

Implementation strategies- getting vaccines into arms

Associate Professor John Litt AM
MB.BS, FRACGP, FAFPHM, MSc (Clin Epid), PhD
Flinders University

Challenges in vaccinating older adults

1. Immunosenescence
2. Patient: vaccine hesitancy
3. Health care providers
4. Implementation paradoxes

Impact of ageing on the various body systems



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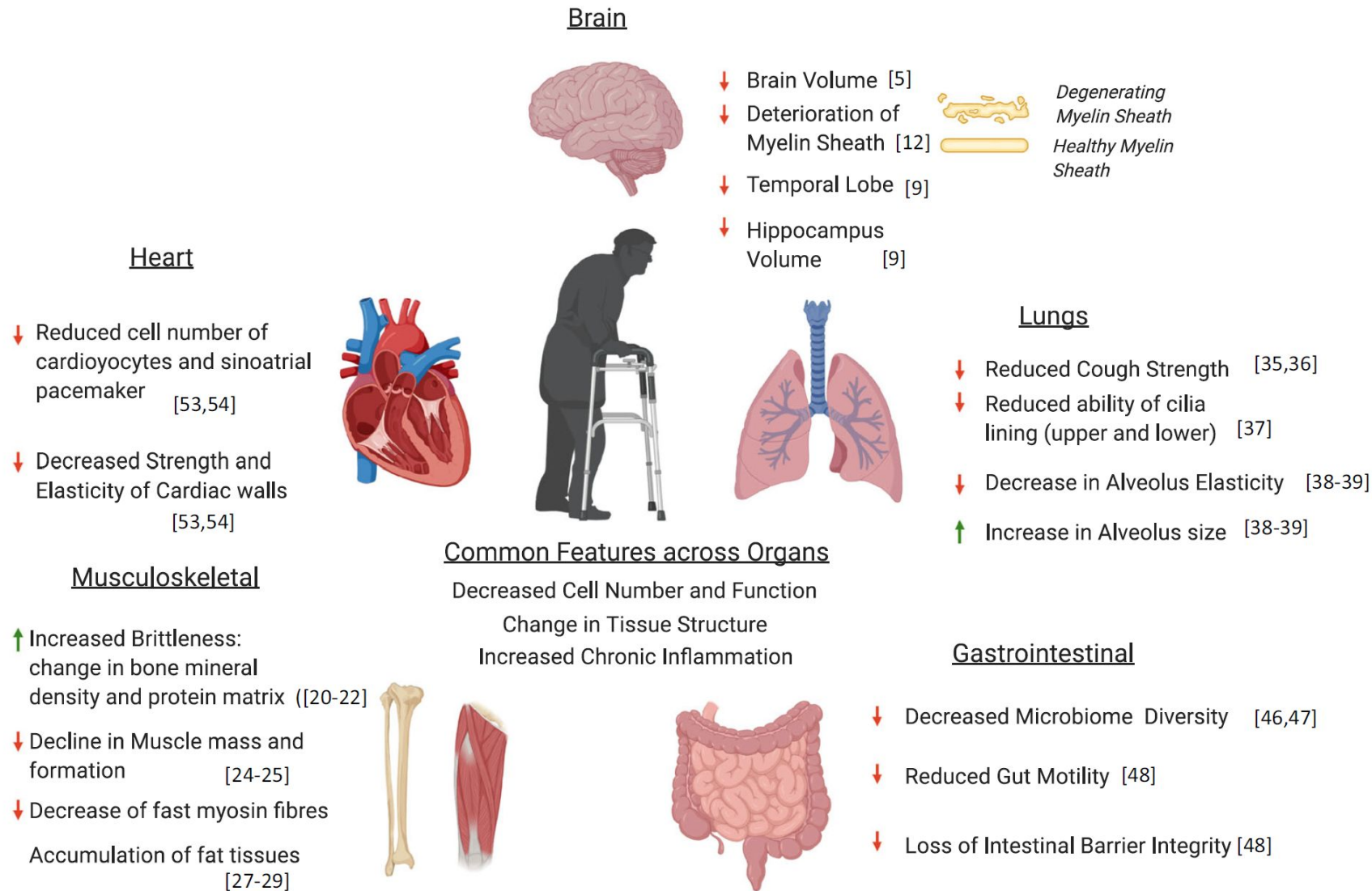


Fig. 1 Age-related deterioration in function of various organ systems during human aging (created with [BioRender.com](https://www.biorender.com))



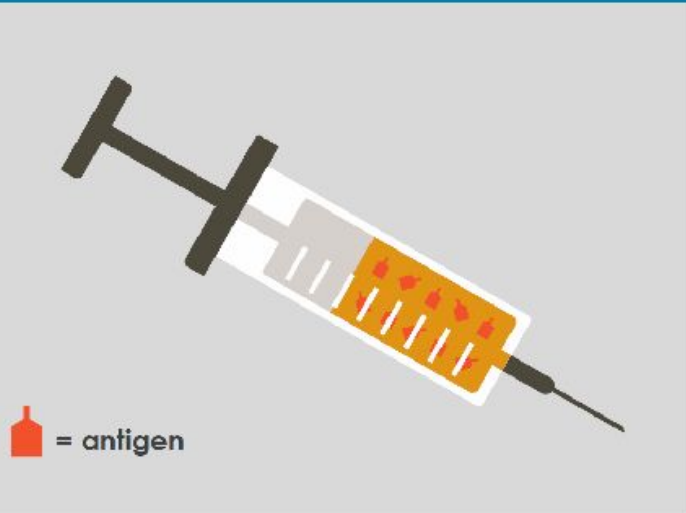
Clinical impact of immunosenescence

- Increased risk of infection due to:
 - greater susceptibility eg respiratory infections ¹
 - altered host resistance due to a number of chronic conditions leading to reactivation of chronic conditions eg zoster²
- Increased severity of infections³
- Increased risk of mortality
 - there is a ten-fold increase in the risk of dying from COVID-19 for every 20 years of age⁴
- Poorer response to vaccines³
- Contributes to the development of age-related diseases eg malignancy, auto-immune diseases^{3,5}
- Poor wound healing⁶

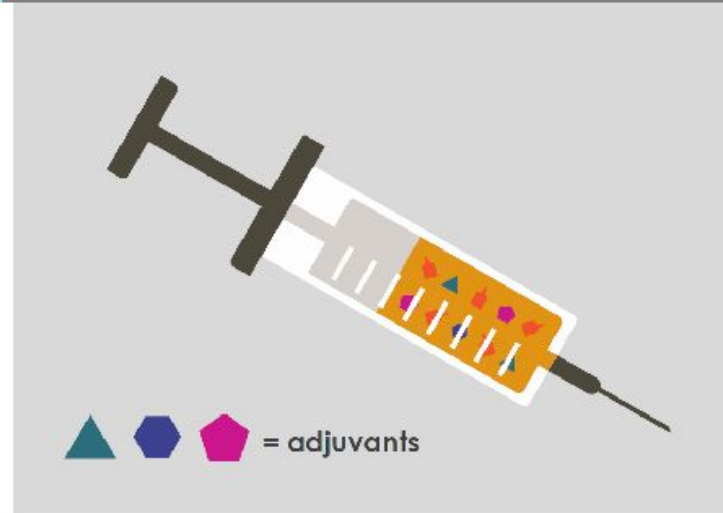
Reduced responsiveness to vaccination in older adults requires novel strategies¹

These include different vaccine formulations and alternative delivery routes¹⁻³

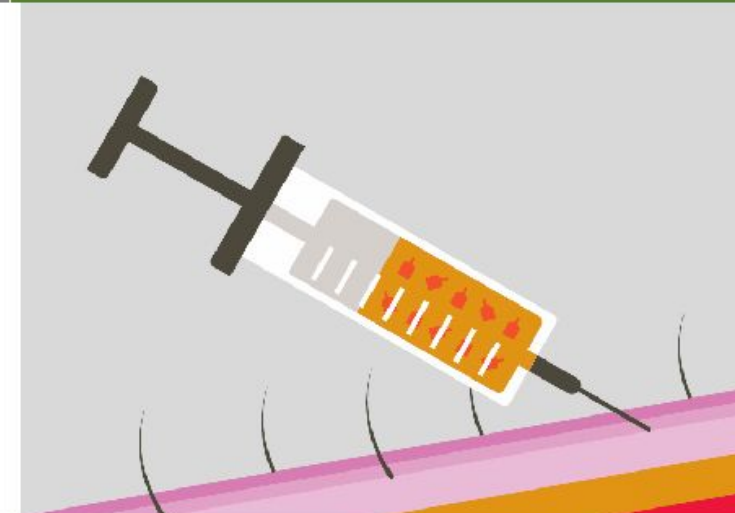
Vaccine formulations with higher antigen content¹



