CHAPTER II

ESSAY

Acute Respiratory Infection (ARI)

2.1 Introduction

Acute respiratory infection (ARI) is considered as one of the major public health problem. They are recognized as the leading cause of morbidity and mortality in many developing countries. According to the World Health Organization (WHO), in developing countries ARI is one of the commonest cause of death of children under five years of age. They are responsible for 4 of the estimated 15 million deaths that occur in children under five years of each years; two-third of these deaths are in infants (especially the young infants) (1). The magnitude of the mortality leaves no doubt that this problem is one of the major challenges of public health confronting the world today. Ten thousand deaths a day from one cause can not be ignored, there is no other disease causing more deaths in children.

ARI, diarrhea, and malnutrition are the principle causes of illness and death among under 5 years of age children in developing countries. Acute lower respiratory tract infection (ALRI) is the leading cause of death in young children (Table 2.1). ARI accounts for 30%-50% of visits by children to health facilities and 20%-40% of pediatric hospitalization in most developing countries. Although the incidence of ARI

is similar throughout the world, the incidence of pneumonia is 5-10 times is higher in developing countries than in developed countries (2).

Table 2.1 Main causes of death among children under 5 in developing counties in 1995.

Disease	Number of death (total 10.5 million)
ALRI	2.1
Diarrhea	2.0
Measles	1.1
Malaria	0.7
Neonatal/prenatal	0.7
Malnutrition	0.3
Others	3.6

Source: The World Health Report, 1998.

2.2 Definition of ARI

ARI is an episode of acute symptoms and signs resulting from infection of any parts of the respiratory tract or related structures (including paranasal sinus, middle ear and pleural cavity). ARI is an inclusive term that refers to both upper respiratory tract infection and lower respiratory tract infection. Upper respiratory tract infection are very frequent and do not substantially contribute directly to childhood mortality,

but lower respiratory tract infection particularly pneumonia is one of the main causes of children mortality in developing countries (3).

2.3 Classification of ARI

Illness are described and classified primarily on anatomical basis as following (4).

- Upper respiratory tract infection
  - common cold, rhinitis, influenza
  - pharyngitis
  - tonsillitis
  - adenoiditis
  - otitis media
  - sinusitis
  - acute epiglottitis
- Lower respiratory tract infection
  - acute bronchitis
  - acute bronchiolitis
- Acute infection of the lungs
  - Pneumonia

According to World Health Organization classification of ARI as following (5):

2.3.1 Classify the illness of the children aged from 2 months up to 5 years:

There are four classification of disease for children aged from 2 months up to 5 years.

- **No pneumonia: cough or common cold**

A child who does not have chest indrawing and has not fast breathing (less than 50 times per minute if 2 months up to 12 months, less than 40 times per minute if 12 months up to 5 years). These children have only a simple cough or cold. In this cases caretakers must know how to recognize signs of pneumonia, good home care is very needed and no need to use antibiotic.

- **Pneumonia (not severe)**

A child who has fast breathing (50 times per minutes or more if 2 months up to 12 months, 40 times per minutes or more if 12 months up to 5 years) and does not have chest indrawing. In this cases caretakers should be given instruction on home care, including when to return if the sick child is getting worse and how to give antibiotic.

- **Pneumonia (severe)**

A child with chest indrawing is classified as having severe pneumonia. Chest indrawing may be the only sign that the child has very pneumonia. A child with the chest indrawing is at higher risk of death from pneumonia than a child with fast breathing without chest indrawing. In this cases need to use antibiotics and should be referred to hospital as soon as possible.

- **Pneumonia (very severe)**

A child with danger signs such as: not able to drink water or breast feeding, convulsion, abnormally sleepy or difficult to wake, or severe malnutrition. In this cases the child is at high risk of dying and the child must be urgently referred to hospital.

2.3.2 Classify the illness of the young children aged less than 2 months:

There are three classification of disease for a child aged less than 2 months.

- **No pneumonia: cough or common cold**

A young infant who has neither fast breathing (less than 60 times per minutes) nor severe chest indrawing, the child has a simple cough or cold.

