Mid-season Adjusted Estimates of Seasonal Influenza Vaccine Effectiveness — United States, February 2013

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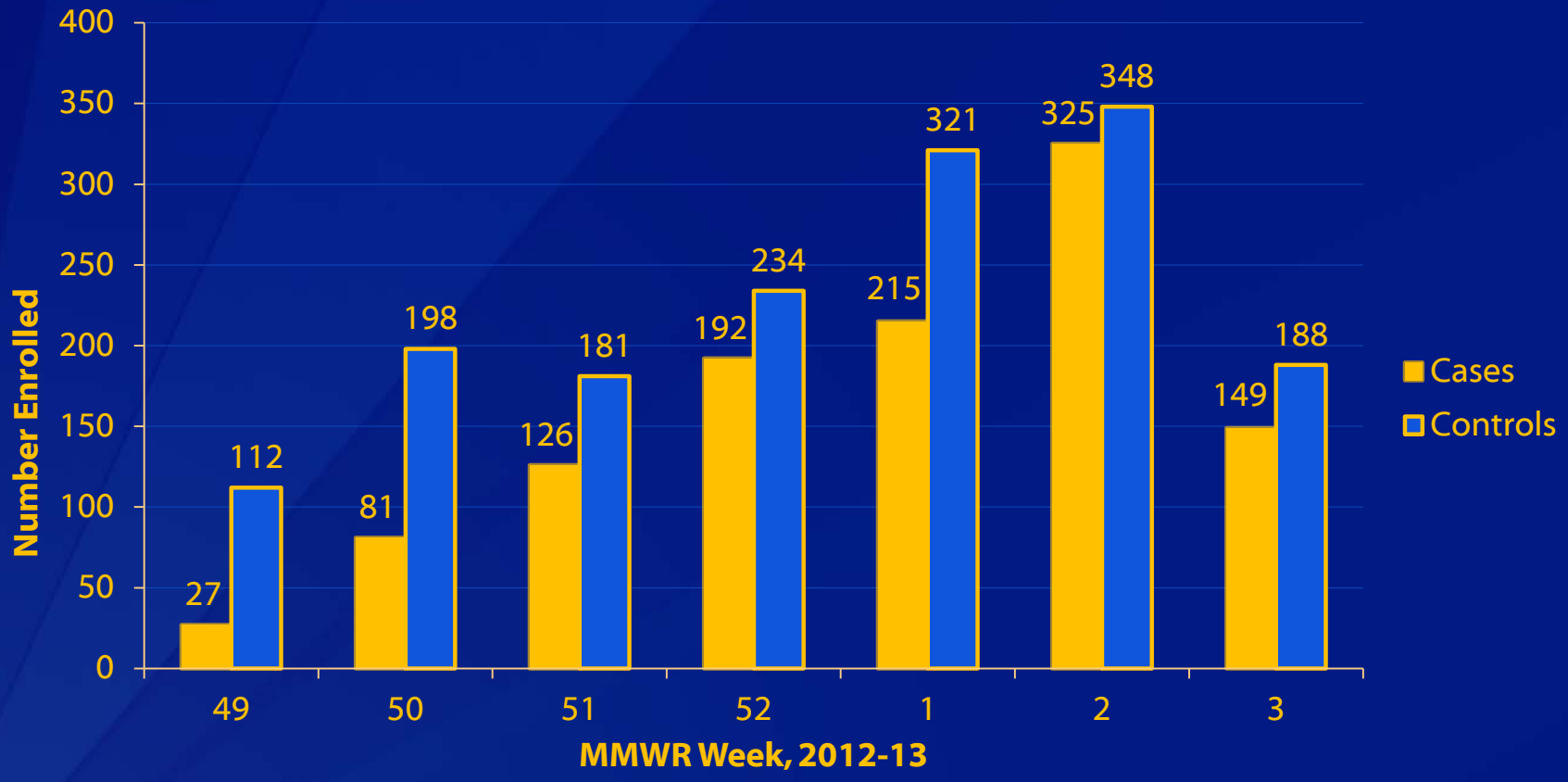
US Flu VE Network: Methods

