total	VT-CAP	Total	Crude VE (95% CI)	p-value crude VE	p-value crude interact.	Adj.[a] VE (95% CI)	p-value Adj.[a] VE	p-value adj.[a] interact.
Per protocol										
Total population GP-dataset	28	20,196	42	20,231	33.2% (−7.7–58.6)	0.098	NA	32.1% (−9.5–57.9)	0.112	NA
With respiratory disease ICPC[b]	17	2393	20	2417	13.5% (−65.2–54.7)	0.661	0.268	11.8% (−68.4–53.8)	0.703	0.257
No respiratory disease ICPC[b]	11	17,803	22	17,814	50.0% (−3.1–75.8)	0.060		49.9% (−3.4–75.7)	0.062	
With DM ICPC[c]	2	2928	14	2958	85.6% (36.7–96.7)	0.010	0.020	85.1% (34.3–96.6)	0.012	0.022
No DM ICPC[c]	26	17,268	28	17,273	7.0% (−58.6 to 45.5)	0.790		6.1% (−68.2–44.9)	0.817	
Modified intention-to-treat										
Total population GP-dataset	37	20,196	48	20,231	22.8% (−18.6 to 49.7)	0.238	NA	21.5% (−20.6 to 48.9)	0.270	NA
With respiratory disease ICPC[b]	21	2393	23	2417	7.1% (−67.9 to 48.6)	0.808	0.397	5.2% (−71.3 to 47.6)	0.859	0.378
No respiratory disease ICPC[b]	16	17,803	25	17,814	36.0% (−19.9 to 65.8)	0.163		35.9% (−20.1 to 65.8)	0.165	
With DM ICPC[c]	4	2928	17	2958	76.3% (29.6–92)	0.010	0.013	75.5% (27.1–91.8)	0.011	0.014
No DM ICPC[c]	33	17,268	31	17,273	−6.6% (−74.1 to 34.7)	0.798		−7.8% (−76.1 to 34)	0.763	

Huijts, S. M., van Werkhoven, C. H., Bolkenbaas, M., Grobbee, D. E., & Bonten, M. J. *(2017) Vaccine, 35(34), 4444-4449.*

Effectiveness of pneumococcal vaccination on hospitalization and death in the adult and older adult diabetic population: a systematic review

Del Riccio, M., Boccalini, S., Cosma, C., Vaccaro, G., Bonito, B., Zanella, B., ... & Bechini, A. (2023).
Expert Review of Vaccines, 22(1), 1179-1184.

Results: Only two studies, encompassing a total of 68,246 subjects, were considered eligible for inclusion and of high quality. In both studies polysaccharide pneumococcal vaccination was associated with a reduction of the risk of hospitalization or death in adult diabetic patients (aHR: 0.76 in one study, aOR: 0.97 in the other one). However, in neither of the two included studies the lower risk was statistically significant.

Conclusions: Further research is needed due to the potentially major clinical implications for diabetic patients. The results of this systematic review can serve as a foundation for future studies, indicating the importance of continuing research in this area to improve patient outcomes.

Author, year	Pneumococcal vaccine used	Outcome	Main Result	Adjustment
Davis TME, 2017 [25]	PPV23[a]	Hospitalizations or death due to pneumonia	aHR: 0.76 (95%CI : 0.47-1-26)	GFR[b]; major depression
Kuo CS, 2016 [26]	PPV23[a]	Hospitalizations	aOR: 0.97 (95%CI 0.93–1.01)	age; gender; COPD[c]; flu vaccination; Charlson index; duration of diabetes

Cochrane Library

Cochrane Database of Systematic Reviews

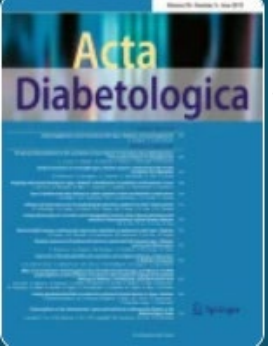
Vaccines for preventing pneumococcal infection in adults

Sarah Moberley[1], John Holden[2], David Paul Tatham[2], Ross M Andrews[3]

[1]Menzies School of Health Research, Darwin, Australia. [2]Garswood Surgery, St. Helens, UK. [3]Menzies School of Health Research, Casuarina, Australia

Authors' conclusions

This meta-analysis provides evidence supporting the recommendation for PPV to prevent IPD in adults. The evidence from RCTs is less clear with respect to adults with chronic illness. This might be because of lack of effect or lack of power in the studies. The meta-analysis does not provide evidence to support the routine use of PPV to prevent all-cause pneumonia or mortality.

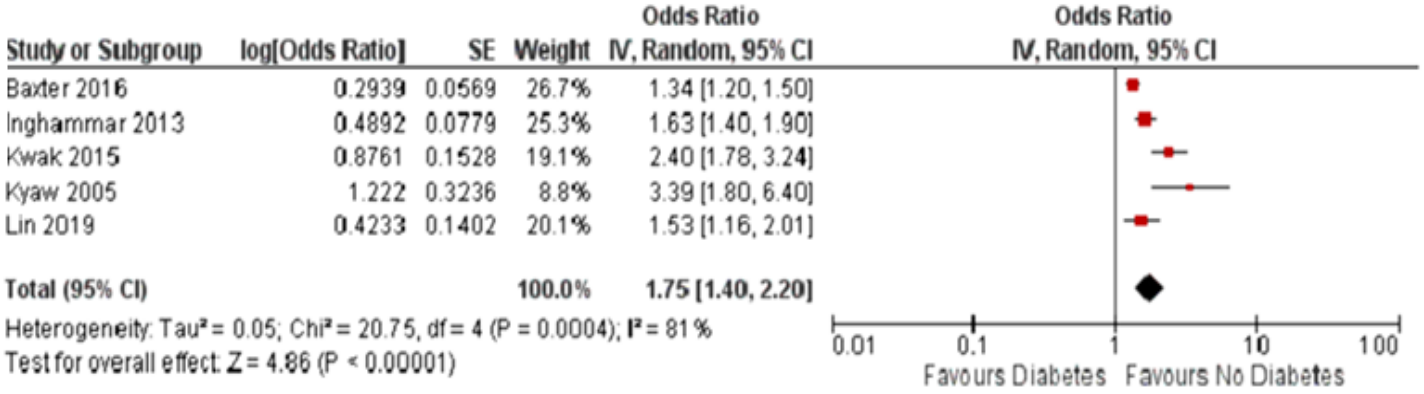


Diabetes as a risk factor for pneumococcal disease and severe related outcomes and efficacy/effectiveness of vaccination in diabetic population. Results from meta-analysis of observational studies

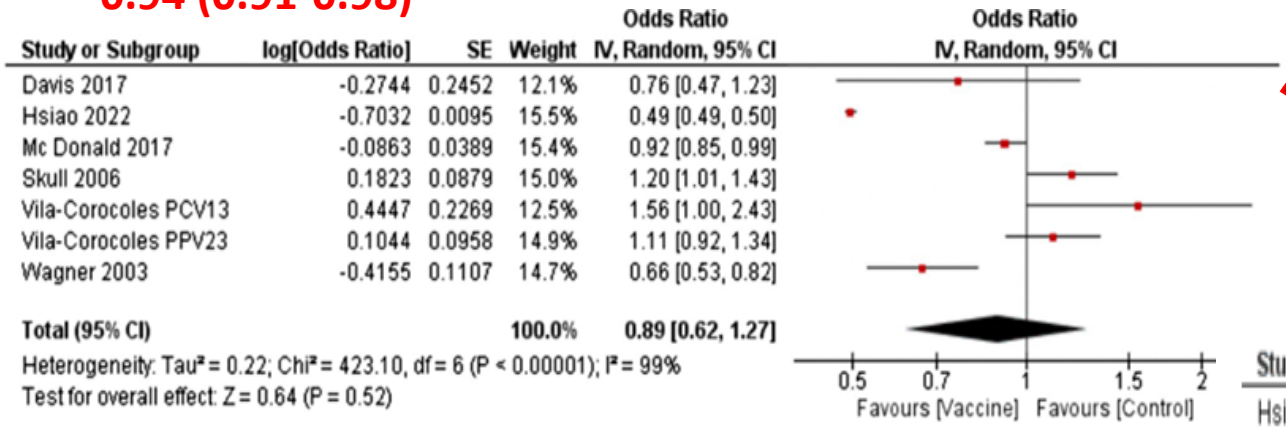
Silverii, G. A., Gabutti, G., Tafuri, S., Sarti, F., Pratesi, A., Clerico, A., ... & SID-AMD-SItI Working Group on Diabetes, Vaccines.

