

Influenza Vaccination Recommendations: Summary Guide 2006-07

Influenza A and B are the two types of viruses involved in epidemic human disease. Influenza A (A) viruses are categorized on the basis of two surface antigens: hemagglutinin (H) and neuraminidase (N). Since 1977, A (H1N1), A (H3N2), and influenza B viruses have circulated globally. Beginning in 2001, reassortant H1N2 viruses also began circulating widely. In humans following vaccination, immunity to the hemagglutinin surface antigen reduces the likelihood of infection and reduces the severity of disease if infection occurs. However, antibodies produced against one influenza virus confer little or no protection against another type, subtype, or antigenic variant. A notable “exception,” antibodies directed against H1N1 and H3N2 strains are thought to provide protection against the corresponding reassortant viruses. Antigenic drift explains the virologic basis for seasonal influenza epidemics and is the reason that influenza vaccines are reformulated annually. Annual vaccinations remain the primary option for reducing the societal impacts of influenza illness. Both killed (inactivated)- and live (attenuated)-virus vaccines are available for use in the United States. In adults, two weeks is necessary for the development of antibodies after vaccination and annual vaccination is necessary because of declining immunity during the year after vaccination. Antiviral drugs used for chemoprophylaxis or treatment of influenza remain adjuncts to, but not substitutes for, annual vaccination.

An important benefit of the influenza vaccine is its ability to help prevent secondary complications which reduces the overall healthcare costs and productivity losses associated with influenza illness. Among older persons who reside in nursing homes, influenza vaccine is most effective in preventing severe illness, secondary complications, and deaths. In this population, the vaccine can be 50–60% effective in preventing influenza-related hospitalizations or pneumonia and 80% effective in preventing influenza-related deaths, even though the effectiveness in preventing influenza illness itself is often only 30–40%. In years when the vaccine and circulating viruses are antigenically similar, influenza vaccine typically prevents influenza illness among 70–90% of healthy adults aged <65 years. Vaccination of healthy adults is also important to decrease work absenteeism, the use of antibiotics, and the consumption of other health-care resources. Vaccination of health-care workers and other persons in close contact with persons at increased risk for severe influenza illness also reduces transmission of influenza and subsequent influenza-related complications.

Both the killed- and live-virus influenza vaccines contain three viral strains that are antigenically equivalent to those currently recommended. For the 2006-07 season these include: 1) A/New Caledonia/20/1999 (H1N1)-like; 2) A/Wisconsin/67/2005- or the antigenically equivalent A/Hiroshima/52/2005 (H3N2)-like; and 3) the B/Malaysia/2506/2004- or the antigenically equivalent B/Ohio/1/2005-like antigens. Viruses for both types of vaccines are grown in eggs so persons with a history of severe hypersensitivity to eggs (e.g., anaphylaxis) should not receive routine influenza vaccinations. In addition, persons with moderate-to-severe acute febrile illness usually should not be vaccinated until their symptoms have abated. However, minor illnesses with or without fever do not contraindicate use of the vaccine, particularly among children with mild upper-respiratory tract infections or allergic rhinitis. Administered intramuscularly, inactivated

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Latest Vaccine Coverage Estimates vs. Healthy People 2010 Goals:

- Persons aged ≥ 65 years: 65% (estimate) vs. 90% (goal).
- Adults with high-risk conditions: 26% (aged 18–49 years) and 46% (aged 50–64 years) vs. 60% (goal).

Increasing vaccination coverage among persons who have high-risk conditions and are aged < 65 years and among children at high risk, is the highest U.S. priority for expanding influenza vaccine use.

Vaccination of health-care workers is also a high priority for expanding U.S. influenza vaccine use. In 2005, seven states had legislation requiring annual influenza vaccination of healthcare workers and 15 states had regulations regarding vaccination of healthcare workers in long-term care facilities. Physicians, nurses, and other workers in both hospital and outpatient settings, including medical emergency-response workers, should receive vaccinations, as should employees of nursing homes and chronic care facilities who have contact with patients or residents.