In this cases can be treated at home without using antibiotics. The caretakers should be given advise on how to care for the sick young infant at home. It is very important to emphasize that caretakers should keep the sick young infant warm, continue to breast feed and clear the nose if it interferes with feeding.

- **Severe pneumonia**

A young infant who has fast breathing (60 times per minute or more) or severe chest indrawing (very deep and easy to see) is classified as having severe pneumonia. The treatment for a young infant in this case is by referring urgently to hospital, the child need antibiotic injection. It is very important to keep a sick young infant warm because low temperature can kill young infant.

- **Very severe pneumonia**

A young infant with any danger sign is classified as having very severe pneumonia such as: convulsion, abnormally sleepy or difficult to wake, and stridor when calm. In this case sick infant must be urgently to hospital, the first dose of antibiotic should be given.

2.4 Etiological agents of ARI

In developing countries, studies had indicated that most cases of severe pneumonia in children are caused by bacteria, usually Streptococcus pneumoniae or Haemophilus influenzae. This contrasts with the situation in developed countries, where the great majority is due to viruses (6).

2.5 Risk factors associated with ARI

A numerous of risk factors have been associated with ARI including age and sex of children, indoor air pollution such as smoke from cigarette, out door air pollution, crowding, nutritional status, breast feeding, low birth weight, immunization, socio-demographic condition, feeding practice, lower respiratory illness in early infancy and parental attitudes toward medical care.

2.5.1 Low birth weight

Low birth weight (less than 2.5kg) infants had approximately 50% greater risk of pneumonia compared with newborns weigh more than or equal 2.5kg. Low birth weight may contribute to pneumonia through the decreased immune response of low birth weight infants (7).

2.5.2 Nutritional status

Malnutrition is one of the risk factor on ARI. Malnourished children are at greater risk of death.

A hospital based study was done in Manila to evaluate the influence of malnutrition with ARI.

It was shown that for children whose nutritional status was normal, the case fatality rate was 6 per 1,000 in those with mild degree of malnutrition the rate was 4 times higher, increased to 23 per 1,000. For 335 children who were admitted into hospital with pneumonia and who at the time considered to severely malnourished, the case fatality rate was 77 per 1,000, it means 12 times higher than those with normal nutritional status (8).

2.5.3 Breast-feeding

Proper breast-feeding reduces the risk of ARI morbidity and mortality. Nafstad et al (9) found that during the first year of life, the risk of lower respiratory tract infections was increased when the duration of breast-feeding was less than six months.

2.5.4 Immunization

Some study had indicated that a complete immunization play a protective role in pneumonia. It was illustrated by study of Sri-a-run, found that incomplete immunization in children aged under five years increased the risk of pneumonia (10).

2.5.5 Smoking

Several studies have been reported that children whose parents smoke have more respiratory infection, more respiratory symptoms, and an increased frequency of hospitalization for bronchitis and pneumonia than children whose parents do not smoke (11).

2.5.6 Socio-demographic factor

Socio-demographic factors are the important condition which related to the children's death of pneumonia, such as large family size, short birth interval, low income, low level of parental education, poor housing and inappropriate child care practice (12).

2.5.7 Gender

There is a slight difference between girls and boys in the incidence and severity of ARI affecting the lower respiratory tract: it is more common, and the symptoms are more severe in boys (13).

2.5.8 Age

Pneumonia incidence is greatest among infants below 1 years of age, and decreases steadily with age during childhood. The fatality rate due to pneumonia is higher in infants, the younger the child the higher fatality rate (13).

2.5.9 Crowding

From a previous study (14), crowding appeared to increase the risk of childhood pneumonia in the study population. The risk increased with the total household size and the number of children at home.

2.6 WHO guideline for prevention and control of ARI

In order to reduce morbidity and mortality rate caused by ARI among children under 5 years of age, in 1982 the WHO established a global program for prevention and control of ARI by emphasizing on three main strategies: improving childhood immunization, standard case management and health education.