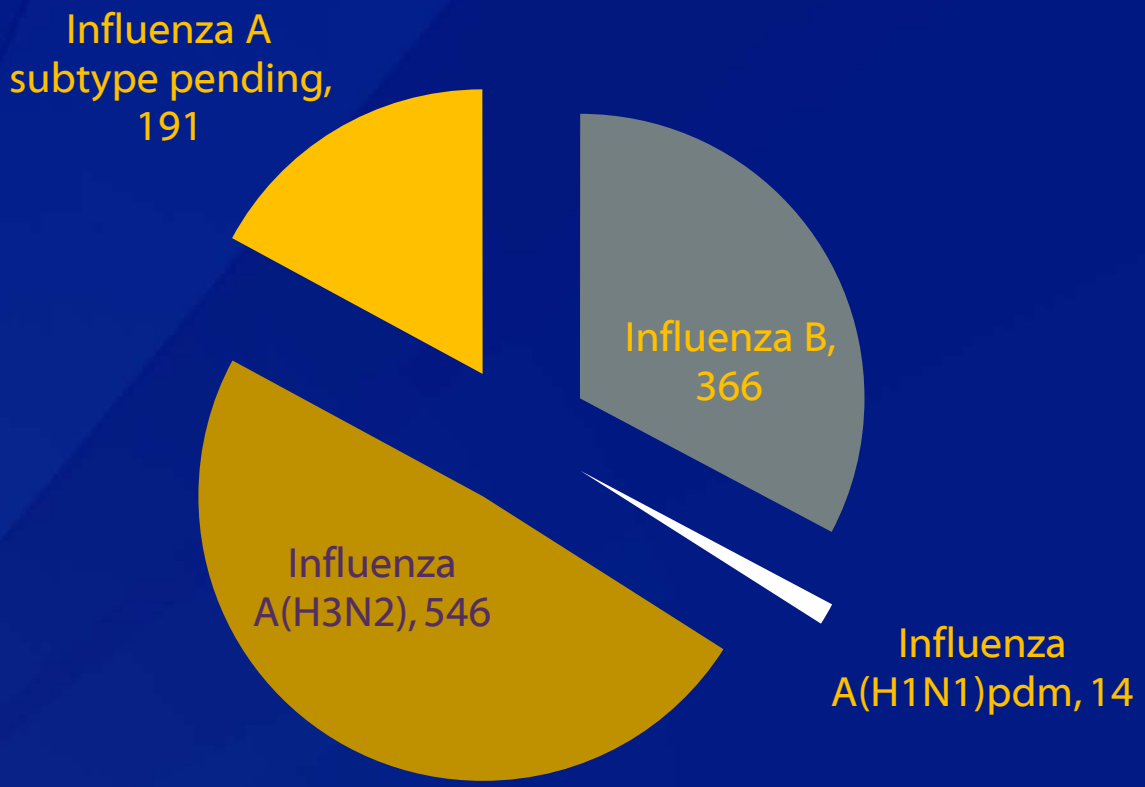
- **Purpose:** Estimate VE for prevention of outpatient healthcare visits due to influenza
- **Design:** Prospective case-control study
  - **Cases**: Medically attended ARI and RT-PCR influenza
  - **Controls**: Medically attended ARI but negative for influenza
- **Interim vaccination status:** Confirmed by medical record or registry (3 sites) and by self-report (2 sites)
- **Immunization:** 1+ dose of vaccine ≥14 from illness onset
- **Analysis:** VE = (1 – adjusted OR) x 100%
  - Standard covariates: age, site, and days from illness onset to enrollment
  - Adjusted for potential confounding by race/ethnicity and self-rated health

Numbers of influenza-positive medically attended ARI cases (orange bars) and influenza-negative controls (blue bars) by week of illness onset



Week 3 only includes patients with completed laboratory tests and thus does not reflect all enrolled patients during that week across study sites.