Vaccine formulations with adjuvants²



Alternative administration routes such as intradermal³



1. Robertson CA *et al. Expert Rev Vaccines* 2016;15:1495–1505; 2. Lal H *et al. N Engl J Med* 2015;372:2087–2096; 3. Arakane R *et al. Vaccine* 2015;33:6650–6658

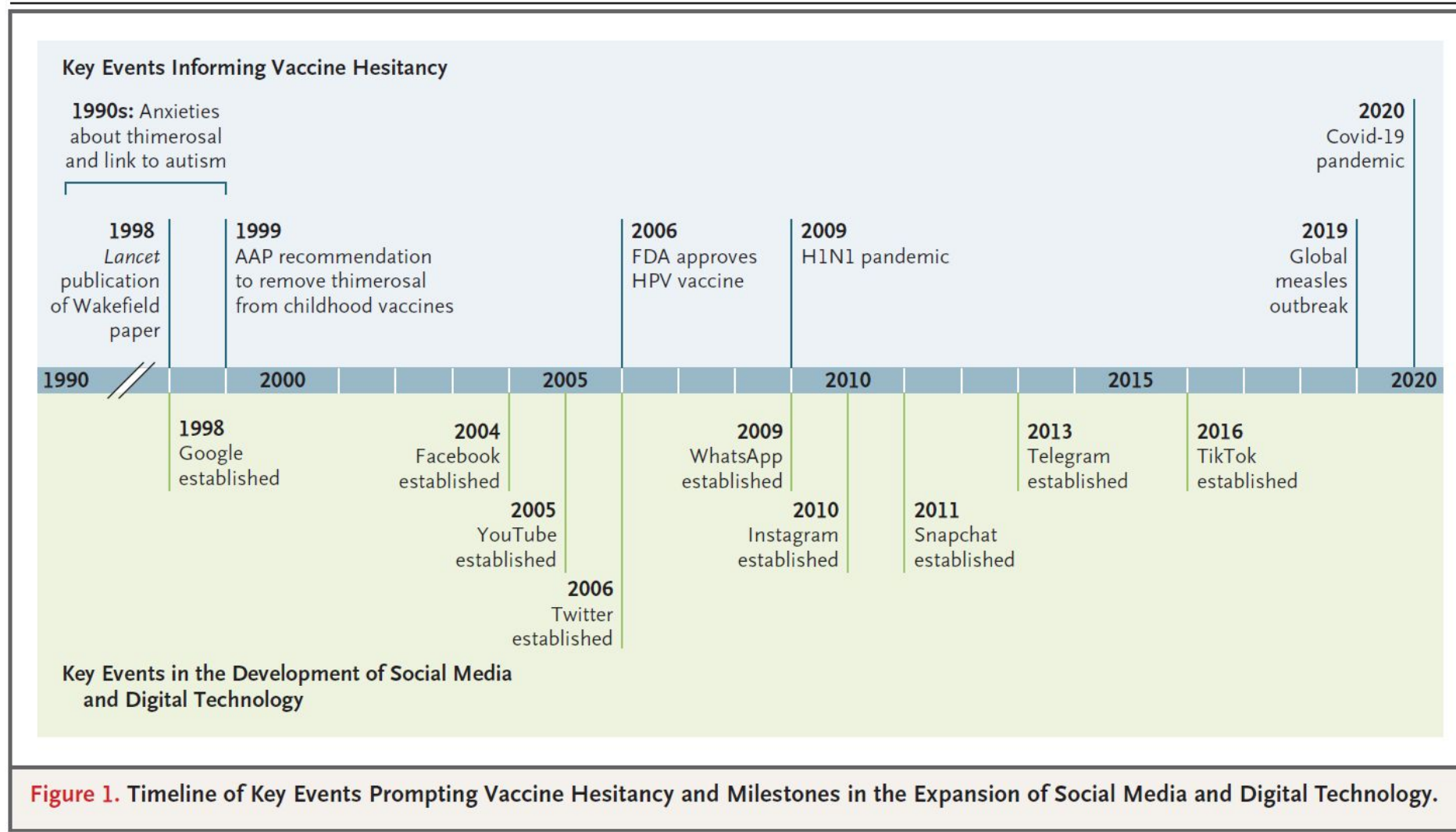
2. Vaccine hesitancy

- What is it?

*The delay in acceptance or refusal of safe vaccines despite availability of *



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Larsen N Engl J Med. 2022 Jul 7;387(1):58-65

Figure 1. Timeline of Key Events Prompting Vaccine Hesitancy and Milestones in the Expansion of Social Media and Digital Technology.



5C of vaccine hesitancy

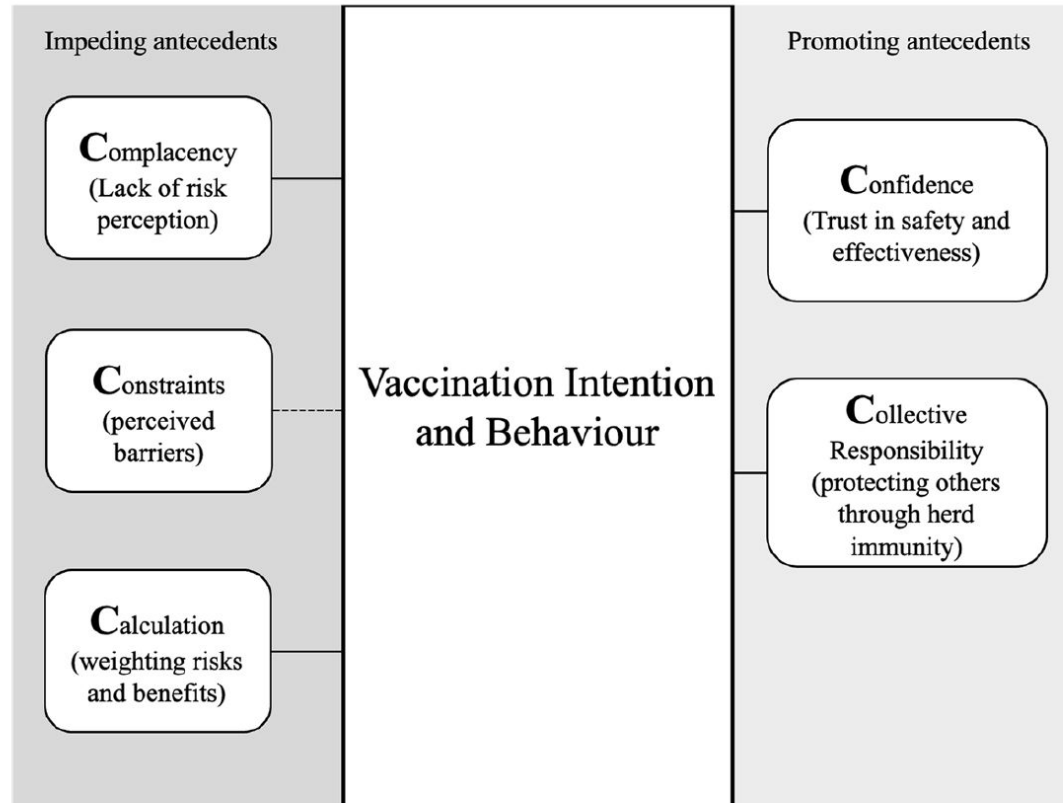


Fig. 1 Overview of the 5C antecedents. *Note.* Higher Confidence [9, 12] and Collective Responsibility [6, 13] are related to higher vaccination intention and behaviour. Higher Complacency [14] and Calculation [15, 16] are related to lower vaccination intention and behaviour. Constraint: related to lower vaccination behaviour [17], but with intentions, the results are inconclusive [11]