(2024). *Acta Diabetologica, 1-11.*

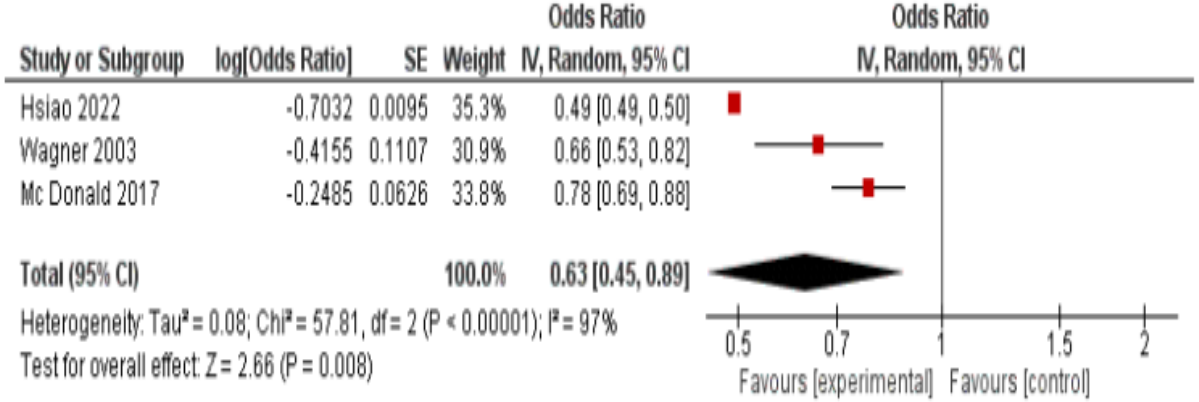
Adj OR IPD DM vs no DM
1.73 (p<00001)



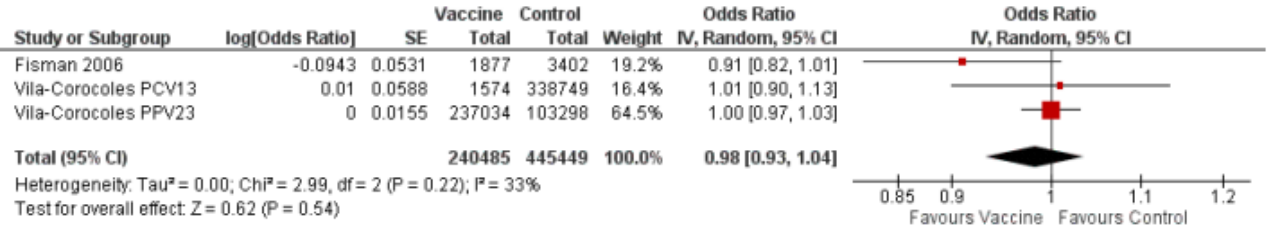
Adj OR ospedalizzazioni vaccinati vs non vaccinati
0.94 (0.91-0.98)



Effetto significativo sui pazienti vaccinati entro un anno.



Livello di significatività p 0.54 per mortalità



Intesa, ai sensi dell'articolo 8, comma 6, della legge 5 giugno 2003, n. 131, tra il Governo, le regioni e le Province autonome di Trento e di Bolzano, sul documento recante «Piano nazionale di prevenzione vaccinale (PNPV) 2023-2025» e sul documento recante «Calendario nazionale vaccinale». (Rep. atti n. 193/CSR del 2 agosto 2023). (23A04685)

(G.U. Serie Generale , n. 194 del 21 agosto 2023)

PNP 2023-2025

Vaccino antipneumococco

La vaccinazione antipneumococcica e' raccomandata a tutti coloro che presentino le seguenti patologie o condizioni predisponenti:

- . Alcoolismo cronico
- . Asplenia anatomica o funzionale e candidati alla splenectomia
- . Cardio/pneumo/epatopatie croniche
- . Diabete mellito

Posologia: numero di dosi come da scheda tecnica a seconda dell'eta' e in funzione della patologia o condizione. Per bambini >2 anni e adulti, schedula sequenziale PCV/PPSV23 (una prima dose di PCV seguita ad almeno 8 settimane di distanza da una dose di PPSV23).

Raccomandazione:
il paziente diabetico dovrebbe ricevere la vaccinazione anti-pneumococcica utilizzando due possibili approcci:

- Una dose di vaccinazione anti-pneumococcica 20-valente
- la schedula sequenziale (vaccinazione anti-pneumococcica 15-valente e dopo 12 mesi vaccinazione anti-pneumococcica 23-valente polisaccaridica).