Cases enrolled by (sub)type to date



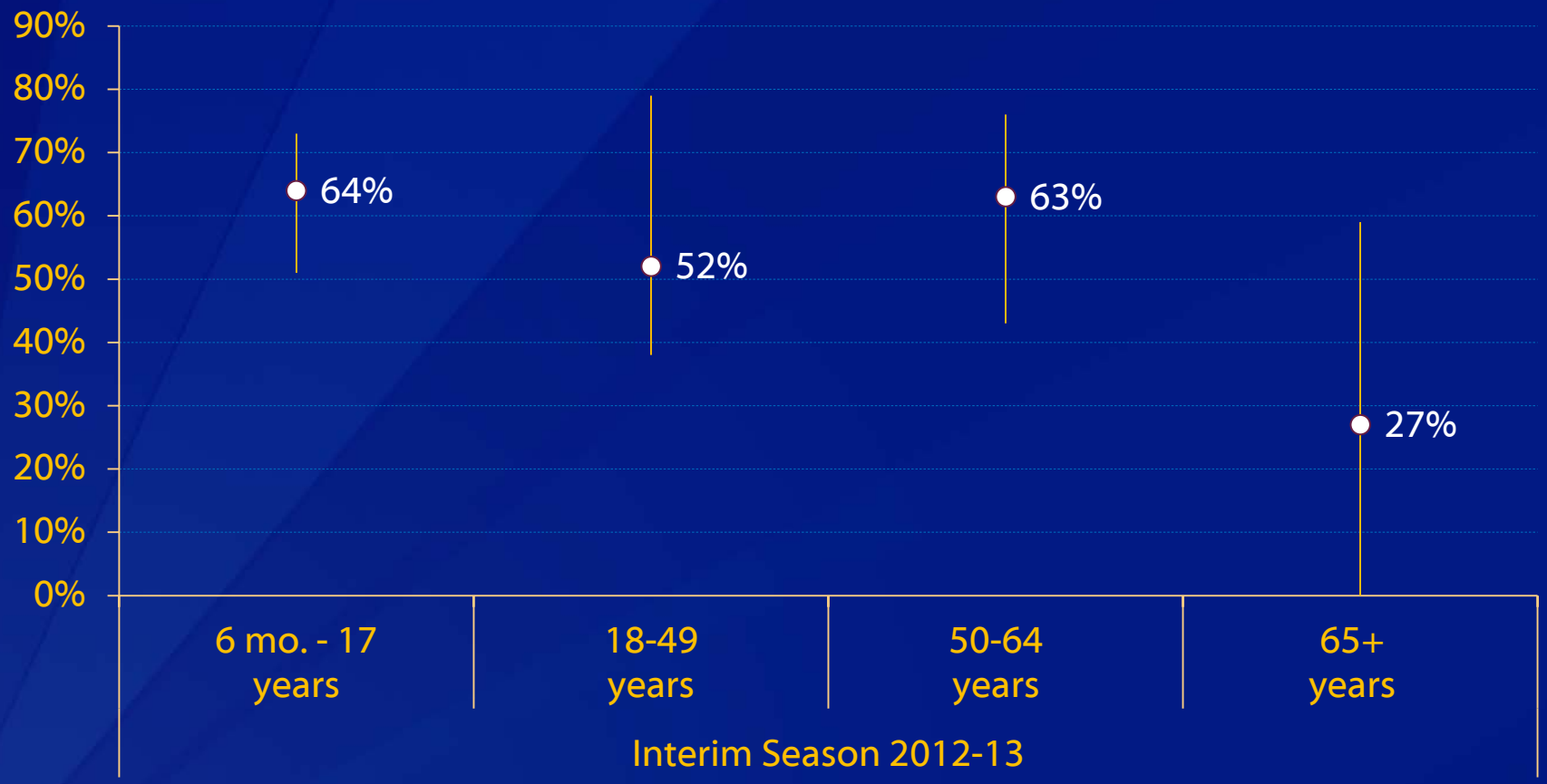
Among the 751 influenza A virus infections, 560 (75%) have been subtyped to date; 546 (98%) were due to A(H3N2) viruses.