"HE HAD THE ASTRAZENECA VACCINE AND THEN HE WAS HIT BY A METEORITE"

Strategies to address vaccine hesitancy



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- HCW (strengthen engagement)
 - recommendation¹
 - address knowledge and concerns²
 - awareness, effectiveness, safety, low risk perception
- Patients (enhance access to vaccination services; combat misinformation)
 - recognise constraints³
 - access eg mobile clinics, convenience
 - communication
 - understand patient concerns eg vaccine safety⁴
 - address misconceptions eg perceived effectiveness; perceived low risk/not susceptible⁵
 - motivational interviewing strategies⁶
 - improve trust⁷
 - reminders⁸

1. Wheeler J Public Health (Oxf). 2025 May 29;47(2):222-231. Malik Health Policy. 2023 Nov;137:104894. Wang JMIR Public Health Surveill. 2023 Mar 9;9:e43893. Eiden Hum Vaccin Immunother. 2022 Nov 30;18(6):2127290. Nowak Vaccine. 2015 Jun 4;33(24):2741-5. Wang JMIR Public Health Surveill. 2023 Mar 9;9:e43893
2. Prieto-Campo Public Health. 2024 Jan;226:17-26. Lytras Hum Vaccin Immunother. 2016 Mar 3;12(3):671-81.
3. Larson Hum Vaccin Immunother. 2025 Dec;21(1):2463732. Schmid PLoS One. 2017 Jan 26;12(1):e0170550. Lentakis Vaccine. 2024 Dec 2;42(26):126458
4. Schmid Vaccine. 2024 Nov 14;42(25):126092. Lawes-Wickwar Vaccines (Basel). 2021 Jan 20;9(2):72. Stratoberdha Can Pharm J (Ott). 2022 Jun 6;155(4):206-218. Wang JMIR Public Health Surveill. 2023 Mar 9;9:e43893
5. Nowak Vaccine. 2015 Jun 4;33(24):2741-56. Stratoberdha Can Pharm J (Ott). 2022 Jun 6;155(4):206-218.
6. Fasce NPJ Vaccines. 2025 Jul 3;10(1):142. Gagneur Hum Vaccin Immunother. 2024 Dec 31;20(1):2391625.
7. Wang JMIR Public Health Surveill. 2023 Mar 9;9:e43893. D'Silva Front Public Health. 2024 Nov 20;12:1406861.
8. Ohta Cureus. 2025 Apr 20;17(4):e82615. . Lentakis Vaccine. 2024 Dec 2;42(26):126458



Strategies to address vaccine hesitancy

- System (targeted education; foster social support networks and norms)
 - cost¹
 - time/opportunities²
 - professional guidelines³
 - organisational eg feedback ⁴, prompts ⁵, clinics⁶
 - continuity of care⁷

1. Stratoberdha Can Pharm J (Ott). 2022 Jun 6;155(4):206-218. Wang JMIR Public Health Surveill. 2023 Mar 9;9:e43893

2. Silvonon Vaccines (Basel). 2023 Apr 20;11(4):870. Nowalk J Am Board Fam Pract 2005;18(1);20-27

3. Woodward Clin Interv Aging. 2023 May 31;18:869-880.

4. Ohta Cureus. 2025 Apr 20;17(4):e82615.

5. . Wheeler J Public Health (Oxf). 2025 May 29;47(2):222-231

6. Wheeler J Public Health (Oxf). 2025 May 29;47(2):222-231

7. Lentakis Vaccine. 2024 Dec 2;42(26):126458.

3. Health Care workers



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Influenza vaccination in health care workers

1. HCW influenza vaccination is effective and provides protection to vulnerable patients and groups¹
2. Professional groups recommend HCWs get vaccinated annually against influenza²
3. Vaccination against influenza reduces³:
 - 1) Nosocomial transmission
 - 2) Absenteeism
 - 3) Presenteism
4. Ethical reasons⁴
 - 1) Duty of care
 - 2) Non-maleficence:
 1. HCWs have a duty not to place patients at undue risk of harm
 2. HCWS have an obligation to their patients to take reasonable actions to prevent transmission of the virus
 3. Many patients are highly vulnerable to flu, so choosing not to be vaccinated is choosing to do harm
 - 3) Beneficence
 1. HCWs have an ethical and professional obligation to act in the best interest of the health of their

1. Ahmed Clin Infect Dis. 2014 Jan;58(1):50-7. 2. <https://immunisationhandbook.health.gov.au/vaccine-preventable-diseases/influenza-flu> 3. Van den Dool et al Vaccine 27 (2009) 6261-6267. 4. Anikeeva et al Am J Pub Health 2009;99(1):24-9

Infection control



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-Prospective study (France, 3 flu seasons)

-Relative risk (RR) of hospital-acquired (HA) ILI during hospitalization according to in-hospital exposures to contagious individuals.

-Surveillance of ILI and laboratory-confirmed influenza.

-A total of 21 519 patients and 2153 health care workers (HCWs) from 2004 to 2007 were included.

- The RR of HA-ILI in patients was calculated according to exposure to other contagious patients and HCWs.

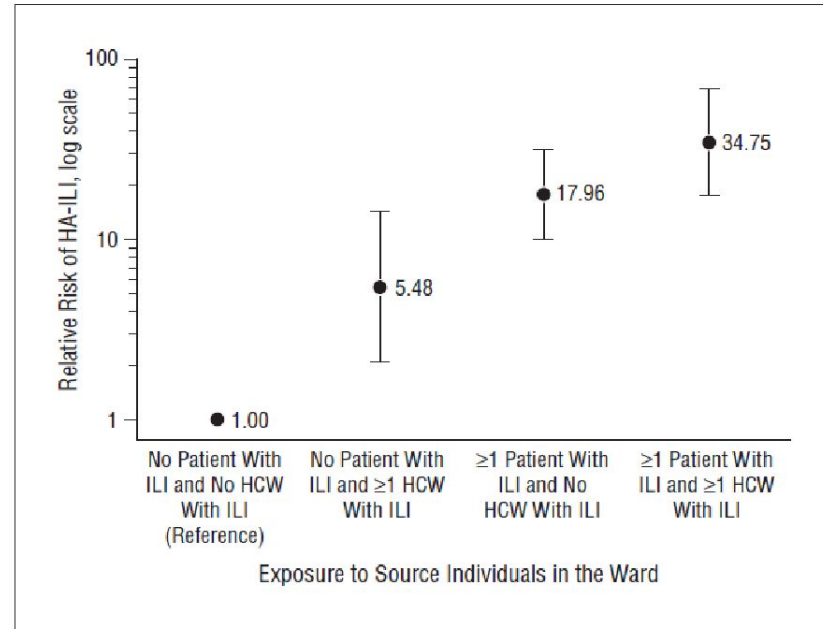


Figure. Relative risk of hospital-acquired influenza-like illness (HA-ILI) in patients according to exposure to source individuals at Edouard Herriot Hospital, 2004-2007. HCW indicates health care worker. Vertical bars represent 95% confidence intervals.

Vanhems Arch Intern Med. 2011 Jan 24;171(2):151-7.