Data also indicate low compliance with the ACIP recommendations for vaccination of pregnant women against influenza.

influenza vaccine contains killed viruses, and thus cannot produce signs or symptoms of influenza virus infection. In contrast, the intranasally administered live-attenuated influenza virus vaccine (LAIV) has the potential to produce mild symptoms related to influenza infection. LAIV is more expensive than inactivated influenza vaccine and is approved only for use among healthy non-pregnant persons aged 5–49 years. Inactivated influenza vaccine is approved for use among persons aged ≥ 6 months, including those who are healthy and those with chronic medical conditions. Among previously unvaccinated children aged 6 months up to 9 years, 2 doses of inactivated vaccine administered ≥ 1 month apart are recommended, preferably with the second dose administered before the onset of the influenza season.

Annual Vaccination Summary Recommendations:

1. Inactivated influenza vaccine is recommended for the following persons who are at increased risk for severe complications from influenza:
 - children aged 6–23 months;
 - children and adolescents (aged 6 months–18 years) who are receiving long-term aspirin therapy and might be at risk for Reye's syndrome in association with influenza infection;
 - women who will be pregnant during the influenza season; [*note: breast-feeding is not a contraindication to vaccination*]
 - adults and children who have chronic disorders of the pulmonary or cardiovascular systems, including asthma; [*note: hypertension is not considered a high-risk condition*]
 - adults and children who have required regular medical follow-up or hospitalization during the preceding year because of chronic metabolic diseases (including diabetes mellitus), renal dysfunction, hemoglobinopathies, or immunodeficiency (including immunodeficiency caused by medications or by HIV infection);
 - adults and children who have any condition that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk for aspiration (e.g., cognitive dysfunction, spinal cord injuries, seizure disorders, or other neuromuscular disorders);
 - residents of nursing homes and other chronic-care facilities that house persons of any age who have chronic medical conditions; and
 - persons aged ≥ 65 years.
2. Inactivated influenza vaccine is recommended for the following persons who are at an increased risk for influenza-associated clinic, emergency department, or hospital visits, particularly if they have a high-risk medical condition:
 - children aged 24–59 months; and
 - persons aged 50–64 years.
3. Inactivated influenza vaccine or LAIV (see note below) is recommended for the following persons to prevent transmission of influenza to persons identified above:
 - healthy household contacts and caregivers of children aged 0–59 months and persons at high risk for severe complications from influenza; and
 - health-care workers.
4. In addition to the groups for which annual influenza vaccination is recommended, vaccination should be offered to:
 - any person who wishes to reduce the likelihood of becoming ill with influenza or transmitting influenza to others should they become infected;
 - persons who provide essential community services; and
 - students or other persons in institutional settings (e.g., those who reside in dormitories).

[Note: Use of inactivated influenza vaccine is preferred for vaccinating household members, health-care workers, and others who have close contact with severely immunocompromised persons (e.g., patients with hematopoietic stem cell transplants) during those periods in which the immunocompromised person requires care in a protective environment. If a health-care worker or hospital visitor receives LAIV, that worker/visitor should refrain from contact with severely immunocompromised patients for 7 days after vaccine receipt.]

Stress Ulcer Prophylaxis (SUP) Guidelines for Adults at UW Medicine

Who should receive SUP?