Mid-season adjusted VE against A and B

	Influenza and Vaccination Status				Vaccine Effectiveness	
	Influenza-Positive Cases		Influenza-Negative Controls		Adjusted †	
	No. Vaccinated /Total	(%)	No. Vaccinated /Total	(%)	(%)	(95% CI)
Influenza A and B						
All ages	367/1115	(32)	793/1582	(50)	**(56)**	(47-63)
6 mo. – 17 years	118/463	(26)	275/565	(49)	**(64)**	(51-73)
18 – 49 years	100/353	(28)	256/604	(42)	**(52)**	(38-79)
50-64 years	63/174	(36)	143/248	(58)	**(63)**	(43-76)
65+ years	86/125	(69)	119/165	(72)	**(27)**	(-31,59)

† Vaccine effectiveness was estimated as 100% X (1 – odds ratio [ratio of odds of being vaccinated among the cases to the odds of being vaccinated among the controls]) using logistic regression. Multivariate models adjusted for age, race/ethnicity, study site, days from illness onset to enrollment, and self-rated health status. For the all ages models, age was represented as categories; age in years was used in age-stratified models.

Mid-season adjusted VE (95% CI) against A and B

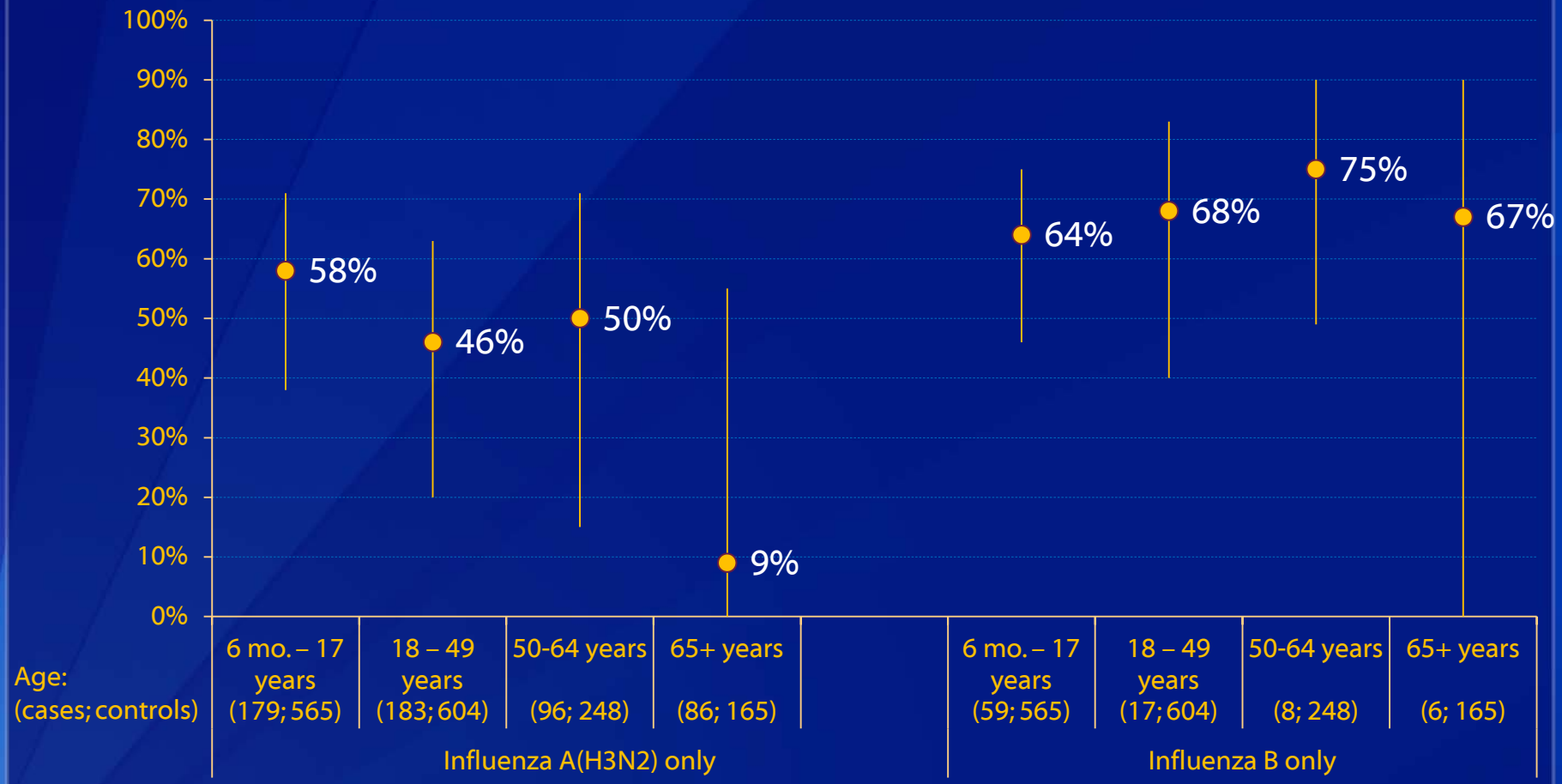


Mid-season VE against A(H3N2) only and B only by age

Virus and age groups	Influenza and Vaccination Status: Influenza-Positive Cases No. Vaccinated /Total	(%)	Influenza-Negative Controls No. Vaccinated /Total	(%)	Vaccine Effectiveness Adjusted † (%)	(95% CI)
Influenza A(H3N2) only						
All ages	211/544	(39)	793/1582	(50)	**(47)**	(35-58)
6 mo. – 17 years	52/179	(29)	275/565	(49)	**(58)**	(38-71)
18 – 49 years	53/183	(29)	256/604	(42)	**(46)**	(20-63)
50-64 years	41/96	(43)	143/248	(58)	**(50)**	(15-71)
65+ years	65/86	(76)	119/165	(72)	**(9)**	(-84, 55)
Influenza B only						
All ages	90/364	(25)	793/1582	(48)	**(67)**	(51-78)
6 mo. – 17 years	59/230	(26)	275/565	(49)	**(64)**	(46-75)
18 – 49 years	17/79	(22)	256/604	(42)	**(68)**	(40-83)
50-64 years	8/40	(20)	143/248	(58)	**(75)**	(39-90)
65+ years	6/15	(40)	119/165	(72)	**(67)**	(-10, 90)