Although this program have been performed in many countries, the outcome of the program is still limited. In Cambodia, according to the National Health Statistic Report from the Ministry of Health in 1999, revealed that ARI still was a serious problem in the country. More than 25% of out-patient and 40% of in patient are children under 4 years old.

2.6.1 Immunization

Expanded program on immunization (EPI) against diphtheria, pertussis, measles and tetanus is a very important role in the strategy for prevention and control of ARI. The close relationship between EPI and ARI program can reduce morbidity and mortality rate in children under 5 years of age.

2.6.2 Standard case management

Case management is the promotion of a standard approach to the detection and treatment of pneumonia, which is simple enough to be taught to peripheral health workers, yet sufficiently technically accurate to be effective. Standard case management consist of distinguishing case of pneumonia from others cases of ARI, and providing appropriate treatment and home care advice. The most important objective of standard case management is to recognize and treat pneumonia. The WHO protocol comprises three essential steps as following:

- Identify the children who should be examined for possible pneumonia (case-finding on the basis of entry criteria).

- Identify the case of pneumonia (case assessment and classification).

- Institute the appropriate treatment (home treatment or referral).

The main objective of the assessment is to identify children who have pneumonia and to classify the severity of the disease. This classification then determines what treatment is given. The strategy's success depends on case management services reaching as many children as possible. This mean that health workers at the periphery, as well as in hospitals, need to be able to diagnosis pneumonia, distinguish severe from less severe disease, and make a decision about treatment and/or referral.
However, if the health workers at the first level are to do this, diagnosis and treatment procedures must be simple enough for them to put into practice. Complicated diagnosis techniques used in hospital, and requiring expensive equipment, are not appropriate for health workers who have only basic medical skill and simple assessment aids.

2.6.3 Health education

Health education increases the capabilities of families to recognize a child with pneumonia and decide when to seek health. Almost the death cases due to pneumonia because the sick child are brought to seek treatment or health too late. Therefore, education about the key symptoms is very necessary, this includes rapid breathing, chest indrawing and cyanosis. Apart from this caretakers should also be given about knowledge in term of how to take care at home and when the sick child is referred to hospital.

Health education should be given to general people in the community and encourage them in these following aspects:

2.6.3.1 The personal health and hygiene should be promoted by:

- Avoid crowded areas
- Take good quality and balance diet
- Breast-feed children and keep them in good nutrition
- Improve housing condition by avoiding gas or charcoal smoke exposure in the house
- Keep body warm by wearing suitable cloths, especially during cold season
- Complete immunization in children

All of these points are theoretically very good, but in reality, especially for the developing countries, some points of this aspects are very difficult to practice in their everyday lifestyle due to many reasons. In Cambodia 90% of the people are farmers with low standard of living and many members in the family, so the question is how can they afford, such as, avoid crowded area, take good quality and balance diet, improve housing condition by avoiding charcoal or firewood smoke exposure in their house and how can they find suitable cloths for the children during the cold season.

2.6.3.2 The route of transmission:

Knowledge of the transmission of acute respiratory infection should be provided. For example, ARI can be transmitted by droplet infection such as: nasal discharge and saliva. Thus people should avoid contamination from coughing,

sneezing and also avoid sharing the same spoons or same glasses with the acute respiratory infection patients.

This is the main needed idea that many developing countries should focus on, because of poverty lead them to inadequate knowledge or inappropriate practice influence on health problem.

2.6.3.3 Public information:

An update on the situation and knowledge of acute respiratory infection prevention should be passed through mass media, and public communication, especially at the time of epidemic.

2.7 Conclusion

Acute respiratory infection constitute a global public health problem especially in the developing countries. The magnitude of the problem is also well represented by health service statistics and morbidity and mortality rates.

The basic understanding in terms of etiological agents and risk factors associated with ARI is very important in identifying solutions for the complex problem of ARI in children under five years of age.

Effective prevention and control programs ARI, addressing should consist of three main strategies: (1) improving childhood immunization, (2) standard case management (early detection and appropriate treatment) and (3) health education. These are the key to success of the program. However, to overcome difficulties in practice, due to the real situations in each country, strategies need to be modified to suit local situations.

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