While the majority of ICU patients will have significant reductions in mucosal blood flow and endoscopic evidence of mucosal damage, clinically-important bleeding is uncommon (2-6% of patients).¹ Splanchnic hypoperfusion is the primary etiology of mucosal damage, and thus aggressive resuscitation and maintenance of adequate visceral perfusion is key to preventing stress related mucosal damage.²⁻⁴ In addition, acid suppressive therapy to keep pH>3.5 has been shown to reduce clinically important bleeding—defined as hematemesis, gross blood in NG aspirate, hematochezia, or melena with at least one of the following in the absence of other causes:

- Hypotension (decrease in BP by 20mm Hg)
- Drop in hemoglobin by ≥ 2 g/dL with subsequent transfusion not achieving the expected increase in hemoglobin.⁵

SUP with acid suppressive therapy is **NOT** necessary for most adult patients outside of ICU and post-surgical settings.⁶ SUP is not without risks (bacterial colonization with potential for nosocomial pneumonia and/or *C. difficile* infection) and thus should be reserved for those patients at greatest risk for clinically important bleeding.

SUP should be implemented in ICU patients with:^{1,6}

- Respiratory failure requiring >48 hours of mechanical ventilation
- Coagulopathy in non-oncology patients (plts <50K, INR>1.5, PTT>2X normal)

Assess the risks vs. benefits of SUP for ICU patients with the following risk factors for stress related mucosal damage:

- Hypotension
- Sepsis and Sepsis Syndrome
- Hepatic and/or renal failure
- Head injury with GCS <10
- Thermal injury involving >35% of BSA
- Multiple trauma with Injury Severity Score ≥ 16
- Spinal cord injury
- Organ transplant and/or >250mg of hydrocortisone (or equivalent) per day.

SUP Guidelines for Adults		Medication	Route	Dose	Comments
1st Line: H₂ Antagonist		Ranitidine	PO/PNG/PFT	150mg BID if CrCl<50mL/min reduce to 150mg daily	1. Available in a liquid formulation. 2. Case-control trials have not demonstrated a conclusive correlation between H2 antagonists and thrombocytopenia.
			IV	50mg Q 8h if CrCl<50mL/min reduce to 50mg daily	
Move to 2nd line agents only if patient fails (bleeding) OR is intolerant of, or has contraindication to, 1st line therapy.					
2nd line: Proton Pump Inhibitor	1st Line Treatment failure	Pantoprazole	IV	40mg Q 12h	1. Goal pH>4. 2. Consider alternative routes (PO or enteral) once active bleeding has resolved. 3. For patients found to be at high risk via endoscopy: goal pH>6 with continuous infusion of PPI.
	Patient intolerant/contraindication to 1st line therapy	Pantoprazole	PO	40mg daily	Tablet cannot be crushed.
		Lansoprazole solutab	NG/PFT	30mg daily	Disperse tablet in water prior to administration via tube.

References:

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UW Medicine Monitoring Guidelines for Parenteral Antimicrobial Therapy For Patients Receiving Greater than One Week of Therapy

These guidelines are primarily intended for the ambulatory setting; however, the principles apply in the inpatient setting as well. These minimum recommendations do not replace clinical judgment and are intended to provide initial guidance which may be modified depending on the individual patient.						
Medication	CBC with differential and plts	Chem-7	Magnesium/ Calcium/ Phosphorous	CPK	LFT	Comments
ANTIBIOTICS						
Aminoglycosides (gentamicin, tobramycin, amikacin)	Weekly	Twice weekly				Serum levels with 3rd dose after initiation or dosage change. Weekly trough. Audiogram at baseline and q 4 weeks if duration of therapy longer than 2 weeks (when medical condition allows).
Beta-lactams (penicillins, cephalosporins, carbapenems, monbactams)	Weekly	Weekly				
Daptomycin	Weekly	Weekly		Weekly		
Linezolid	Weekly					Weak MAO inhibitor. Also monitor PO dosing weekly.
Quinupristin-dalfopristin	Weekly	Weekly			Weekly	
Vancomycin	Weekly	Weekly				Trough level should be done for patients with changing renal function or fluid status (edematous). Peak levels are not necessary.
Agents with good oral bioavailability for which individualized monitoring is recommended depending on co-morbidities and dose						
Clindamycin	*				*	*Weekly for parenteral dosing ($\geq 600\text{mg}$ q 6h).
Fluoroquinolones (ciprofloxacin, levofloxacin, moxifloxacin)						Monitoring based on symptoms.
Metronidazole						Monitor for neurologic symptoms.
Rifampin						Monitoring based on symptoms.
Trimethoprim/Sulfamethoxazole	**	**			**	**Weekly for high dose (TMP 15-20mg/kg).
ANTIFUNGALS						
Amphotericin B (including lipid formulations)	Weekly	Twice weekly	Weekly		Weekly	
Azoles (fluconazole, itraconazole, voriconazole)		Weekly			Weekly	Beware of potential drug interactions; notify prescriber if new interacting medication is started.
Echinocandins (casposfungin, micafungin)					Weekly	
ANTIVIRALS						
Acyclovir	Weekly	Weekly				
Foscarnet	Weekly	Twice weekly	Twice weekly			
Ganciclovir	Weekly	Weekly				
Cidofovir	Weekly	Weekly	Weekly			Urinalysis and renal monitoring before dosing.