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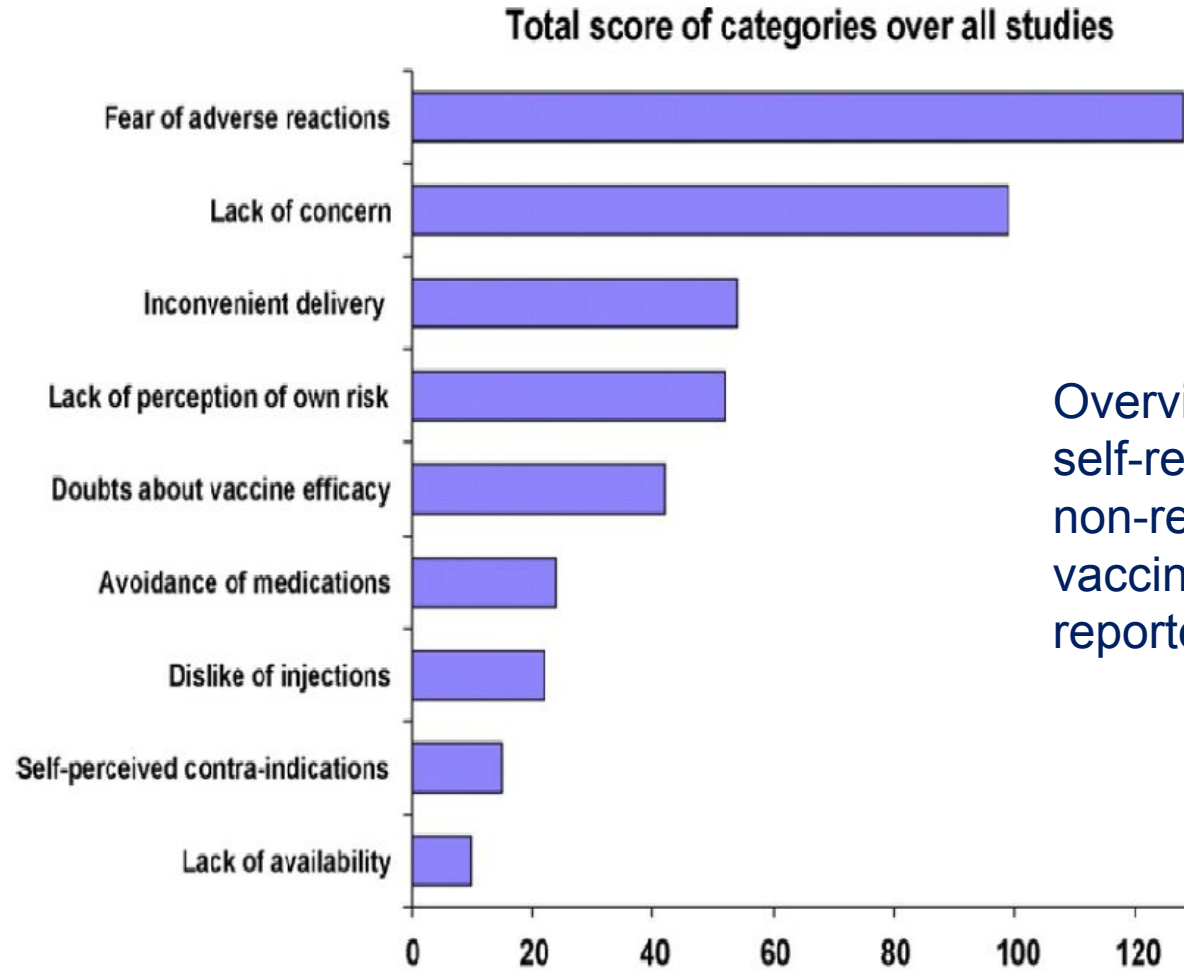


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"I must be growing up. I've caught myself washing my hands without being told to."



Main Health Care worker predictors for NOT getting the influenza vaccine



Overview of categories of self-reported reasons for non-receipt of influenza vaccination among HCW, as reported in different studies

Four Implementation paradoxes



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1. Effort is greater at the extremes of performance

RSV
COVID vaccine booster
Pertussis

PCV13
diphtheria/tetanus

Influenza
Zoster

Effort
required

Inertia / start up

Pareto
principle
/ceiling effect

0%

33%

66%

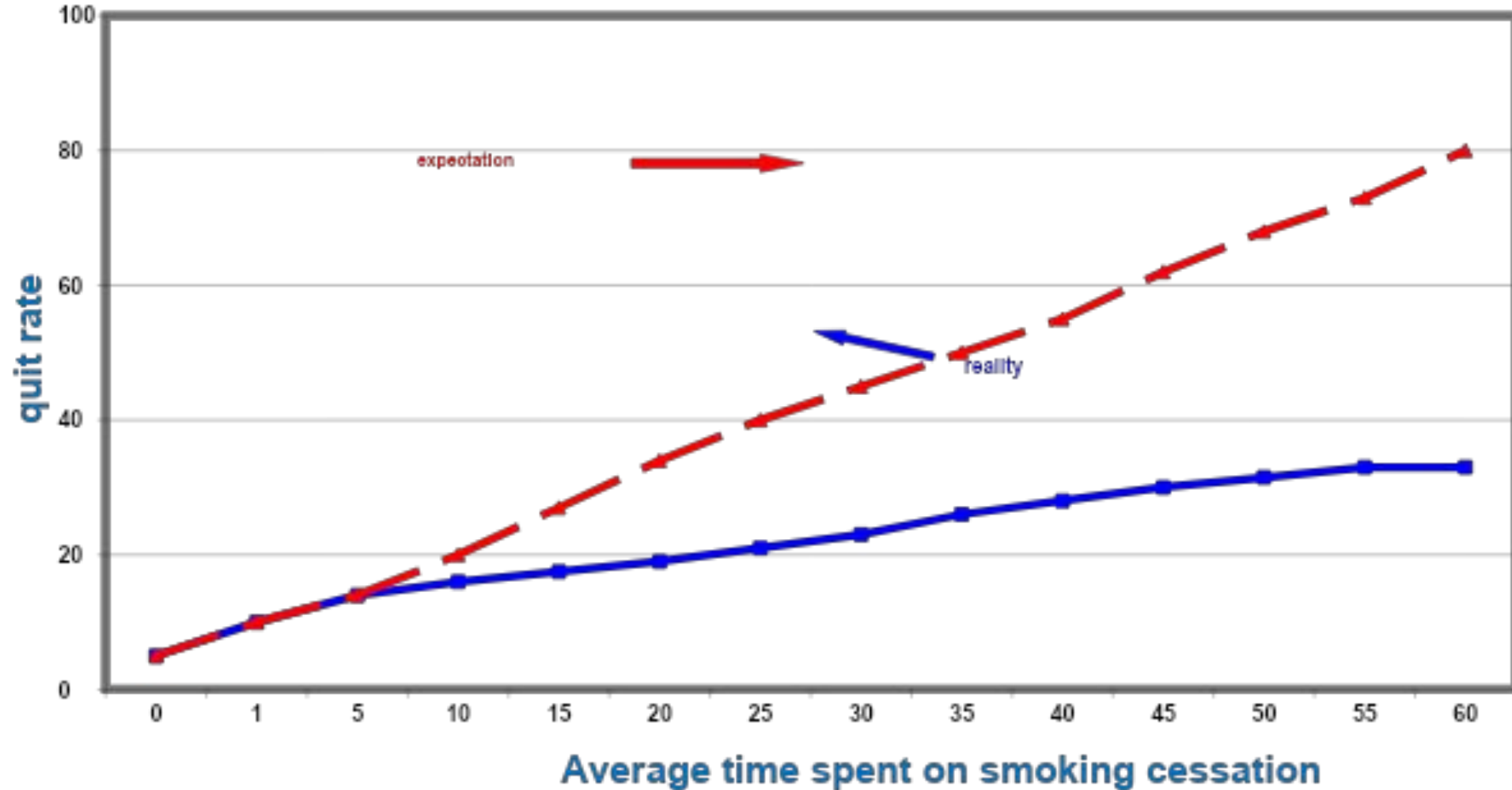
100%



gain

Shukla . J Family Med Prim Care. 2021. Belice . J Family Med Prim Care. 2020; Androozzi Diabetol Metab Syndr. 2020. Shawahna J Natl Med Assoc. 2019. Pallares-Carratala Blood Press. 2019. Giugliano J Endocrinol Invest. 2019. Keijzers Emerg Med Australas. 2018. Reach Rev Prat. 2017. Aujoulat . BMC Fam Pract. 2015. Aujoulat Adv Med Educ Pract. 2014. Litt Implementation of prevention. PhD 2007
Tagaram Quality Tools and Techniques Statpearls 2024
<https://www.ncbi.nlm.nih.gov/books/NBK607994/>

2. Impact is not necessarily a linear function of effort



Quit rate as a function of the average time spent by Health Care Workers (HCW)