Consensus 2023

Contents lists available at ScienceDirect

Journal of Infection

journal homepage: www.elsevier.com/locate/jinf

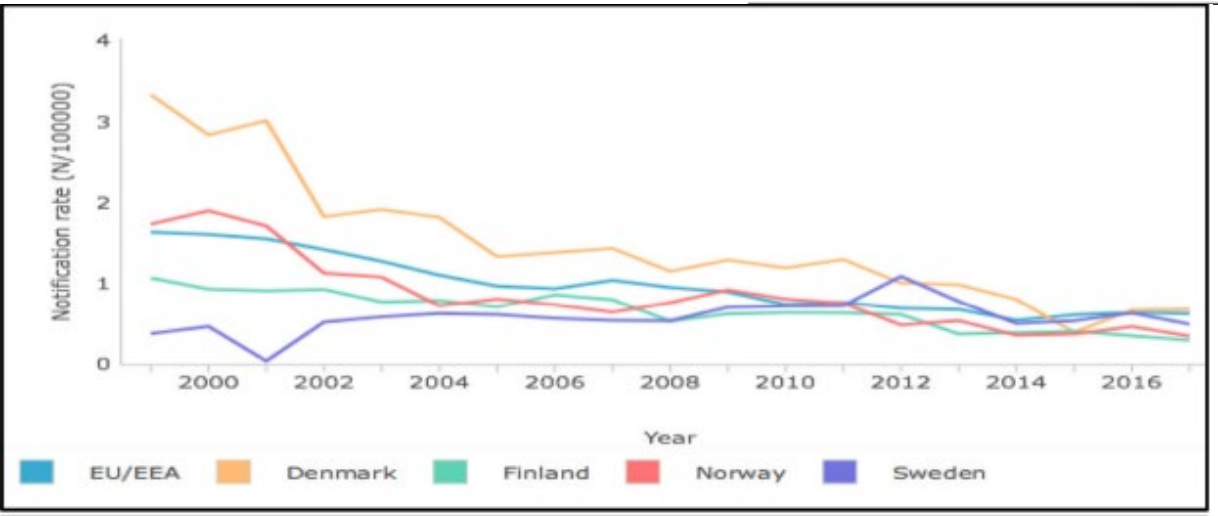
Review

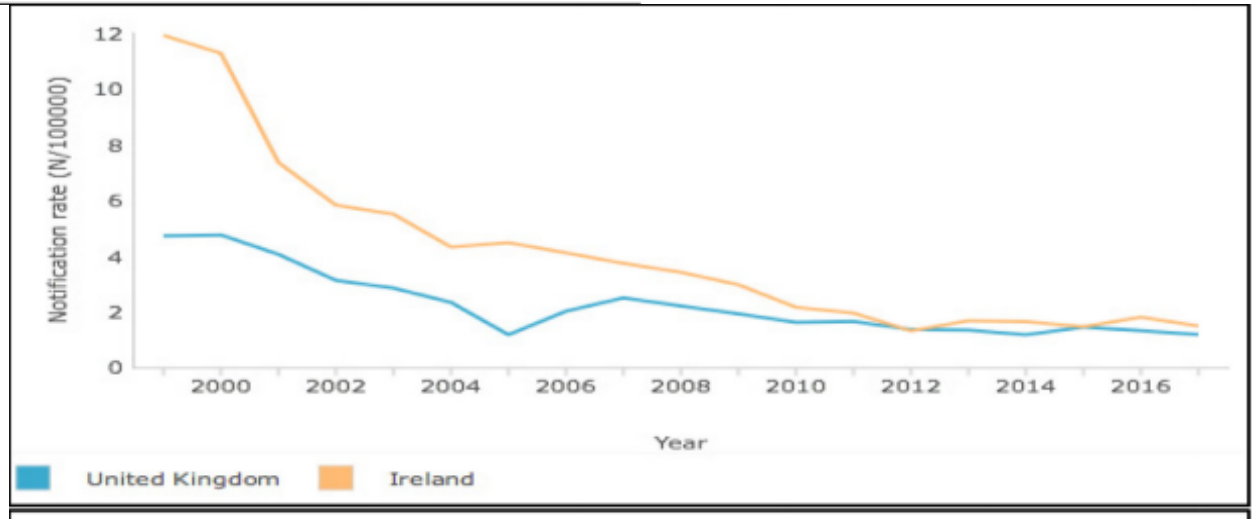
The everchanging epidemiology of meningococcal disease worldwide and the potential for prevention through vaccination

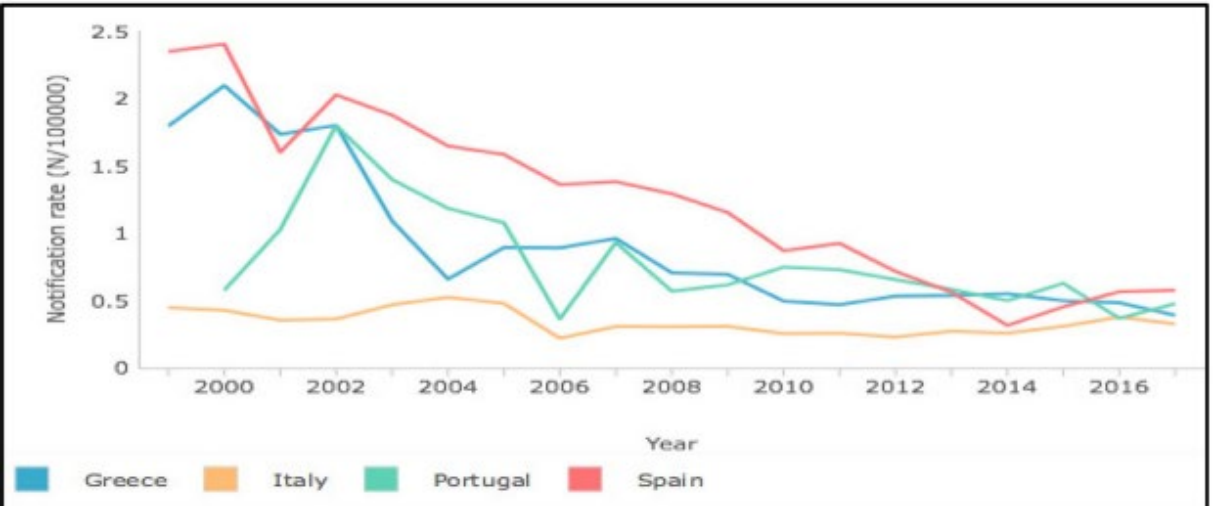
Parikh, S. R., Campbell, H., Bettinger, J. A., Harrison, L. H., Marshall, H. S., Martinon-Torres, F., ... & Ladhani, S. N. (2020). *Journal of Infection, 81(4), 483-498.*

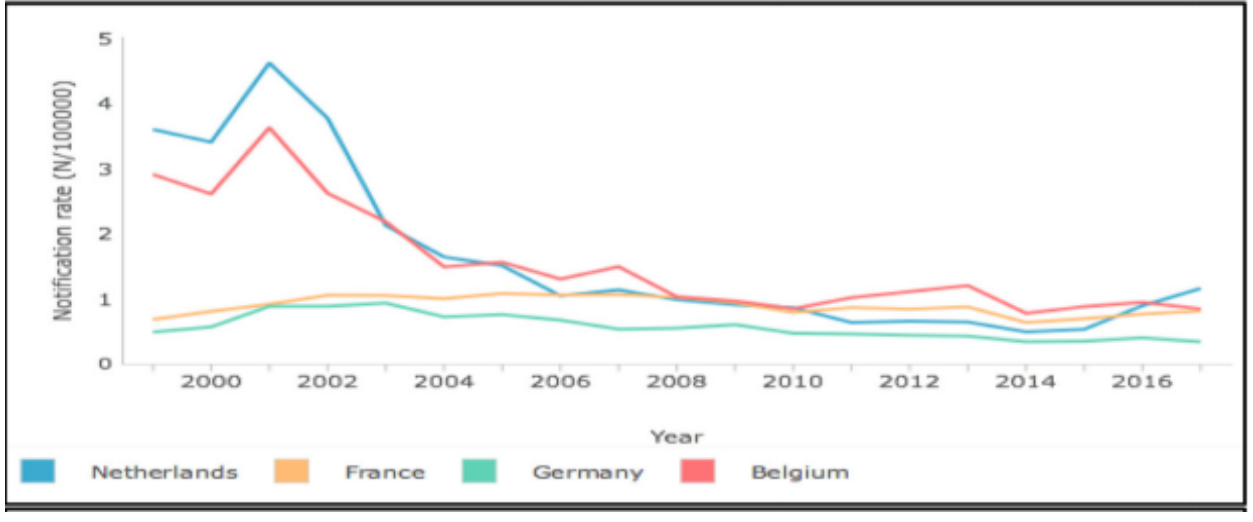
Currently licensed and available polysaccharide-conjugate and broad-spectrum meningococcal vaccines

Vaccine	Coverage (*N. meningitidis* serogroup)	Manufacturer	Protein conjugate
Protein conjugate vaccines			
Meningitec®	C	Nuron Biotech Inc., Exton, PA, USA	CRM197
Menjugate®	C	GlaxoSmithKline Biologicals SA, Rixensart Belgium	CRM197
NeisVac-C®	C	Pfizer Inc., New York, NY, USA	Tetanus toxoid
MenAfriVac®	A	Serum Institute of India Ltd., Pune, India	Tetanus toxoid
Menactra®	A, C, W, Y	Sanofi Pasteur SA, Lyon, France	Diphtheria toxoid
Menveo®	A, C, W, Y	GlaxoSmithKline Biologicals SA, Rixensart Belgium	Diphtheria cross
Nimenrix®	A, C, W, Y	Pfizer Inc., New York, NY, USA	Tetanus toxoid
Combination conjugate vaccines			
Menitorix®	C + *Haemophilus influenzae* type b	GlaxoSmithKline Biologicals SA, Rixensart Belgium	Tetanus toxoid
Subcapsular meningococcal antigen vaccines			
Bexsero®	B	GlaxoSmithKline Biologicals SA, Rixensart Belgium	-
Trumenba®	B	Wyeth Pharmaceuticals Inc., Philadelphia, PA, USA*	-









MenB-FHbp Meningococcal Group B Vaccine (Trumenba®): A Review in Active Immunization in Individuals Aged ≥ 10 Years

Matt Shirley[1] · Muhamed-Kheir Taha[2]

MenB-FHbp Meningococcal Group B Vaccine (Trumenba®): clinical considerations in active immunization in individuals aged ≥ 10 years

A recombinant protein MenB vaccine containing two variants of fHBP, a surface-exposed protein present in almost all serogroup B meningococci

Licensed in the EU as a two- or three-dose series, with a booster dose to be considered for individuals at continued risk of IMD

A two-dose series (on a 0- and 6-month schedule) or a three-dose series (on a 0-, 1- to 2-, 6-month schedule) elicits robust bactericidal immune responses against MenB strains representative of those circulating in Europe

Can be given concomitantly with other select vaccines for adolescents and young adults

Generally well tolerated; the most common adverse reactions are pain at the injection site, fatigue and headache

Raccomandazione:
è opportuno che il soggetto diabetico riceva la vaccinazione anti-meningococcica B e la vaccinazione anti-meningococcica quadrivalente ACYW con prodotto coniugato.
Sono raccomandati booster ogni 2-5 anni.