The full 2006/07 Recommendations of the Advisory Committee on Immunization Practices (ACIP) on the Prevention and Control of Influenza can be found at <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr55e628a1.htm>.

For the 2006-07 season, neither amantadine nor rimantadine should be used for the treatment or chemoprophylaxis of influenza A in the U.S.

Children aged <9 years who receive influenza vaccine for the first time after influenza activity has begun can require up to 6 weeks of chemoprophylaxis (i.e., chemoprophylaxis for 4 weeks after the first dose of vaccine and an additional 2 weeks of chemoprophylaxis after the second dose).

Health-care professionals should promptly report to UW Patient Safety Net and VAERS all clinically significant adverse events after influenza vaccination, even if the health-care professional is not certain that the vaccine caused the event.

Antiviral Agents for Influenza

Although annual vaccination is the primary strategy for preventing complications of influenza virus infections, antiviral medications with activity against influenza viruses can be effective for chemoprophylaxis and treatment. Four influenza antiviral agents are available in the U.S.: amantadine, oseltamivir, rimantadine, and zanamivir. ACIP recommends that neither amantadine nor rimantadine be used for the treatment or chemoprophylaxis of influenza A in the U.S. until susceptibility to these medications has been re-established.

Oseltamivir (Tamiflu[®]) and zanamivir (Relenza[®]) are chemically related antiviral neuraminidase inhibitors that have activity against both influenza A and B viruses. Oral oseltamivir or zanamivir inhalation can be prescribed if antiviral treatment of influenza is indicated. The two drugs differ in pharmacokinetics, side effects, routes of administration, approved age groups, dosage, and cost. Oseltamivir is approved for treatment of persons aged ≥ 1 year and zanamivir is approved for treatment of persons aged ≥ 7 years. When administered within 2 days of illness onset to otherwise healthy adults, oseltamivir and zanamivir can reduce the duration of uncomplicated influenza A and B illness by ~ 1 day compared with placebo. Data are limited regarding the effectiveness of the agents in preventing serious influenza-related complications (e.g., pneumonia or exacerbation of chronic diseases). Data are also limited concerning the effectiveness of oseltamivir and zanamivir for treatment of influenza among persons at high risk for serious complications of influenza. Five days of antiviral therapy initiated within 2 days of illness onset is recommended for the treatment of influenza infection.

