



PAKISTAN

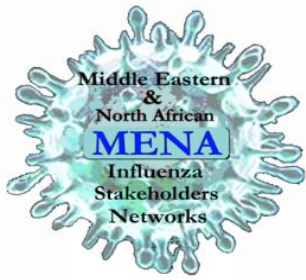
(country presentation template)

Prof. Yusuf Kamal Mirza
Agha Khan University Hospital Karachi

6th Mena Influenza Stakeholders Meeting

Organized by Fondation Mérieux

Prague, Czech Republic
6-7 April 2017



MENA ISN OBJECTIVES

(for reference purposes)



1. Improve Surveillance and Disease Burden Data

- Support the WHO initiative in building laboratory capacity and surveillance in the MENA region and urge the governments to give high priority to the establishment and continued support for influenza surveillance systems.
- Identify the needs of countries for establishing or improving existing surveillance networks
- Disseminate surveillance and disease burden data through publications.

2. Increase the Evidence-based Communication on Influenza Burden and Benefits of Vaccination

- Bring together key stakeholders to in local country identify and discuss common concerns and challenges in communicating the importance and benefits of seasonal influenza vaccination, addressing misinformation
- Be the active advocate for acceptance of vaccination by health professionals and the public
- Identify effective communication tools

3. Increase the Number of Countries with Flu Vaccination in Their National Immunization Programs

- Provide/increase official recommendations for influenza vaccination
- Provide /increase funding for vaccination by governments

1. Improve the Monitoring of Influenza Coverage Rates to Increase the Rates

- Define barriers and drivers among lay public, Health Care Staff and Health Authorities
- Set official «vaccination coverage rate targets» customized to the countries
- Develop actions to increase vaccination coverage rates in pregnant women, people at risk, elderly and children (vaccination campaigns)

COUNTRY OBJECTIVES FOR THE UPCOMING 3 YEARS

- To collect more retrospective data to evaluate seasonal variation pattern
- Prospective control surveillance data at airport
- To create awareness on international guidelines at GPs level
- Surveillance of seasonal disease burden
- Plan to enter in the Adult population like Diabetes and COPD with the updated guidelines

- Annual epidemics results in about
 - **3 to 5 million** cases of severe illness
 - **250,000 to 500,000** deaths.¹
- The **first pandemic**, or worldwide epidemic occurred in 1580.
- At least **four pandemics of influenza occurred in 19th century** and **three occurred in 20th century**.
- Pandemic of **Spanish Influenza** in 1918-1919 caused an **estimated 21 million deaths**.
- The **first pandemic of 21st century** occurred in 2009-2010.²

1. Adapted from: <http://www.who.int/mediacentre/factsheets/fs211/en/>. Last accessed on 26th March 2017

2. Adapted from: <https://www.cdc.gov/vaccines/pubs/pinkbook/flu.html>. Last accessed on 26th March 2017



World Health
Organization

Globally

- **In January 2011, Pandemic influenza virus caused²**
 - more than 60 million Americans to become ill.
 - more than 270,000 hospitalizations and 12,500 deaths.
 - 90% of Hospitalizations and deaths occurred in persons younger than 65 years of age.²

- **During 2013 to 2017, annual epidemics of Avian influenza in China resulted in 1,258 infections in humans.³**

- **Typically in an epidemic, influenza attack rates are lower than in pandemics.²**
 - In the northern Hemisphere, epidemics usually occur in late fall and continue through early spring.*
 - In the Southern Hemisphere, epidemics usually occur 6 months before those in the Northern Hemisphere.

*Pakistan lies in Northern Hemisphere

2. Adapted from: <https://www.cdc.gov/vaccines/pubs/pinkbook/flu.html>. Last accessed on 26th March 2017

3. Adapted from: <https://www.cdc.gov/mmwr/volumes/66/wr/mm6609e2.htm>. Last accessed on 26th March 2017

COUNTRY EPIDEMIOLOGICAL UPDATE

(please provide the following data specifics for your country)

1. Start and end dates of influenza epidemics: Seasonal influenza viruses from September to March with a peak in December
2. Circulating viruses: 1066 (72%) influenza virus A, 423 (28%) Influenza virus B, 2% seasonal H1N1, 16% H3N2 and 82% H1N1pdm09
3. Subtypes / lineages: A/H1N1, A/H3N2, B/Yamagata, B/Victoria
4. Severity of the epidemics:
 - Morbidity (No of reported cases) 500 CASES
 - Mortality (No of reported deaths) 15 CASES

Locally

Influenza Virus Surveillance in Pakistan during 2008-2011

N Badar et al.