3. More is not necessarily better

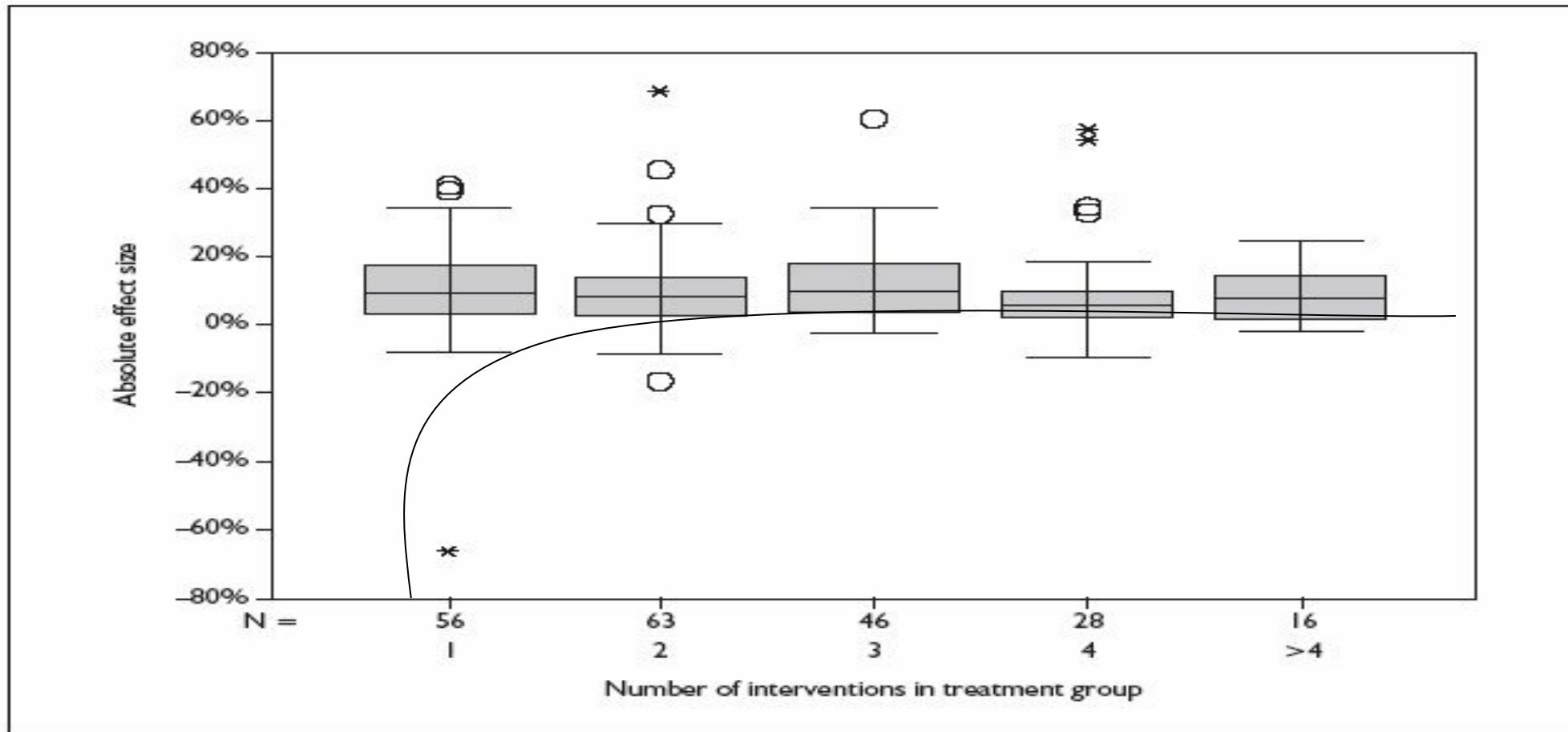
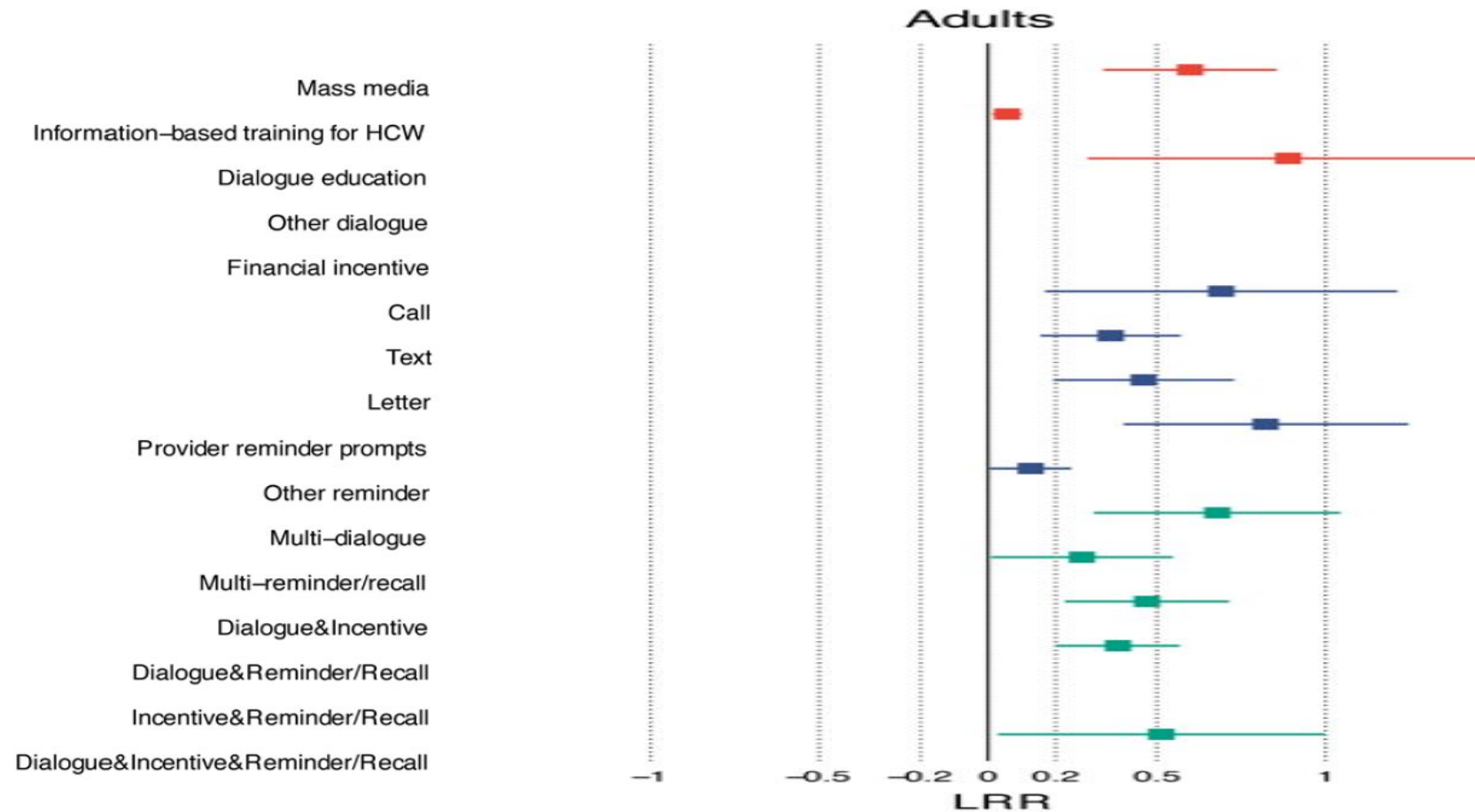


FIGURE 6 Effect sizes of multifaceted interventions by number of interventions

Summary of evidence (2)



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LRR are log
relative risk
ratios

■ Dialogue-based intervention ■ Incentive-based intervention ■ Reminder/Recall-based intervention ■ Multi-component intervention

Figure 2 Effects of specific intervention type on vaccination split by participants' age. Only intervention types with more than seven RRs were displayed in the forest plot. Specific effect sizes and other statistics applying to this forest plot are presented in online supplemental table S4.