Oseltamivir and zanamivir also can be prescribed for chemoprophylaxis of influenza; oseltamivir is licensed for use in persons aged ≥ 1 year, and zanamivir is licensed for use in persons aged ≥ 5 years. Although they are considered to be critical adjuncts in preventing and controlling influenza outbreaks, chemoprophylactic drugs are not a substitute for vaccination. In community studies of healthy adults, both oseltamivir and zanamivir are similarly effective in preventing febrile, laboratory-confirmed influenza illness. Both antiviral agents also have been reported to prevent influenza illness among persons administered chemoprophylaxis after a household member has had influenza diagnosed. To be maximally effective as chemoprophylaxis, the drug must be taken each day for the duration of influenza activity in the community. In addition, if an outbreak is caused by a strain of influenza that is not likely to be covered by the vaccine, chemoprophylaxis should be considered for all persons who provide care to those at high risk, regardless of their vaccination status. Chemoprophylaxis can also be considered for persons at high risk who are expected to have an inadequate antibody response to influenza vaccine; this category chiefly includes persons with advanced HIV disease.

Considerable overlap with symptoms from illness caused by other pathogens limits the accuracy of clinical diagnosis of influenza on the basis of symptoms alone. Community surveillance information and diagnostic testing can aid clinical judgment and help guide treatment decisions. Bacterial infections that underlie influenza symptoms or that occur as a complication of influenza should be appropriately treated.

The annual supply of influenza vaccine and the timing of its distribution cannot be guaranteed in any year. Currently, influenza vaccine manufacturers are projecting that approximately 100 million doses of influenza vaccine will be available in the United States for the 2006-07 influenza season, an amount that is approximately 16% more doses than were available for the 2005-06 season but distribution delays or vaccine shortages remain possible. When educating patients regarding potential side effects, clinicians should emphasize that: 1) inactivated influenza vaccine contains non-infectious killed viruses and cannot cause influenza, and 2) coincidental respiratory disease unrelated to influenza vaccination can occur after vaccination.

Pharmacy & Therapeutics Committee Actions

Stress Ulcer Prophylaxis	The P&T Committee voted to approve a new educational tool to improve SUP prescribing (see pg. 35).	
Antiemetics: The P&T Committee approved the following recommendations designed to encourage the cost-effective prescribing of antiemetics for non-chemotherapy-induced nausea & vomiting.	Post-operative nausea & vomiting	Prophylactic monotherapy with ondansetron 4mg IV for patients at moderate risk and combination therapy with 2 or 3 agents from different drug classes (i.e., dexamethasone 4mg, prochlorperazine 5mg, or promethazine 12.5mg) for patients at high risk. Rescue therapy should be with an agent from a different class than that used for prophylaxis, and 5-HT3 antagonists (e.g., ondansetron) should not be re-dosed within any 24h period.
	Opioid-induced nausea & vomiting	Routine prophylaxis is not recommended. Metoclopramide 5-10mg IV q 6h PRN should be used 1st line. Ondansetron 4mg IV q 8h for a maximum of 2 doses in any 24h period may be used 2nd line.
	Other etiologies of nausea & vomiting	Patient specific factors such as the underlying cause of nausea and vomiting, risk of adverse events, and drug interactions must be considered. Prochlorperazine, promethazine, and metoclopramide are 1st line with ondansetron reserved for patients not responding to, or intolerant of, 1st line options.
	Special ondansetron considerations	EXCLUDING chemotherapy-induced nausea and vomiting orders written on chemotherapy order forms: 1) All ondansetron orders will have a 24h stop time; 2) When ordered more frequently, pharmacy will automatically change the frequency of ondansetron orders to q 8h.

Download the UW Medicine e-Drug Formulary to Your PDA

The *UW Medicine Drug Formulary* lists the drug products available for prescribing to UW patients and contains full-text clinical information from *A-to-Z Drug Facts*. The Formulary is updated during the third week of every month following UW Medicine Pharmacy and Therapeutics Committee meetings. The Formulary can be accessed electronically from HealthLinks by entering the word “formulary” in the search box. Choose the “UW Medicine Drug Formulary for Palm” or “UW Medicine Drug Formulary for PocketPC” hyperlink. The drug list requires 2MB of free space while the drug list with the *Drug Facts* requires 6MB of free space on the PDA device. Downloading is simple. If assistance is needed, contact druginfo@u.washington.edu or call 598-6612.

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