An update of clinical experience with the quadrivalent meningococcal ACWY-CRM conjugate vaccine

What is the context?

- MenACWY-CRM targets four of the most commonly isolated invasive meningococcal serogroups: A, C, W and Y, and has contributed to control of invasive meningococcal disease since its first launch in 2010 in the United States. MenACWY-CRM is currently licensed in more than 64 countries worldwide, with more than 37 milion doses of MenACWY-CRM distributed since launch.
- This review provides a summary of the clinical immunogenicity and safety evidence generated with MenACWY-CRM published since the last review in 2011.

What is new?

- After 8 years of continual use of MenACWY-CRM, 32 studies in 20 countries worldwide have shown that MenACWY-CRM induced seroprotective hSBA titers (>8) in the majority of vaccinated infants, children, adolescents and adults from 2 months to 75 years of age. Antibody persistence has been demonstrated up to 5 years after vaccination across age groups.
- Co-administration studies in infants, adolescents and adults did not suggest any clinically relevant vaccine interactions between MenACWY-CRM and commonly administered vaccines in any age group.
- Safety data from >30,000 individuals from clinical trials and >55,000 individuals from post-marketing safety trials support the acceptable safety profile of MenACWY-CRM.

What is the impact?

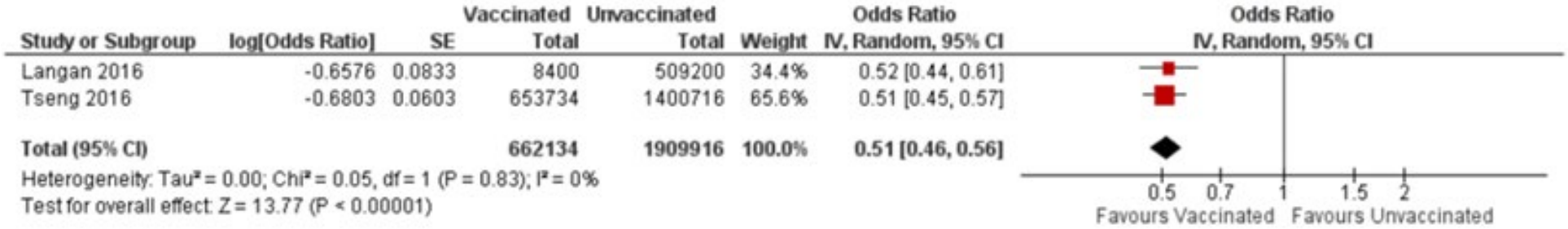
- Available data support the favorable benefit-risk ratio of MenACWY-CRM to provide broad protection against invasive meningococcal disease in all age groups.
- MenACWY-CRM can be administered alone or with other routine vaccines to infants, children, adolescents and adults. MenACWY-CRM can be incorporated into different vaccination schedules, from infancy through adulthood.

https://doi.org/10.1007/s00592-023-02127-7

ORIGINAL ARTICLE

Efficacy and effectiveness of Herpes zoster vaccination in adults with diabetes mellitus: a systematic review and meta-analysis of clinical trials and observational studies

Giovanni Antonio Silverii[1] · Alessandra Clerico[2] · Riccardo Fornengo[3] · Giovanni Gabutti[4] · Valeria Sordi[5] · Ottavia Peruzzi[1] · Silvio Tafuri[6] · Edoardo Mannucci[1] · Ilaria Dicembrini[1]



Studi osservazionali

Analisi su pazienti che decidevano di vaccinarsi

RCT

Pazienti arruolati secondo criteri di selezione

In attesa di possibili confronti «head to head»

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Herpes Zoster Recombinant Vaccine	Placebo	Relative (95% CI)	Absolute (95% CI)		
New outcome												
2	randomised trials	not serious	not serious	serious[a]	serious[b]	strong association	7/8723.8 (0.1%)	80/8652.7 (0.9%)	**OR 0.09** (0.04 to 0.19)	**8 fewer per 1.000** (from 9 fewer to 7 fewer)	⨁⨁⨁◯ Moderate	
3	observational studies	not serious	not serious	serious[a]	serious[b]	none	1186/149458 (0.8%)	10634/861577 (1.2%)	**OR 0.52** (0.49 to 0.56)	**6 fewer per 1.000** (from 6 fewer to 5 fewer)	⨁⨁◯◯ Low	

91-95%

48%

Contents lists available at ScienceDirect

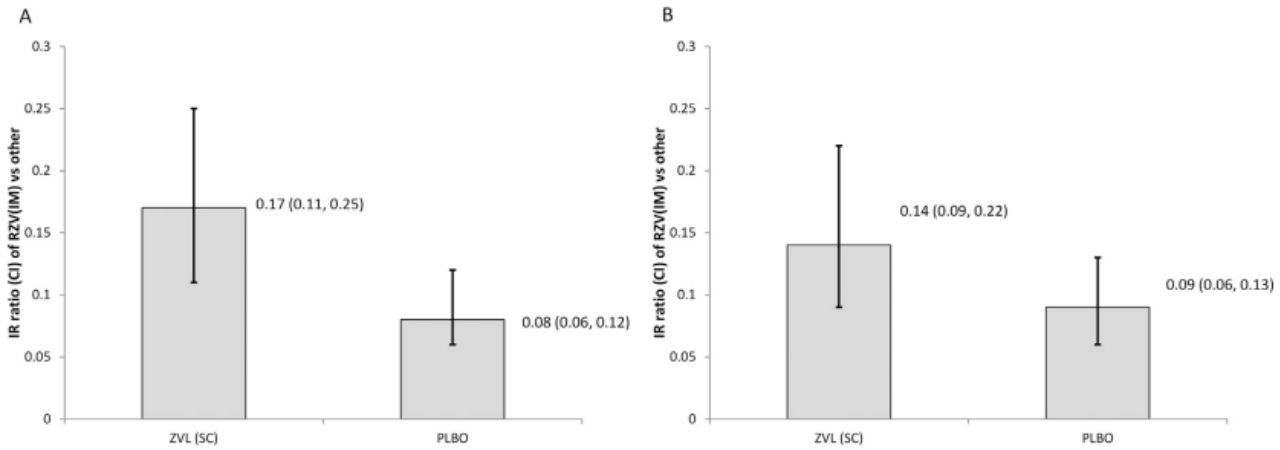
Vaccine

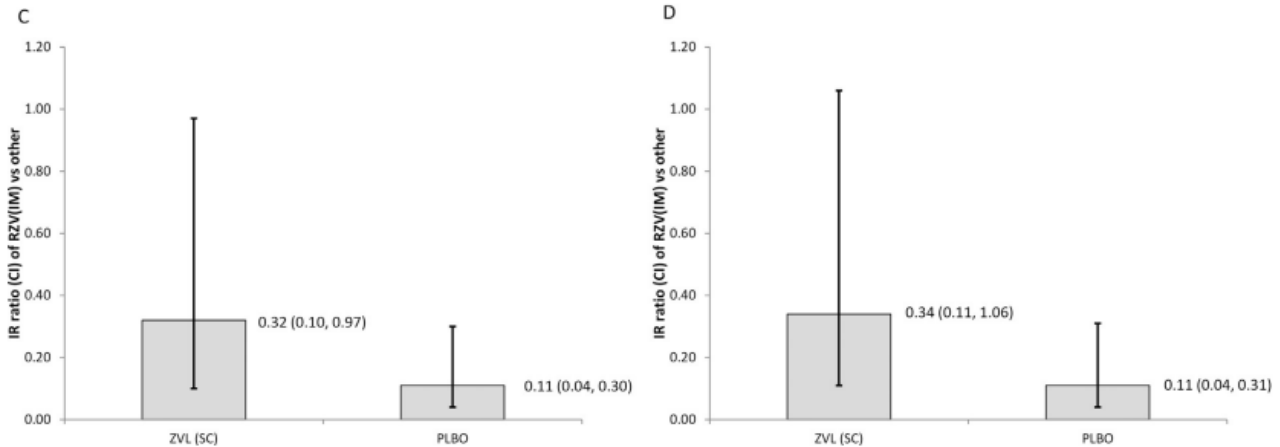
journal homepage: www.elsevier.com/locate/vaccine