4. Need may not translate into effort or impact

1). Assessment of need may be skewed

- Self-reported performance shows inconsistent correlation with objectively-assessed performance¹

2). Focus on the individual (numerator) vs the population (denominator)²

3). Choice of implementation strategy may be flawed

- Preferred learning strategies are often the least effective eg CPD dinner meetings³
- failure to be strategic⁴

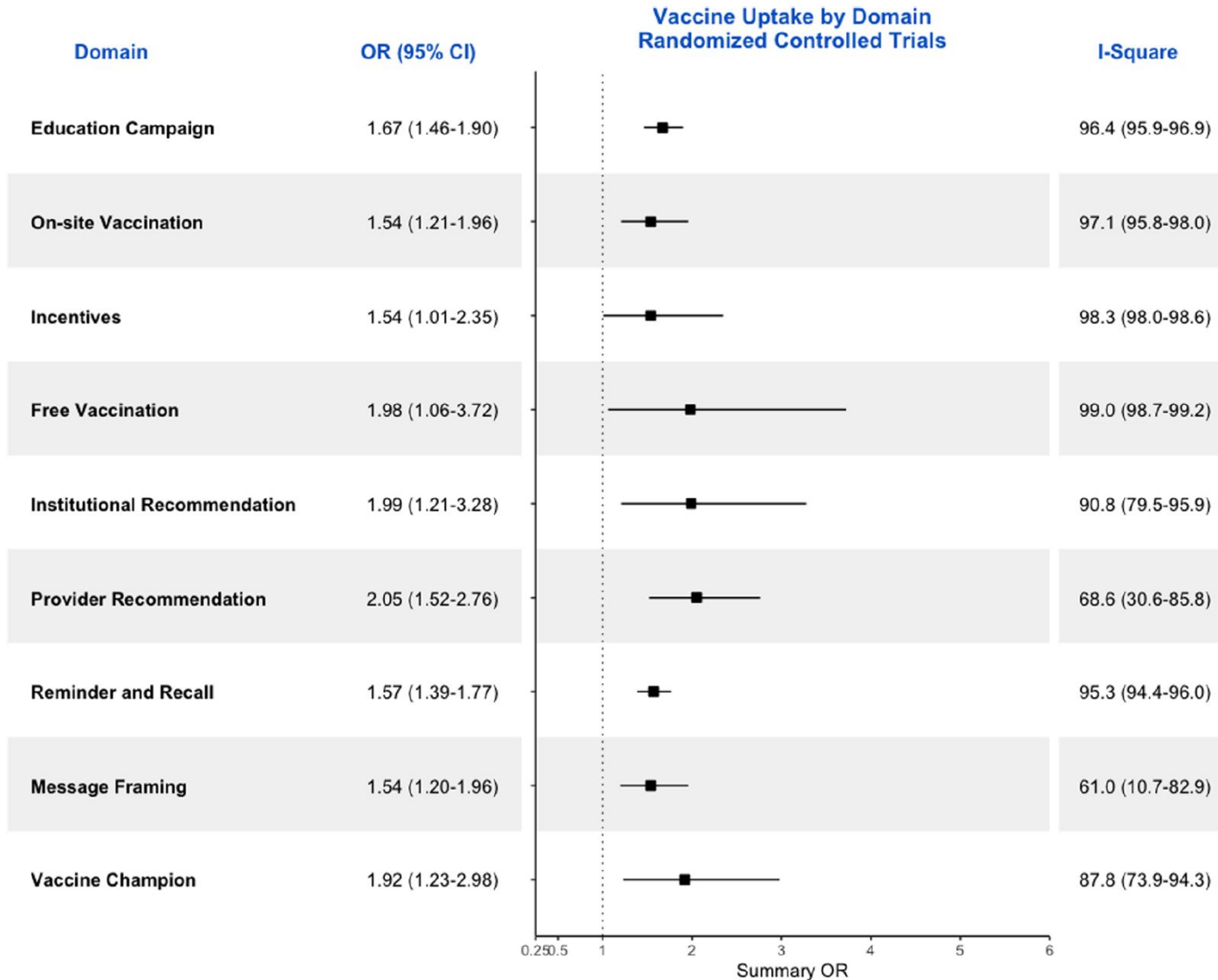
4) Less preferred learning strategies are often more effective³

1. Dang <https://pubmed.ncbi.nlm.nih.gov/32160564/> , Davis et al JAMA 2006; Tracey et al BMJ 1997; Sibley et al NEJM 1982.2. <https://www.safetyandquality.gov.au/standards/clinical-care-standards/how-use-clinical-care-standards> ; Grimshaw et al Health Technol Assess 2004; Grimshaw et al Med Care 2001. 3. RACGP Green Book, 3rd Ed, 2018, Table 4, p42. Litt Implementation of prevention. PhD 2007. 4. Liu BMJ Glob Health. 2025 Apr

Summary of the evidence



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- Behavioural interventions
- Global
- 613 included studies
- 50% of studies focused on childhood vaccination

- All effective
- Highest effect size:

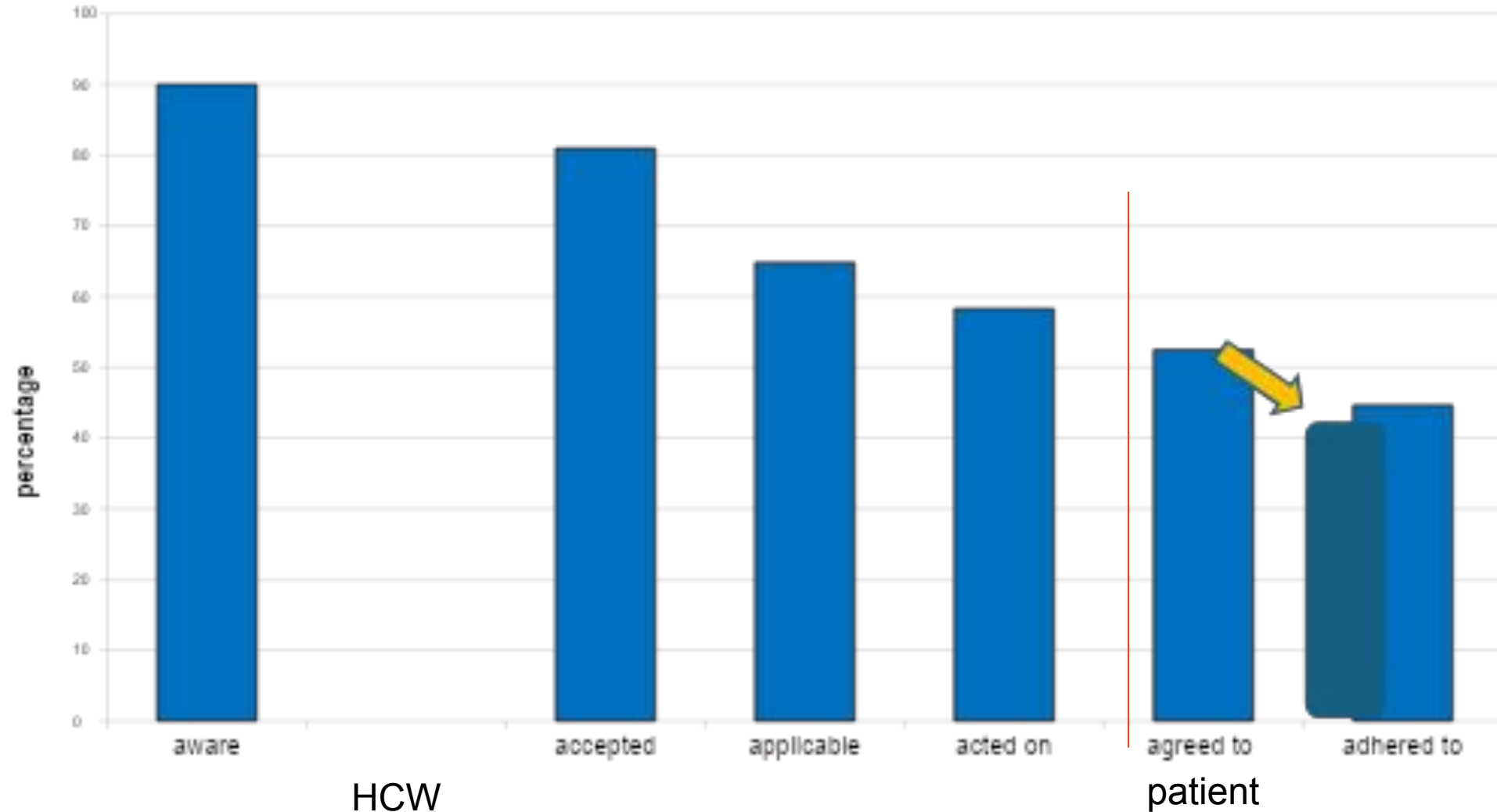
- **Provider recommendation**
- **Onsite-vaccination**