Locally

■ Background:

- A country-wide **lab-based surveillance system for ILI* and SARI**** with weekly sampling and reporting was established in 2008.
- This system was **necessary for early detection of emerging novel influenza subtypes** and timely response for influenza prevention and control.

■ Methods:

- Five sites at tertiary care hospitals across Pakistan collected epidemiological data and respiratory samples from ILI and SARI cases from January 2008 to December 2011.

*lab-based surveillance system

**Severe Acute Respiratory Illness

Locally

■ Results:

- Total of 6258 specimens were analyzed
- Influenza virus was detected in 1489 (24%) samples,
 - 1066 (72%) Influenza type A viruses.
 - 423 (28%) influenza type B viruses.

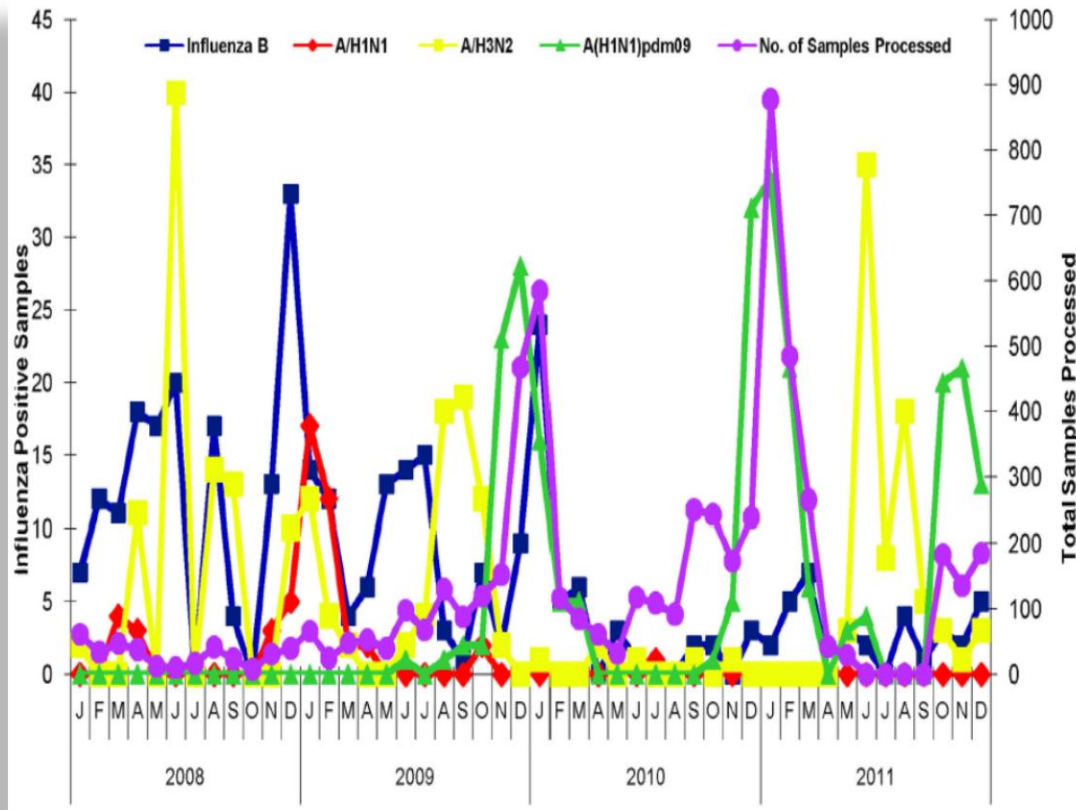
Year	Total No. of Samples Tested	Total Positive Samples (n, %)	Samples Positive for Influenza A or B		Samples Positive for Influenza A subtypes		
			Influenza B (n, %)	Influenza A (n, %)	A/H1N1 (n, %)	A/H3N2 (n, %)	A(H1N1)pdm09 (n, %)
2008	364	77 (21%)	49 (64%)	28 (36%)	6 (21%)	22 (79%)	NA
2009	1357	367 (27%)	102 (28%)	265 (72%)	18 (7%)	74 (28%)	173 (65%)
2010	2105	372 (18%)	169 (45%)	203 (55%)	1 (0.50%)	9 (4%)	193 (95%)
2011	2432	673 (28%)	103 (15%)	570 (85%)	-	64 (11%)	506 (89%)
Total	6258	1489 (24%)	423 (28%)	1066 (72%)	25 (2%)	169 (16%)	872 (82%)

Year wise distribution of Influenza Subtypes (2008–2011).