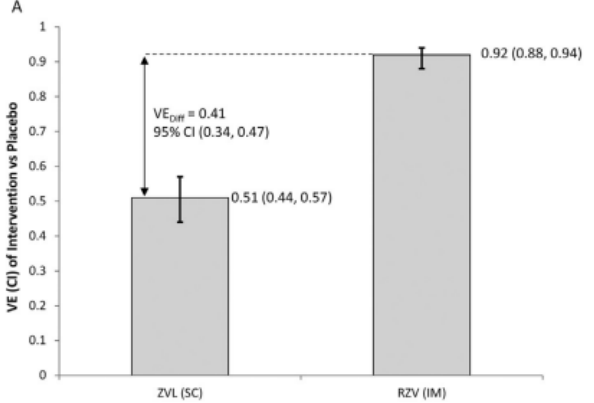
Review

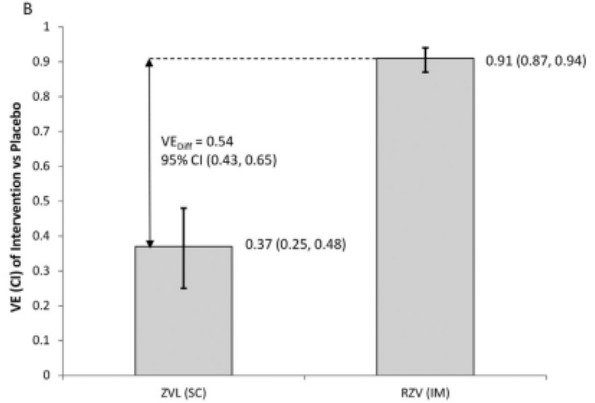
The comparative efficacy and safety of herpes zoster vaccines: A network meta-analysis ☆

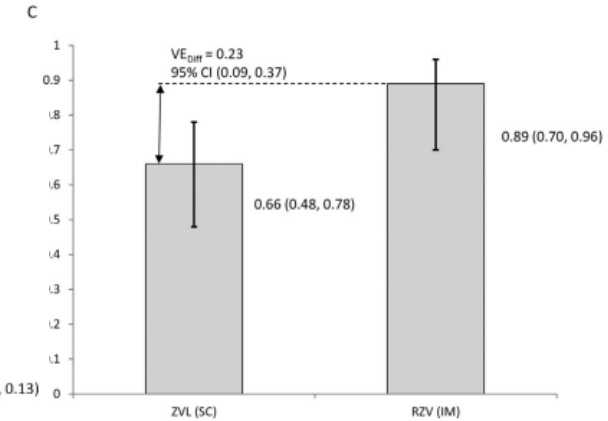
McGirr, A., Widenmaier, R., Curran, D., Espié, E., Mrkvan, T., Oostvogels, L., ... & Newson, R. S. (2019). *Vaccine, 37(22), 2896-2909.*

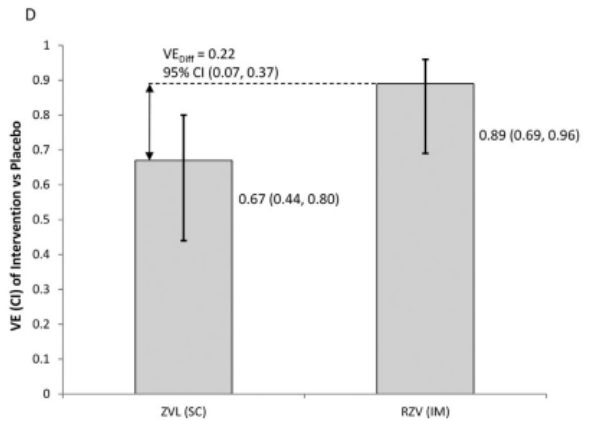












Clinical Infectious Diseases
MAJOR ARTICLE

The Adjuvanted Recombinant Zoster Vaccine Confers Long-Term Protection Against Herpes Zoster: Interim Results of an Extension Study of the Pivotal Phase 3 Clinical Trials ZOE-50 and ZOE-70

Céline Boutry,[1a] Andrew Hastie,[2] Javier Diez-Domingo,[3] Juan Carlos Tinoco,[4] Cheng-Jen Yu,[5] Charles Andrews,[6] Jean Beytout,[7] Covadonga Caso,[8] Hong-Shiou Cheng,[9] Hee Jin Cheong,[10] Eun Ju Choe,[11] Dan Curiac,[12] Emmanuel Di Paolo,[13] Marc Dionne,[14] Tamara Eckermann,[15] Meral Esen,[16] Murdo Ferguson,[17] Wayne Ghesquiere,[18] Shinn-Jong Hwang,[19,20] Thiago Junqueira Avelino-Silva,[21] Pavel Kosina,[22] Chin-Shong Lin,[23] Jukka Markkula,[24] Beate Moeckesch,[25] Cláudia Murta de Oliveira,[26] Dae Won Park,[27] Karlis Pauksens,[28] Paola Pirotta,[29] Georg Plasmeijer,[30] Carel Pretorius,[31] Lars Rombo,[32] Bruno Salaun,[33] Johan Sanmartin Berglund,[34] Isabelle Schenkenberger,[35] Tino Schwarz,[36] Meng Shi,[1] Benita Ulkonen,[36] Teufik Zahaf,[36] Cristiano Zerbini,[37] Anne Schuind,[1a] and Anthony L. Cunningham,[38,39] on behalf of the Zoster-049 Study Group

	Adjuvanted Recombinant Zoster Vaccine				Historical Control[a]/Placebo Group in ZOE-50 and ZOE-70[b]				
	N	n	Sum of Follow-up Years	Incidence (per 1000 Person-Years)	N	n	Sum of Follow-up Years	Incidence (per 1000 Person-Years)	Vaccine Efficacy, % (95% Confidence Interval)
Vaccine efficacy in the current follow-up study: primary objective (up to the data lock point for the interim analysis in the current follow-up study)									
Overall[a]	7277	27	19 621.7	1.4	7277	169	19 621.7	8.6	84.0 (75.9–89.8)
Vaccine efficacy from 1 month post-dose 2: secondary objective (up to the data lock point for the interim analysis in the current follow-up study)									
Overall	13 881	59	72 744.6	0.8	13 881	651	72 744.6	8.9	90.9 (88.2–93.2)
Year 1[b]	13 881	3	13 744.5	0.2	14 035	130	13 823.3	9.4	97.7 (93.1–99.5)
Year 2[b]	13 569	10	13 415.6	0.7	13 564	136	13 332.5	10.2	92.7 (86.2–96.6)
Year 3[b]	13 185	9	13 016.1	0.7	13 074	116	12 834.0	9.0	92.4 (85.0–96.6)
Year 4[b]	12 757	10	12 946.7	0.8	12 517	95	12 637.4	7.5	89.8 (80.3–95.2)
Year 6[a]	7277	10	7208.8	1.4	7277	66	7208.8	9.2	84.9 (70.4–93.1)
Year 7[a]	7097	10	6993.1	1.4	7097	68	6993.1	9.7	85.3 (71.3–93.3)
Year 8[a,c]	6876	7	5160.2	1.4	6876	44	5160.2	8.5	84.1 (64.4–94.0)

