Severe Acute Respiratory Infection (SARI): Epidemiology and Surveillance System in Abbassia Fever Hospital, Cairo, Egypt

Thesis
Submitted for partial fulfillment of Master Degree in
Epidemiology

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DEDICATION

In the Name of **God**, Most Gracious, Most Merciful

This work is dedicated to my dear ***mother***; without her presence in my life, I would have never been able to achieve any success in my study or my career, she is the most precious gift God gave to me during my short life.

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MOHAMED ELHAKIM

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List of Abbreviations

Abbreviation	*Detailed*
AFRO	African Regional Office, WHO
ARI	Acute Respiratory Infection
ARDS	Acute Respiratory Distress Syndrome
CDC	Centers for Disease Control and Prevention
CFR	Case Fatality Rate
CPHL	Central Public Health Laboratory
DNA	Deoxyribonucleic acid
ECDC	European Centre for Disease Prevention and Control
ELISA	Enzyme-linked immunosorbent assay
EMRO	Eastern Mediterranean Regional Office, WHO
ER	Emergency Room
EV	Enteroviruses
GIP	Global Influenza Program
GISRS	Global Influenza Surveillance and Response System
HAI	Hemagglutination Inhibition
HCDCP	Hellenic Center for Disease Control and Prevention
HIV	Human Immunodeficiency Virus
hAdVs	Human adenoviruses
hBoVs	human bocaviruses
hMPV	Human metapneumovirus
hPIV	Human parainfluenza virus
IATA	International Air Transport Association
IHR	International Health Regulation
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10^{th} revision
ICU	Intensive Care Unit
ILI	Influenza Like Illness
LARI	Lower Acute Respiratory Infection
MAP	Maximum Accumulated Rates Percentage
MEM	Moving Epidemic Method
MERS	Middle East respiratory infection
MOHP	Ministry of Health and Population

Abbreviation	*Detailed*
NAMRU-3	The U.S. Naval Medical Research Unit No. 3
NIC	National Influenza Center
OTC	Over the counter
PAHO	Pan American Health Organization
PCR	Polymerase Chain Reaction
PPE	Personal Protective Equipment
RIDT	Rapid Influenza Diagnostic Test
RNA	Ribonucleic Acid
RSV	Respiratory Syncytial Virus
RV	Rhinoviruses
SAGE	Strategic Advisory Group of Experts on Immunization
SARI	Severe Acute Respiratory Infection
SARS	Severe Acute Respiratory Syndrome
UARI	Upper Acute Respiratory Infection
WHO	World Health Organization

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Abstract

Background. Sentinel surveillance for severe acute respiratory infections (SARI) in Egypt began in 2007 and occurs in eight hospitals. Avian influenza is endemic, human cases of A(H5N1) are reported annually since 2006. This study aimed to assess the SARI sentinel surveillance in a major sentinel site in the country.

Methods. Data was collected, during three consecutive years 2013-2015, from Abbassia Fever hospital in Cairo. Epidemiology of SARI cases was studied, as well as, a questionnaire was developed and used to collect necessary data for assessment of the surveillance system at the sentinel site.

Results. During the study period, 1254 SARI cases, conform with WHO case definition, were admitted to the hospital representing 5.6% of admitted patients for all causes and 36.6% from acute respiratory infection patients. 1250 cases (99.7%) were tested, and 263 cases (21.04%) tested positive. 128 cases (48.7%) were influenza A viruses, while 66 cases (25%) were influenza B. From influenza A, 64 cases (24%) were influenza A(H1N1)pdm09, 60 cases (23%) were influenza A(H3N2), and 4 cases (2%) were influenza A(H5N1). Under 5-year-old is the predominant age group with 443 cases (35.3%). The seasonality of the influenza data is conforming with the northern hemisphere pattern. The influenza vaccination rate among patients was less than 1%. A questionnaire for assessment of sentinel site was developed using a checklist extracted from WHO and CDC guidelines.

Conclusion. Study's results show that SARI leads to substantial morbidity in Egypt. SARI sentinel surveillance is mandatory for a country like Egypt, with more than 90 million population. There is a great need for a high-quality surveillance system; especially with endemic respiratory threats in the country like the avian influenza A(H5N1), as well as in the neighbor countries like the Middle East respiratory syndrome (MERS) in Saudi Arabia.

Keywords. Influenza, severe acute respiratory infection, sentinel surveillance, fever hospital, strengthening surveillance system, Egypt.

Protocol

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Protocol
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INTRODUCTION:

Respiratory infections are common across the globe. Influenza, the most common virus causing these infections, can occur during various seasons (seasonal influenza), among animals that can be transferred to humans (zoonotic influenza) and across many parts of the world (pandemic influenza). The virus attacks mainly the upper respiratory tract – the nose, throat and bronchi. The symptoms include sudden onset of high fever, cough, sore throat, rhinitis, muscle pain, and headache. **(WHO, 2014)**

Egypt suffers from different types of Influenza viruses; till date, it is ranked the first country worldwide in reporting Avian Influenza A (H5N1). Ever since the first human infection of avian influenza A (H5N1) was reported in 2006 from the country, human infections continue to be reported sporadically. **(EMRO, 2015)** According to WHO latest report on 14 December 2015, Egypt has reported 346 cases and 116 deaths of H5N1, with a case fatality rate (CFR): 33.5%. **(WHO/GIP, 2015)**

Emerging respiratory infectious diseases pose a substantial risk for humans because of their extremely high potential to spread from person-to-person. Four pandemics involving emerging respiratory infectious diseases have occurred in the last century, with the most recent being the 2009 influenza A(H1N1) pandemic. Some of the lessons learned from the 2009 pandemic included the need to collect data about severe cases, utilize a standard methodology for collecting information, and have historical data to assess the current influenza activity in the context of previous seasons. **(PAHO, 2014)**

Influenza surveillance was established in Egypt in 1999 and has expended throughout the collaboration of the MOHP with NAMRU-3, CDC and the regional WHO office (EMRO). Egypt has multiple activities for influenza within their surveillance system. General influenza surveillance takes place in all government hospitals, up to 450, and approximately 5,000 outpatient clinics. **(CDC, 2013)**