† Adjusted for age, site, race/ethnicity, self-rated health, and days from onset

Mid-season adjusted VE (95% CI) against A(H3N2) only and B only by age



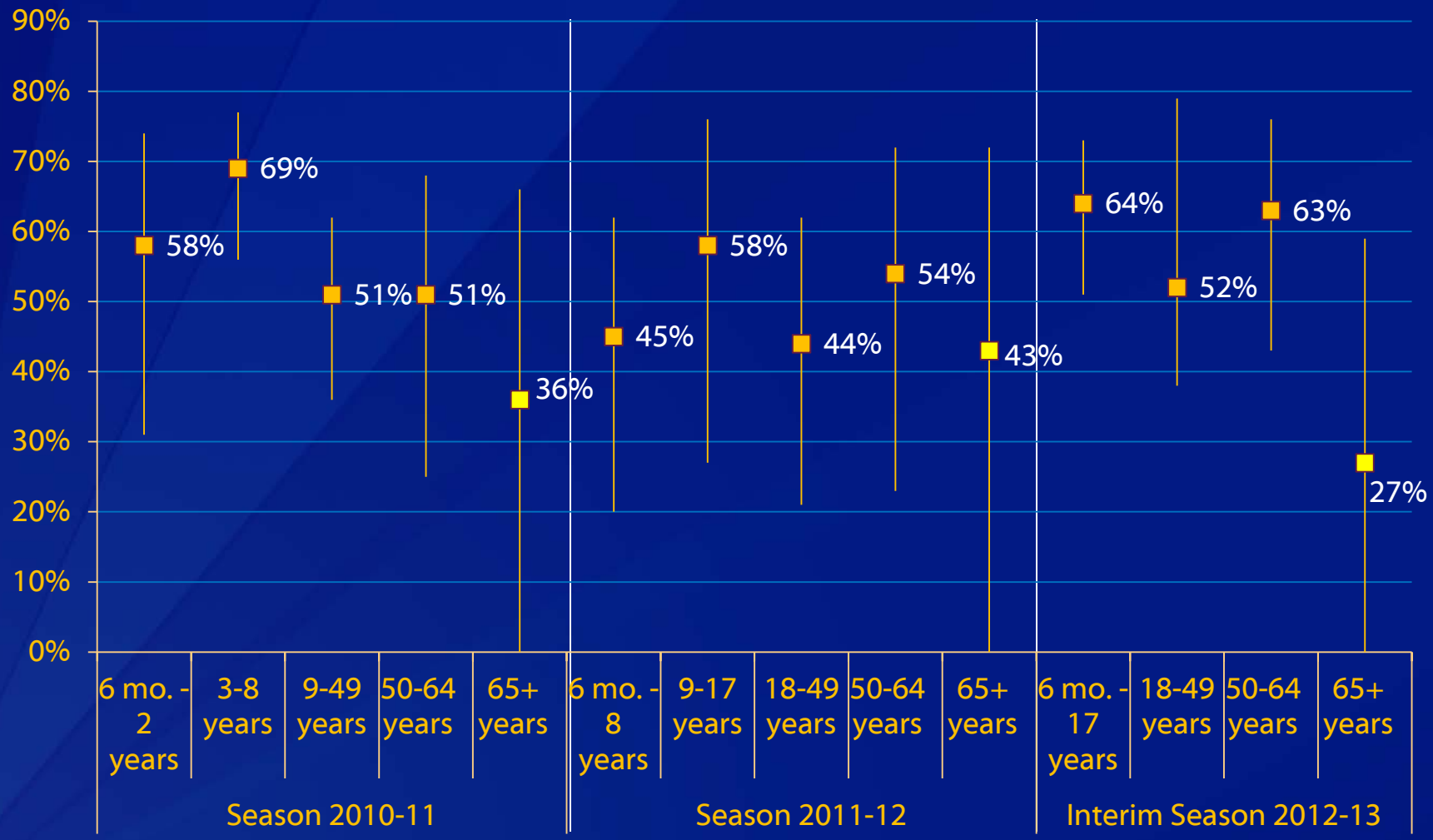
Conclusions

- **Adjusted VE against influenza A and B was 56% (47-63%)**
  - Similar to earlier unadjusted VE of 62% (51-71%) against A and B
- **Vaccination reduced the risk of outpatient medical visits:**
  - Due to influenza A(H3N2) by half (47%); consistent for ages <65
  - Due to influenza B by two-thirds (67%); consistent for all ages
- **Similar to other interim estimates from this season**
  - Canada: VE against A(H3N2) = 45% (13%–66%)
  - UK: VE against A = 49% (-2%-75%) and against B = 52% (23%-70%)
  - I-MOVE: VE against A and B = 62% (21%-82%)

Conclusions

- **Sub-optimal VE against A(H3N2) among adults aged 65+**
  - Similar to interim VE against A(H3N2) among elderly in Denmark
- **Limits and next steps**
  - Pending full enrollment from entire season
  - Missing chronic medical conditions, vaccine type, and prior vaccination status until final data set
  - Additional potential confounders will be considered
- **Implications**
  - Opportunity to expand beneficial vaccination, especially among younger age groups
  - Important to recognize illness and treat with antiviral medications, especially among older adults
  - Need more effective vaccines and vaccination strategies
  - Need better understanding of factors that modify VE
  - VE this season has to be considered in the context of other seasons, strains, and outcomes

Adjusted VE (95% CI) against circulating strains by season in US Flu VE Network



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