Raccomandazione:
per il soggetto diabetico, è consigliata la vaccinazione anti-Herpes Zoster con vaccino ricombinante adiuvato a partire dai 18 anni di età

Intesa, ai sensi dell'articolo 8, comma 6, della legge 5 giugno 2003, n. 131, tra il Governo, le regioni e le Province autonome di Trento e di Bolzano, sul documento recante «Piano nazionale di prevenzione vaccinale (PNPV) 2023-2025 sul documento recante «Calendario nazionale vaccinale». (Rep. atti n. 193/CSR del 2 agosto 2023). (23A04685)

(G.U. Serie Generale , n. 194 del 21 agosto 2023)

PNP 2023-2025

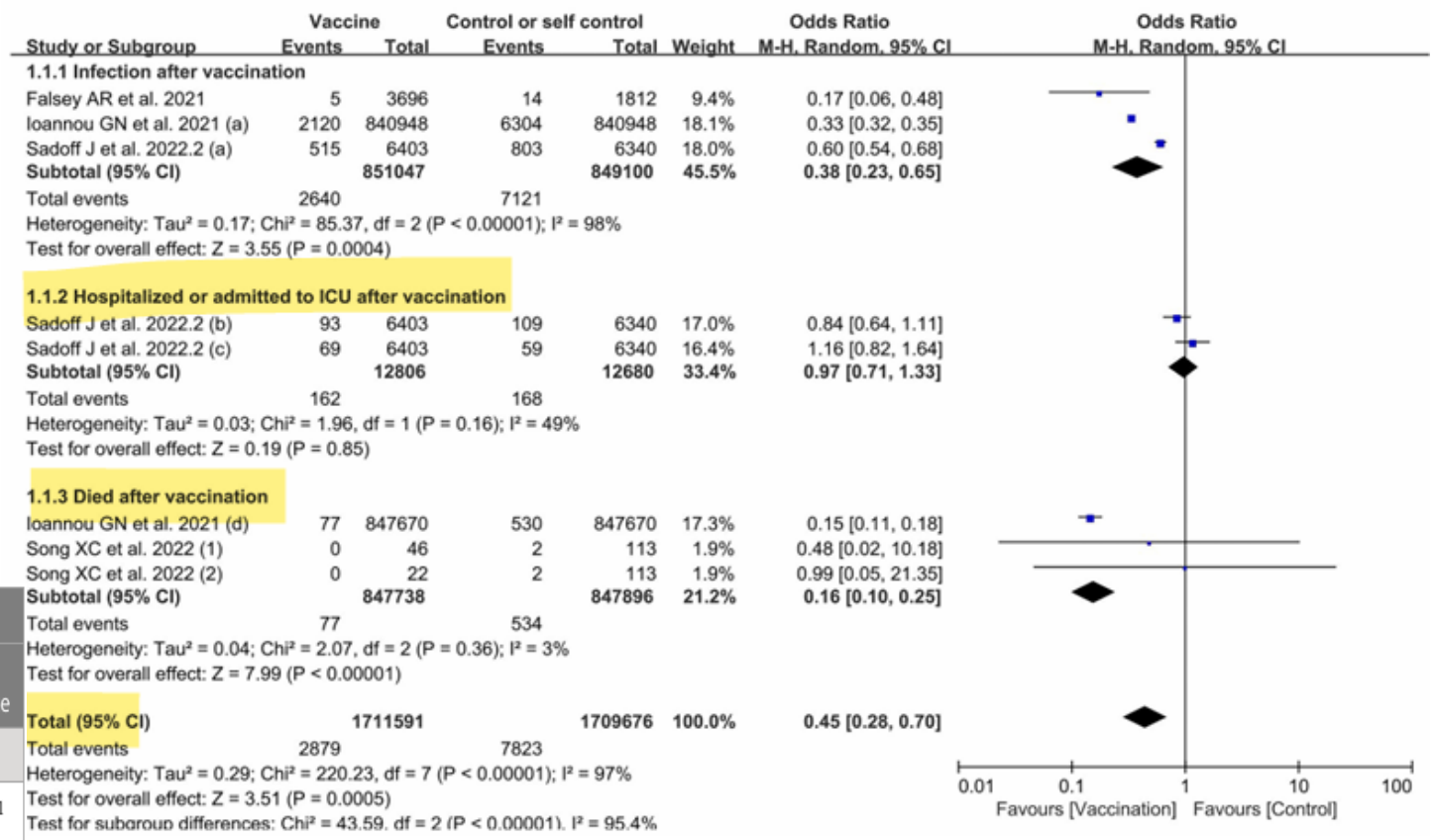
Si sottolinea che il vaccino a virus vivo attenuato (ZVL) e' indicato dai soggetti di 50 e piu' anni, mentre quello adiuvante ricombinante a partire dai 18 di eta'.

Posologia: ZVL singola dose. RZV due dosi (0, 2-6 mesi). Nei soggetti che sono o che potrebbero diventare immunodeficienti o immunodepressi a causa di malattia o terapia e che trarrebbero beneficio da una schedula accelerata, la seconda dose di RZV puo' essere somministrata da 1 a 2 mesi dopo la dose iniziale.

A systematic review and meta-analysis of the effectiveness and safety of COVID-19 vaccination in older adults

Xu, K., Wang, Z., Qin, M., Gao, Y., Luo, N., Xie, W., ... & Ma, X. (2023). *Frontiers in Immunology, 14, 1113156*.

Study character-istics	Data			Test for heterogeneity			Test for effect		Subgroup	
	No. of studies	Vaccine	Control	I^2 (%)	Chi-squared test	*p*-value	OR (CI)	*p*-value	Statistic	*p*-value
No. doses										
One dose	4	19,255	19,133	80	15.24	0.002	0.81 (0.56–1.17)	0.26	10.24	0.001
Two doses	4	1,692,336	1,690,543	94	47.05	<0.00001	0.23 (0.11–0.45)	<0.00001		
Total	8	1,711,591	1,709,676	97	220.23	<0.00001	0.45 (0.28–0.70)	0.0005		
Vaccine type										
IV	2	68	226	0	0.11	0.74	0.69 (0.08–6.00)	0.74	5.90	0.05
NAV	2	1,688,618	1,688,618	98	45.14	<0.00001	0.22 (0.10–0.50)	0.0003		
VVV	4	22,905	20,832	86	21.78	<0.0001	0.69 (0.46–1.05)	0.08		
Total	8	1,711,591	1,709,676	97	220.23	<0.00001	0.45 (0.28–0.70)	0.0005		



This systematic review and meta-analysis have comprehensively synthesized the latest data on vaccine effectiveness, immunogenicity, and safety in older adults based on 22 RCTs. In the meta-analysis, we found that vaccination is more effective in preventing SARS-CoV-2 infection and in reducing the number of COVID-19-related deaths in elderly people. The effect of two doses s stronger than that of one dose. After vaccination, high AS rates are observed in the elderly population. With an increase in the number of inoculation doses received, antibody titer levels also increased among the older population, with the highest antibody titer levels in elderly people being induced by the nucleic acid vaccinein. Vaccination can produce certain adverse reactions in the elderly population, but their incidence is quite low. It needs to be made abundantly clear to elderly people that the advantages of vaccination, which is the best way to control COVID-19 by preventing severe illness and reducing related deaths, far outweigh any potential risks. However, more randomized clinical trials are needed to increase the certainty of the evidence and to draw more reliable conclusions.