*lab-based surveillance system

**Severe Acute Respiratory Illness

Locally

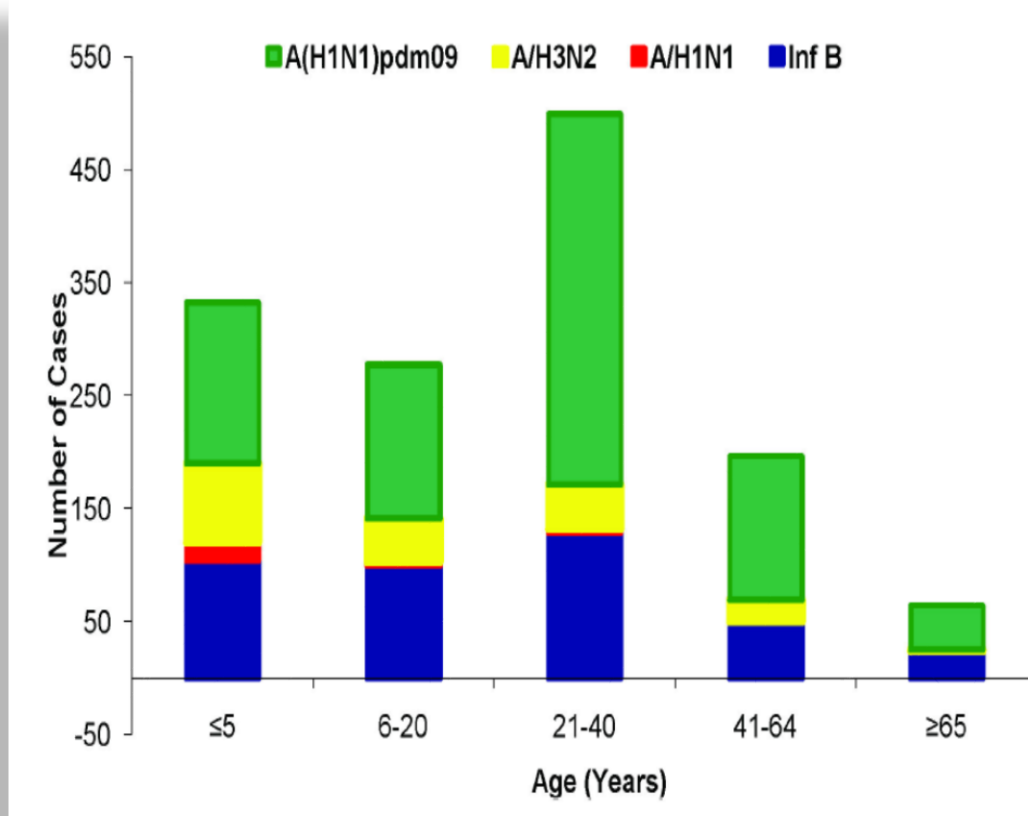


Circulation Pattern of Influenza Viruses during 2008-11 in Pakistan

*lab-based surveillance system

**Severe Acute Respiratory Illness

Locally

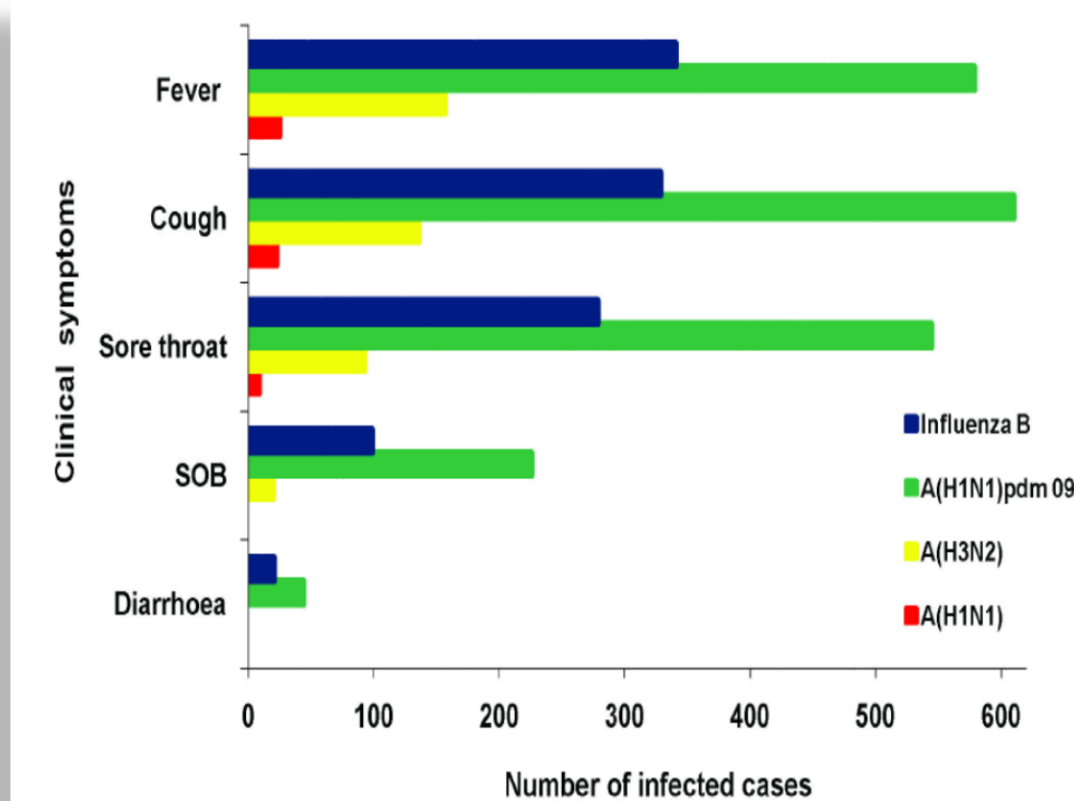


Distribution of Influenza Subtypes among Different Age Groups during 2008-11

*lab-based surveillance system

**Severe Acute Respiratory Illness

Locally



Association between Clinical Symptoms and Influenza Subtypes detected.

*lab-based surveillance system

**Severe Acute Respiratory Illness

Current Data (Influenza B Type) 2011-2014

Molecular Epidemiology of Influenza B Lineages in Pakistan; Surveillance to Evaluate Vaccine Effectiveness

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Chak Shahzad Park Road Islamabad 44000 Pakistan

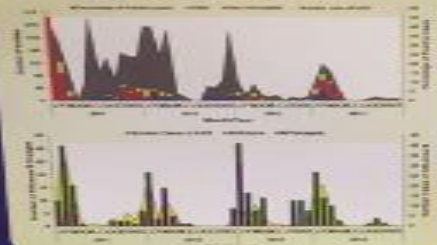
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Background

- Hemagglutinin (HA) gene in Influenza B viruses has evolved into two genetically distinct lineages: B/Yamagata-like (SS) (B/Yam) and B/Victoria-like (B/Vic)-like viruses.
- Regular assessment of prevalent lineages is important in order to determine the closest matching vaccine strain for effective protection to the recipient population.
- Limited data currently available on molecular epidemiology of Influenza B viruses from Pakistan and their compatibility with vaccine strain.



Influenza Circulation Pattern (2011-14)