Quality cascade: the leaky pipeline

Implementation steps to improve Pneumococcal vaccine coverage



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Quality cascade and strategies to address

- HCW

strategies

- Awareness education
- Acceptance beliefs (address concerns); opinion leaders; guidelines
- Applicable ability to identify target audience
- Action knowledge; opportunity; time;

- Patient

- Awareness knowledge; beliefs/concerns; HCW recommendation
vaccine history;
- Adherence opportunity/ availability; affordability; access; vaccine
confidence (trust; vax both effective and safe); social norms
(culture; family and friends)

Predictors of getting the influenza vaccine and strategies to encourage acceptance¹



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Barrier/misperception	prevalence	Impact on getting flu vax (95% CI)	Strategies to address
High susceptibility	26%	1.83 (1.61, 2.07)	Awareness of circulating prevalence (eg ASPREN) + likelihood of getting influenza (2009 pandemic- 1 in 4 had influenza-serology)
High severity	25%	1.35 (1.21, 1.51)*	Hospitalisation rate; impact on being able to work
The flu jab can make you feel sick afterwards	63%	0.61 (0.55, 0.67)*	Significant reactions are uncommon; local injection site pain ~24%; redness 14%; systemic <15%
My doctor recommended that I get the flu jab	58%	2.70 (2.31, 3.16)*	Many are not offered despite being amenable to getting vaxxed
At least one visit to the GP in the last 12 mo	56%	1.62 (1.32, 1.99)*	Be pro-active; offer infrequent attenders a flu vax appointment
The flu jab can give you the flu	36%	0.52 (0.46, 0.59)*	Not possible; inactivated vaccine
I prefer to develop immunity naturally	36%	0.33 (0.28, 0.39)*	Natural infection has significant burden of morbidity
Fear of needles	30%	0.74 (0.65, 0.84)*	GP recommendation can increase vax rate. NIPS: GP recommended-78% got flu vax cf GP did not discuss vax -12% got flu vax
Getting the flu jab is expensive	19%	0.51 (0.42, 0.62)*	Flu vaccine being offered free to patient
Flu vax not needed as rarely get sick	18% [#]	0.37 (0.34, 0.41) [§]	GP recommendation can increase vax rate. NIPS: GP recommended-58% got flu vax cf GP did not discuss vax - 6% got flu vax
I do not have time to get vaccinated	16%	0.62 (0.51, 0.75)*	Flu clinics at flexible times
Don't trust vaccines	14%	0.37 (0.28, 0.48)*	Robust and transparent evidence-base

* aPR- adjusted prevalence ratio based upon Poisson regression

(main) reason cited by those not having a flu vax § Relative risk (RR)

1. Trent Influenza Other Respir Viruses. 2021 Feb 15. doi: 10.1111/irv.12843. Litt Australian National Influenza and Pneumococcal Survey in the elderly. Final Report to GP branch, Commonwealth Department of Health and Ageing, 2003

Impact of HCW recommendation on misperceptions about influenza and influenza vaccine

HEALTH BELIEF *	Positive Response Category	GP recommended vaccination		GP did NOT Recommend vaccination	
		+ attitude	- attitude	+ attitude	- attitude
I do not need a flu injection as I rarely get sick	Disagree	93.4	58.3	58.4	6.4
A flu injection will reduce my risk of becoming seriously ill from the complications of the flu	Agree	91.7	64.6	46.5	12.8
I am concerned that a flu injection may cause me discomfort	Disagree	92.8	71.7	49.2	12.0
I am concerned about having a bad reaction from flu injection	Disagree	92.6	76.3	51.9	14.7
I believe that the flu injection prevents me from getting the flu	Agree	92.3	78.7	54.2	16.7
People often get sick from the flu injection	Disagree	93.6	87.0	64.9	28.5
I am at risk of getting pneumonia this winter	Agree	92.9	86.8	52.9	30.9

Main reasons for getting vaccinated: adjusted odds ratios



Influenza

FACTOR	ODDS RATIO	95% CI
• GP recommendation	8.2	6.7 - 10.2
• Have the flu injection regularly in the last 3 years	4.9	4.0 - 5.0
• Disagree that they do not need flu injection as rarely get sick	4.5	3.6 - 5.7
• Not concerned about possible discomfort	1.9	1.4 - 2.4
• Not concerned about having a bad reaction from the flu injection	1.3	1.0 - 1.5
• Disagree that people often get sick from the flu injection	1.6	1.2 - 2.0
• Believe that flu injection prevents influenza	1.5	1.2 - 1.8
• Older (≥ 75 years vs 65-74 years)	1.3	1.1 - 1.7

23vPPV

FACTOR	ODDS RATIO	95% CI
• GP recommendation	32.1	25.6 - 40.4
• Had flu vax same year	3.5	2.3 - 5.2
• Disagree that they do not need PPV as rarely get sick	1.9	1.4 - 2.6
• Not concerned about possible discomfort from the PPV	1.8	1.3 - 2.1
• Belief that PPV prevents pneumonia	1.7	1.3 - 2.1
• Not concerned about having a bad reaction from the PPV	1.5	1.2 - 2.1

A quality improvement (QI) approach: RACGP Green book & P.R.A.C.T.I.C.E



- Implementing a Quality Improvement (QI) approach to improving care involves several elements:
 - broadening of the focus from just thinking of care of the individual to **actively reflecting on the larger population** ^{18,19}
 - **planning** for change ²⁰
 - **promoting a culture** of QI in the practice team ²¹⁻²³
 - a **collaborative** team approach to prevention ²⁴⁻³⁰
 - a **realistic** framework for implementation ³¹
 - being **outcomes-focused** ^{23,32}
 - **acknowledging the context and complexity** of clinical practice ³³⁻⁴²
 - choosing implementation strategies that are **evidence-based, efficient and 'do-able'** in your setting. ⁴³⁻⁴⁴



PRACTICE: questions to ask

Table 2. PRACTICE components¹⁰²

Components		Issue
P	Principles	What underpins the process?
R	Receptive	What's in it for me (patients and practice)?
A	Ability and capacity	Can I do it?
C	Coordination	Who will organise it?
T	Targeted	Who needs it?
I	Iterative cycles	How can I ensure that it happens?
C	Collaboration	Who can help me?
E	Effectiveness and efficiency	What works to put it in to practice? How can I make it a part of the routine?

Summary

- Vaccine coverage in older adults varies but falls well below paediatric vaccine coverage
- There are a number of challenges to improving vaccine uptake in older adults
 - Ageing and immunosenescence
 - Vaccine hesitancy
 - Health care workers
 - Lack of an evidence-based implementation framework
- P.R.A.C.T.I.C.E provides an evidence- based approach to improving the uptake of vaccines in older adults

Extra slides

1. Immunosenescence

What is immunosenescence

“the gradual decline of the immune system with age”.

Key Features:

- **Reduced function of immune cells** (e.g., T cells, B cells).
- **Diminished response to vaccines and infections.**
- **Thymic involution:** Shrinking of the thymus, where T cells are produced.
- **Imbalance between immune activation and regulation,** leading to chronic low grade inflammation (inflammaging).
- **Accumulation of memory T cells** and fewer naïve T cells, making it harder for the immune system to respond to new threats.

Immunosenescence weakens the immune system, making it less adaptable and more prone to age-related diseases.