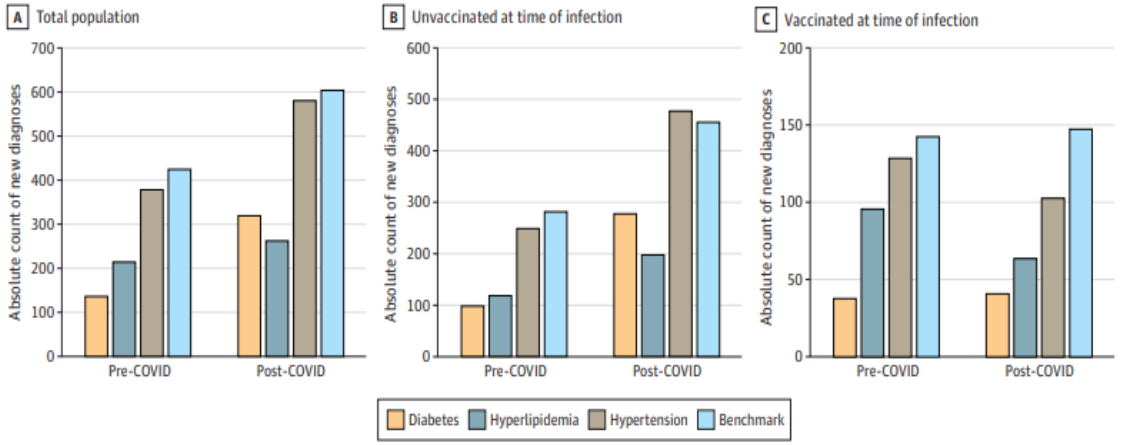
JAMA Network | Open

Research Letter | Infectious Diseases

Association of COVID-19 Vaccination With Risk for Incident Diabetes After COVID-19 Infection

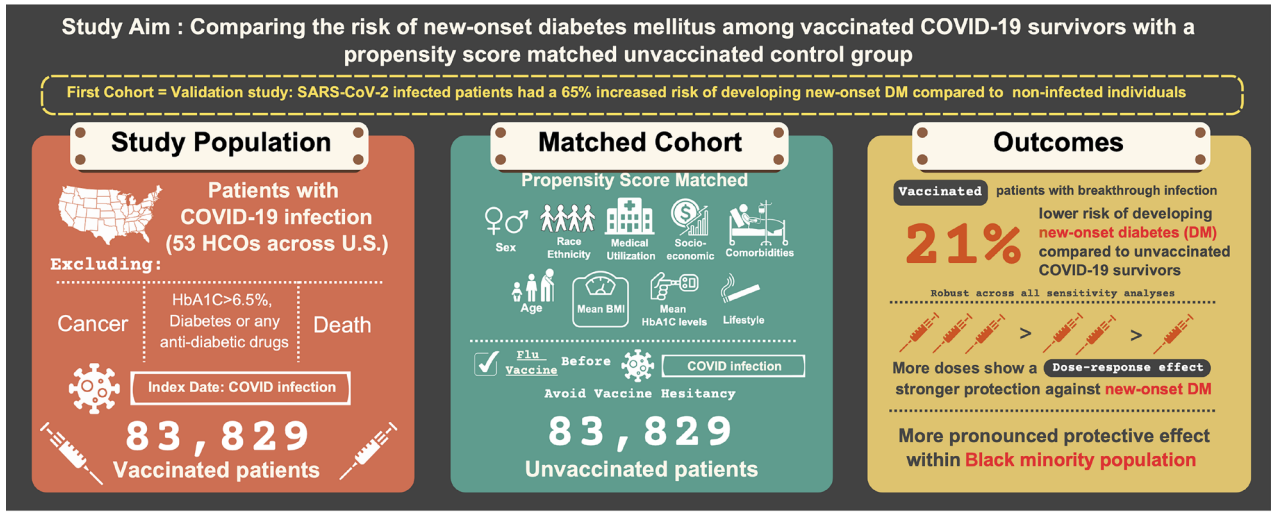
Alan C. Kwan, MD, MSc; Joseph E. Ebinger, MD; Patrick Botting, MSPH; Jesse Navarrette, MPA; Brian Claggett, PhD; Susan Cheng, MD, MPH, MMSc

Figure. New Diagnoses Before and After COVID-19 Infection



COVID-19 Vaccination Prior to SARS-CoV-2 Infection Reduced Risk of Subsequent Diabetes Mellitus: A Real-World Investigation Using U.S. Electronic Health Records

Hsieh, T. Y. J., Chang, R., Yong, S. B., Liao, P. L., Hung, Y. M., & Wei, J. C. C. (2023). *. Diabetes Care, 46(12), 2193-2200.*



COVID-19, coronavirus disease 2019; HCO, health care organization; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2

Raccomandazione:
è opportuno somministrare la vaccinazione anti-Epatite B a tutti i soggetti diabetici non precedentemente immunizzati, valutare periodicamente la persistenza di anticorpi anti-HBs e procedere ad opportuni richiami vaccinali in caso di declino anticorpale.

Raccomandazione:
il soggetto diabetico deve ricevere il ciclo completo di vaccinazione anti-SARS-CoV-2; i soggetti di età superiore a 12 anni devono ricevere i *booster* previsti (primo e secondo) per la popolazione in condizione di estrema vulnerabilità.

Raccomandazione:
è opportuno che il soggetto diabetico conosca il suo stato immunitario per Morbillo, Parotite, Rosolia e Varicella e che i soggetti suscettibili ricevano le adeguate vaccinazioni con schedula a 2 dosi

Ministero della Salute

IPARTIMENTO DELLA PREVENZIONE, DELLA RICERCA E DELLE EMERGENZE SANITARIE
Ex-DIREZIONE GENERALE DELLA PREVENZIONE SANITARIA
Ufficio 5 - Prevenzione malattie trasmissibili e profilassi internazionale

come da Riassunto delle Caratteristiche del Prodotto è prevista singola dose di Comirnaty JN.1 anche per coloro che non sono mai stati vaccinati (ciclo primario). la distanza dalla dose di vaccino anti-COVID-19 più recente deve essere di almeno tre mesi;

per i bambini dai 6 mesi ai 4 anni compresi che non hanno completato un ciclo primario di vaccinazione anti-COVID-19 o senza storia di infezione pregressa da SARS-CoV-2, il RCP di Comirnaty JN.1 prevede, invece, 3 dosi (di cui la seconda a 3 settimane dalla prima e la terza a 8 settimane dalla seconda);

- la campagna nazionale di vaccinazione autunnale e invernale anti COVID-19 2024-25, si avvarrà dei vaccini adattati alla variante JN.1;
- una dose di richiamo del vaccino aggiornato a JN.1 viene offerta attivamente alle categorie individuate nell'allegato 2. La dose di richiamo è annuale. L'aver contratto una infezione da SARS-CoV-2, anche recente, dopo il precedente richiamo, non rappresenta una controindicazione alla vaccinazione;

Per tutti i vaccini anti-SARS-CoV-2/COVID-19 autorizzati in Italia, è possibile la somministrazione concomitante (o a distanza di tempo, prima o dopo) con altri vaccini, compresi i vaccini basati sull'impiego di patogeni vivi attenuati.

Per coloro che accedono sia alla vaccinazione anti-SARS-CoV-2/COVID-19 che quella mpox resta ancora valida l'indicazione di una distanza di almeno 4 settimane (28 giorni) tra un vaccino e l'altro. Nel caso di somministrazione di due vaccini per via intramuscolare, nella stessa seduta vaccinale, è possibile utilizzare due sedi anatomiche differenti (es. deltoide destro e deltoide sinistro) oppure la stessa sede anatomica (es. entrambi nel deltoide sinistro); in questo caso devono essere iniettati a distanza di almeno 2,5 cm l'uno dall'altro, al fine di ridurre la probabilità di reazioni locali sovrapposte.