Comparison of Key Sequence Positions in HA and NA Genes

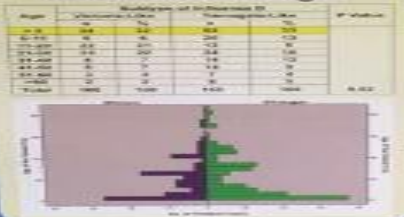
At Nucleotide level

Position	B/Vic	B/Yam	Vaccine
1	T	T	T
2	T	T	T
3	T	T	T
4	T	T	T
5	T	T	T
6	T	T	T
7	T	T	T
8	T	T	T
9	T	T	T
10	T	T	T
11	T	T	T
12	T	T	T
13	T	T	T
14	T	T	T
15	T	T	T
16	T	T	T
17	T	T	T
18	T	T	T
19	T	T	T
20	T	T	T
21	T	T	T
22	T	T	T
23	T	T	T
24	T	T	T
25	T	T	T
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27	T	T	T
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29	T	T	T
30	T	T	T
31	T	T	T
32	T	T	T
33	T	T	T
34	T	T	T
35	T	T	T
36	T	T	T
37	T	T	T
38	T	T	T
39	T	T	T
40	T	T	T
41	T	T	T
42	T	T	T
43	T	T	T
44	T	T	T
45	T	T	T
46	T	T	T
47	T	T	T
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91	T	T	T
92	T	T	T
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94	T	T	T
95	T	T	T
96	T	T	T
97	T	T	T
98	T	T	T
99	T	T	T
100	T	T	T

At Amino Acid level

Position	B/Vic	B/Yam	Vaccine
1	T	T	T
2	T	T	T
3	T	T	T
4	T	T	T
5	T	T	T
6	T	T	T
7	T	T	T
8	T	T	T
9	T	T	T
10	T	T	T
11	T	T	T
12	T	T	T
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95	T	T	T
96	T	T	T
97	T	T	T
98	T	T	T
99	T	T	T
100	T	T	T

Age Distribution by Influenza B lineages



Sequence Comparison (Influenza B) of Pakistani Isolates with Vaccine Strains



Methods

- Study Design: Retrospective
- Study duration: January 2011 to December 2014
- Datasets:
 - Epidemiological
 - Demographical (age, gender)
 - Clinical case presentation (ILI, SARI)
 - Clinical presentation
 - Virological
 - Specimens (nasopharyngeal or throat swabs)
 - Testing: Real-time RT-PCR/CDC protocol
 - Sequence analysis and sequencing performed at CDC
 - Phylogenetic Analysis: MEGA version 5.0 using the NJ method
 - Epidemiological and Laboratory sets: WHO version 11.0

Influenza Subtypes 2011-14

Year	B/Vic (%)	B/Yam (%)
2011	100	0
2012	100	0
2013	100	0
2014	100	0

Phylogenetic Analysis for HA and NA Genes



Conclusions

- This is the first report on molecular epidemiology of Influenza B viruses from Pakistan
- Influenza B viruses have a seasonal burden among children & youth
- The Yamagata lineage predominated during 2011-11 & 2013-14 while B-Victoria circulation was higher during 2011-12 & 2012-13.
- Regular surveillance of Influenza B viruses is important in order to include the representative lineage(s) in the annual influenza vaccine selection

Acknowledgments

- Ministry of Health, Government of Pakistan
- Director, for Disease Control and Prevention
- World Health Organization



Poster presented at: The 1st International meeting on Respiratory Pathogens at the Marina Riverfront, Singapore (September 2 to 4, 2015)

ACTION PLAN COMPONENTS UPDATE

COMPONENTS / Actions	Progress achieved since the beginning of MENA INS?	2017 – 2018- Future actions to attain (to be completed in September)	Challenges
SURVEILLANCE		Airport surveillance and agricultural university role in poultry infection monitoring	To collect the epidemiological data on high risk pregnant women, diabetic and COPD patient and regional epidemiological data
VACCINATION		Starting campaigns like RTDs or SPPs during flu season, i.e september till march through the materials provided by our regional team like slide deck . MOH EPI programme covering 6	Raise the vaccination coverage among pregnant women, diabetes and COPD patients and seek help of WHO in assistance for vaccine

Dr Nadeem Khawaja – Primary Care Physician, Lahore Pakistan

Proposed Plan:

- First interceptors of disease
- An ounce of prevention is a ton of cure
- First convince the caregiver
- Translate research into practice
- Private and Public Partnership
- In Lahore , we have 15000 GPs
- Collaboration with medical societies
- Academy of Family physician creating awareness through workshops and seminars

CONCLUSIONS / HIGHLIGHTS

- In spite of the published guidelines and recommendations, a very low percentage of the healthcare professionals in our hospital were vaccinated against influenza, and the barriers to vaccination were prevalent.
- Motivate MOH to include influenza in EPI program with the help of WHO
- Strategies, including arranging seminars for general practitioners and guidelines for medical societies regarding awareness about vaccinations, are required to improve the knowledge and overall outcomes
- Raise the vaccination coverage in vulnerable population like diabetic, COPD & pregnant women