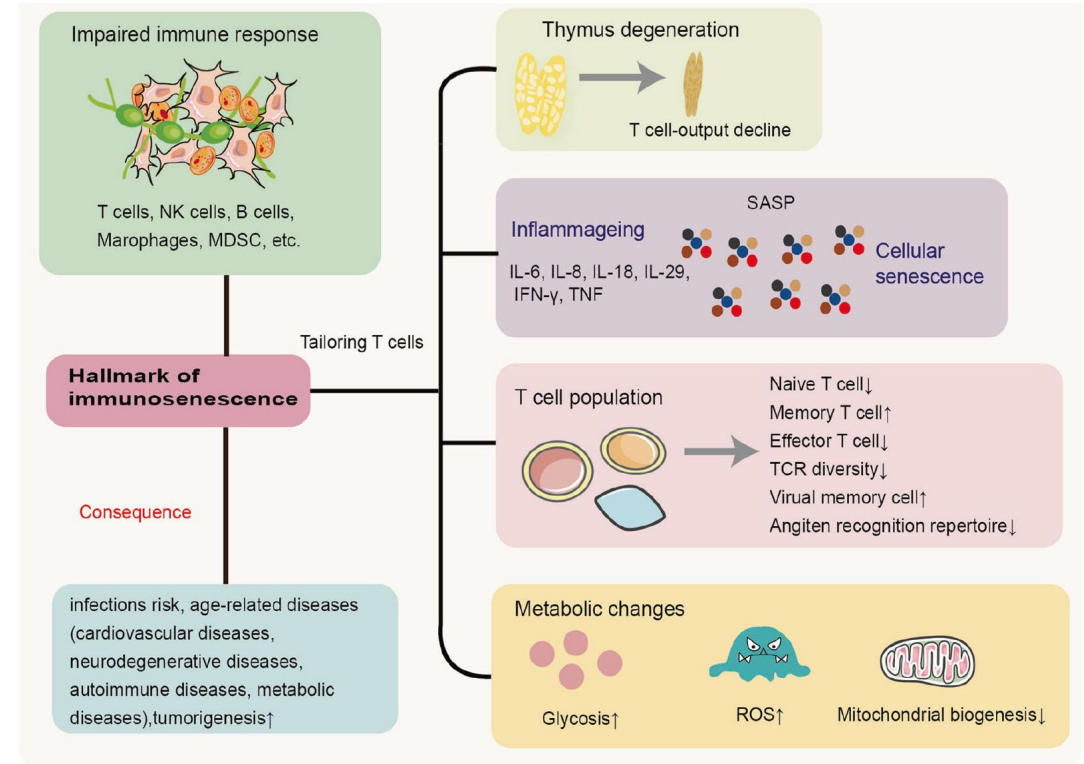
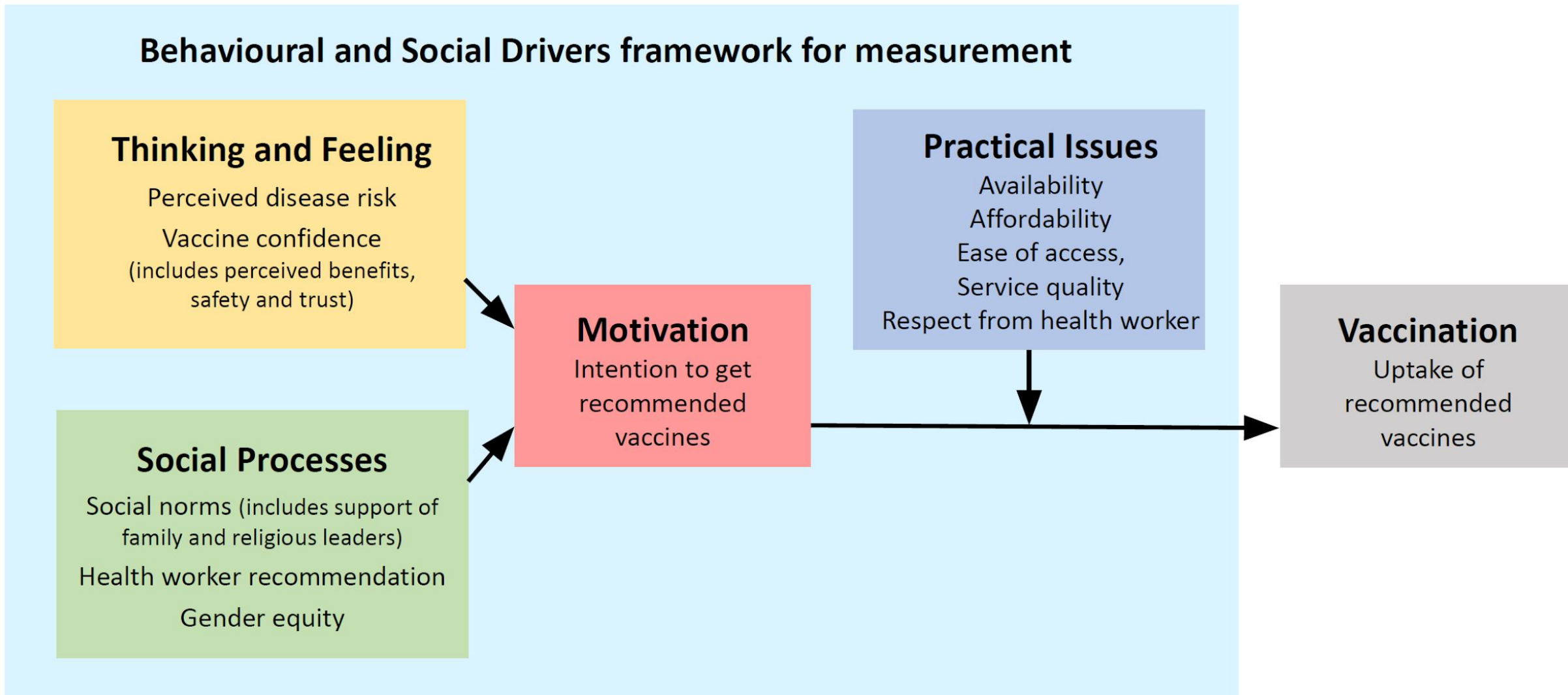


Fig. 2 Hallmarks of immunosenescence and related diseases. Various immune cell subsets changed during immunosenescence. There were significant changes in T-cell subpopulations, including a decline in T-cell production associated with age due to thymic degeneration, abnormal T-cell metabolism, changes in the proportion of T subpopulations, and an SASP-mediated chronic low-grade inflammatory environment. IFN-γ interferon-γ, IL-6 interleukin-6, IL-8 interleukin-8, IL-18 interleukin-18, IL-29 interleukin-29, MDSC myeloid-derived suppressor cells, NK cells natural killer cells, ROS reactive oxygen species, SASP senescence-associated secretory phenotype, TCR T-cell receptor, TNF tumor necrosis factor

It's more than just 'hesitancy'



RZV can be co-administered with the following vaccines

- ✓ **Influenza** (unadjuvanted inactivated seasonal)^{1,2}
- ✓ **Pneumococcal** (PPV23)^{1,3}
- ✓ **COVID-19 RNA vaccines**
- ✓ **Diphtheria-Tetanus-Pertussis** (DTaP)^{1,4}

Co-administration generally well tolerated¹⁻³

No safety issues¹⁻³

No immunologic interference observed¹⁻³

Immunisation coverage in older adults- is there a problem?



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Vaccine coverage **age ≥ 65 yrs¹** **in residential care²**

- Influenza 61.9%¹ 92.6%²

- Pneumococcal In 2025, less than half
of adults (48%) aged 70 years
and over were recorded as having
previously received an adult
dose of PCV.³

- Zoster 44.1%⁴

1. <https://ncirs.org.au/immunisation-coverage-data-and-reports/annual-immunisation-coverage-report-2025-summary#:~:text=Annual%20influenza%20vaccination%20is%20NIP,an%20influenza%20vaccine%20in%202025.>

2. Wiblin Cochrane Database Systematic RV 2025 <https://pubmed.ncbi.nlm.nih.gov/40013540/> Year is 2023

3. <https://ncirs.org.au/immunisation-coverage-data-and-reports/annual-immunisation-coverage-report-2025-summary>