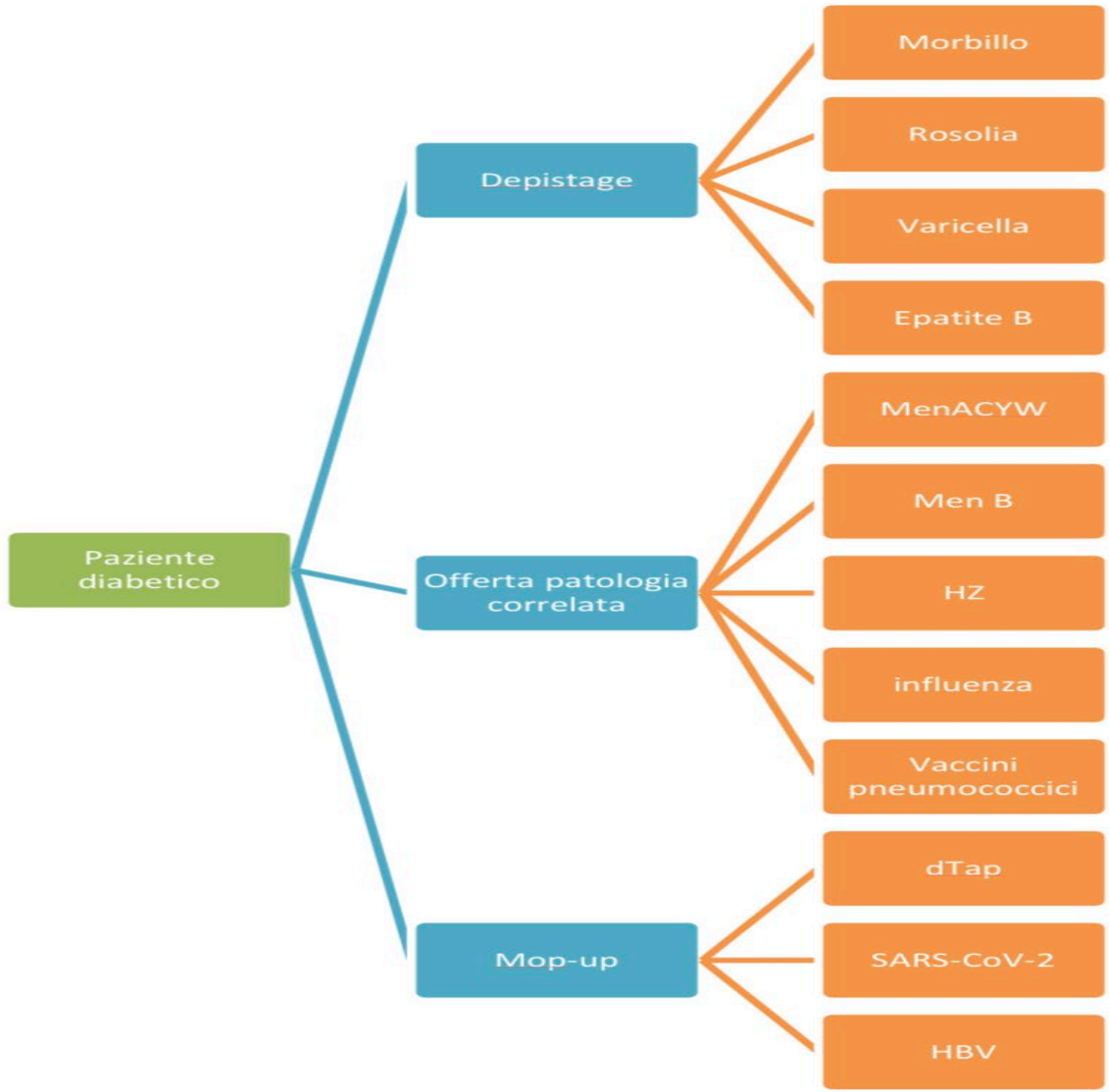
ALLEGATO 2

Elenco gruppi di Persone a cui viene raccomandata la vaccinazione di richiamo con il nuovo vaccino aggiornato.

Ferma restante la possibilità per chiunque di accedervi gratuitamente, la vaccinazione anti COVID-19 è raccomandata ai seguenti gruppi di Persone:

Malattie croniche a carico dell'apparato respiratorio, inclusa l'asma grave, la displasia broncopolmonare, la fibrosi cistica, la broncopatia cronico ostruttiva-BPCO, la fibrosi polmonare idiopatica, l'ipertensione polmonare, l'embolia polmonare e le malattie respiratorie che necessitino di ossigenoterapia;
Malattie dell'apparato cardio-circolatorio (esclusa ipertensione arteriosa isolata), comprese le cardiopatie congenite e acquisite, le malattie coronariche, lo scompenso cardiaco e i pazienti post-shock cardiogeno;
Malattie cerebrovascolari;

Diabete/altre endocrinopatie severe quali diabete di tipo 1, diabete di tipo 2, morbo di Addison, panipopituitarismo;


Paziente diabetico
Depistage
Morbillo
Rosolia
Varicella
Epatite B
Offerta patologia correlata
MenACYW
Men B
HZ
influenza
Vaccini pneumococcici
Mop-up
dTap
SARS-CoV-2
HBV

Patient version

American Diabetes Association®

Guidelines InSIGHT
Your visual guide to the guidelines

Shield Yourself & Loved Ones Against Serious Diseases

THE REALITY IS SERIOUS

Many Americans still develop illness that vaccines can help prevent every year, leading to hospital admissions and deaths.

WHY VACCINES MATTER

Factors, such as your age, job, lifestyle, or health conditions, such as diabetes, increase your risk for developing the illnesses vaccines help prevent. The protection from vaccines you received as a child wears off over time and can also put you at risk.

American Diabetes Association®

Guidelines InSIGHT
Your visual guide to the guidelines

Protect Yourself with Vaccines if You Have Diabetes

Which vaccines are recommended?

VACCINE	AGE
COVID-19 (and boosters)	■ 6 months old and older
Hepatitis B	■ 60 years old or younger ■ If you're over 60 years old—talk with your diabetes care team
Flu (Influenza)	■ 6 months old and older (annually) * All people with diabetes advised not to receive live attenuated (nasal spray) vaccine
Pneumonia *Older vaccine PPSV23*	■ 19–64 years old ■ If you're over 65 years old—talk with your diabetes care team
Newer vaccines: PCV15 or PCV 20	■ 19-64 years old ■ Adults 65 years old or older—talk with you're diabetes care team about options
RSV (Respiratory Syncytial Virus)	■ Adults 60 years old and older
Tdap (Tetanus, Diphtheria, Pertussis)	■ Adults 18 and older ■ If you're pregnant (booster every 10 years)
Shingles (Zoster)	■ Adults 50 years old or older

Infographic is based on recommendations
in ADA's Standards of Care in Diabetes—2024

TAKE HOME MESSAGES

- Il paziente diabetico risulta essere maggiormente suscettibile alle infezioni per una disregolazione immunologica sia dell'immunità innata che adattativa.

- Le malattie infettive hanno un tasso di morbidità maggiore nella popolazione diabetica, per quanto concerne le ospedalizzazioni, il tasso di ricovero in ICU, le sequele post acuzie ma anche la mortalità.

- Le vaccinazioni, hanno dimostrato di ridurre non solo il tasso di infezioni ma anche la morbidità (per alcune saranno necessari dati piu' robusti per valutare impatto anche sulla moralità).

- La vaccinazione influenzale si configura come elemento chiave nella prevenzione cardiovascolare al pari di altri trattamenti farmacologici già codificati *nello standard of care* del diabetico (*maggiori evidenze per il QIVhd negli ultra 65 enni).*
- La vaccinazione anti HZ si è dimostrata efficacie nella riduzione dei tassi di nevralgia post erpetica (con il vaccino ricombinante risultato essere altamente efficace negli RCT rispetto al comparator*, in assenza tuttavia di studi diretti head to head,* ma con il vantaggio d*i essere approvato già dai 18 anni di età nei pazienti a rischio di HZ come i diabetici e di poter essere impiegato negli immunocompromessi*)

- La scheda vaccinale per il singolo paziente andrà formulata in accordo con le evidenze scientifiche e le raccomandazioni delle agenzie regolatorie nazionali e locali.

GRAZIE