CHAPTER 2

LITERATURE REVIEW

This chapter presents a review of the selected literature that is relevant to the study and the conceptual framework used in the study. The review is divided into 4 sections as follows:

1. The HIV/AIDS epidemic
   - 1.1 Global overview
   - 1.2 HIV/AIDS in Asia
   - 1.3 HIV/AIDS in Thailand
2. HIV/AIDS in children
3. Treatment and care of HIV/AIDS
   - 3.1 HAART
   - 3.2 HAART in children
4. Adherence
   - 4.1 Measuring adherence
   - 4.2 Adherence in children
   - 4.3 Factors of adherence
   - 4.4 Study framework

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

The HIV/AIDS epidemic

Global overview

HIV/AIDS is one of the world's greatest human health crises and in the last few years, the number of people living with HIV increased in every region in the world (WHO SEARO, 2007). Since the first reports of AIDS in the US in 1981, HIV infection has reached pandemic proportions (WHO SEARO, 2007). Over the past 20 years, more than 65 million people have become infected with HIV/AIDS and more than 25 million have died (UNAIDS, 2007). Every day, over 6,800 people become infected with HIV and over 5,700 die from AIDS, mostly because of inadequate access to HIV prevention and treatment services (UNAIDS, 2007). The global HIV epidemic has emerged as a daunting challenge to public health, development and human rights, moreover in countries most severely affected, it has eroded improvements in life expectancy (WHO SEARO, 2007). By 2010 it is estimated that approximately 100 million people will have been infected and that there will be 25 million AIDS orphans worldwide. Even though there have been huge investments in research, currently there is still no vaccine for HIV (Medical Research Council [MRC], 2002). HIV/AIDS still pose grave problems in most countries even though the estimated number of people living with HIV/AIDS has decreased from 39.5 million [34.1-47.1 million] in 2006 to 33.2 million [30.6-36.1 million], in 2007 (UNAIDS, 2007).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

The 2007 UNAIDS report reveals substantial changes in the global estimate of people living with HIV with a decrease in global HIV estimates, however the reduction itself is not actually due to a decrease in the number of people living with HIV but partly because of refinements in the way in which UNAIDS collects and

reports its data. Notably, 70% of the reduction in the global estimate can be attributed to revised estimates for six countries: India, Angola, Kenya, Mozambique, Nigeria, and Zimbabwe. The single greatest change in HIV estimates is in India where the 2006 estimate of 5.7 million people living with HIV has been amended to approximately 2.5 million. However the report still highlights the fact that HIV continues to be a problem of epic proportion with 2.5 million new HIV infections and 2.1 million AIDS-related deaths in 2007; in 2007 over 6,800 people were infected with HIV everyday and 5,700 die from AIDS, mainly due to insufficient access and availability of treatment and prevention services (UNAIDS, 2007). Sub-Saharan Africa is the region with the most affected; home to 22.5 million adults and children infected with HIV, 68% of adults and 90% of children living with HIV in the world live in sub-Saharan Africa. The epicentre of the HIV epidemic is southern Africa accounting for one-third of people living with HIV globally (WHO SEARO, 2007).

HIV/AIDS in Asia

Asia is faced with a multifaceted HIV/AIDS epidemic. Although HIV did not hit Asian countries until the late 1980s, by the late 1990s the epidemic was well established across the region (Brown, 2002). Since HIV first appeared over 20 years ago, approximately 9 million Asians have been infected with HIV; 2.6 million men, more than 950,000 women, and almost 330,000 children have died of AIDS-related diseases (Report of the Commission on AIDS in Asia, 2008). UNAIDS reports that in 2007, approximately 446,000 Asians/Pacific Islanders were newly infected with HIV, bringing the total number living with HIV/AIDS in Asia and the Pacific to 4.9 million,

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

moreover more than 300,000 people died from AIDS-related illnesses in this region in the same year.

Despite the progress made in many of the countries in Asia and the declining trend of new HIV infections in a few of them, AIDS currently accounts for more deaths annually among 15–44 year-old adults than do tuberculosis and other diseases (Report of the Commission on AIDS in Asia, 2008). The prevalence of HIV in some South-East Asian countries remains relatively low, however with a population that is approximately 60% of the world's total, even low prevalence can mean a large proportion who are infected (WHO SEARO, 2007). The World Health Organization, South-East Asia office (2007) reports that the prevalence of HIV varies widely between and within Asian countries, India with the highest number of HIV infections (5.2 million) to the Maldives with less than 100. Furthermore, they highlighted the point that vulnerable segments of the population have disproportionately high HIV infection rates. Male and female sex workers and injection drug users were the first groups to be seriously affected by HIV/AIDS in most of Asia and the Pacific and remain critical engines of the epidemic (WHO SEARO, 2007).

South-East Asia, with an estimated 7.2 million people living with HIV has the second highest burden of HIV in the world, following sub-Sahara Africa (WHO SEARO, 2007). According to the WHO South-East Asia Region report, 2007 the majority of the HIV burden in the region is in India, Indonesia, Myanmar, Nepal and Thailand (adult prevalence; 0.9%, 0.2%, 1.3%, 0.5%, 1.4% respectively). The source of South-East Asia's HIV/AIDS epidemic is found in the social problems faced by the people. There has been an increase in population mobility and environmental

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

deprivation because of the economic turmoil the region has faced over the past two decades (WHO SEARO, 2007). Sexual transmission of HIV is exacerbated by this mobility, with migrant workers spending long periods of time away from home and frequently visiting sex workers, then returning home to infect their spouses, who in turn pass the virus to their newborns (UNFPA, 2002). Although the epidemics vary considerably from country to country, they share important characteristics, namely that they are centred mainly around: unprotected paid sex, the sharing of contaminated needles and syringes by injecting drug users, and unprotected sex between men (Report of the Commission on AIDS in Asia, 2008).

HIV/AIDS in Thailand

Thailand identified its first case of HIV in 1984, HIV then began to spread among intravenous-drug users (IDU's), from there to commercial sex workers (CSW's) and their clients, and then from the male clients to their wives and girlfriends (Brown & Sittitri, 1995). Thailand is among the few countries in the world to have turned around a rapidly escalating generalized HIV epidemic; the number of estimated new infections decreased from 140,000 (per year) in 1991 to 17,000 in 2005 (WHO SEARO, 2007). The overall HIV/AIDS epidemic in Thailand can be divided into five major epidemic waves, among homosexual males (1984-5), among intravenous drug users (1988), among female commercial sex workers (1989), among male clients of commercial sex workers (1990), and among family housewives and newborns (1991) (Berkely, 1993).

The ensuing response from all sections of the government and society helped to slow transmission, Thailand's comprehensive prevention programs,

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

including the female sex workers targeted “100% Condom Programme” implemented in 1991, have substantially reduced the levels of sexual risk behaviour in Thailand and cut the annual new HIV infections to about 30,000, from a high of 140,000 a decade ago (MOPH/WHO SEARO, 2005). Thailand is one of the few countries to have achieved its Millennium Development Goal of reversing the spread of HIV by 2015 (UNDP, 2007). However by the end of 2007 an estimated half a million Thais were living with HIV/AIDS, with four in ten new infections occurring among women, many infected by their husbands and prevalence among injection drug users remains high, ranging between 30% and 50% (World Health Organization, 2007).

The situation of HIV is particularly serious in Northern Thailand; six provinces in Thailand’s Upper North region suffer the largest burden of the HIV epidemic accounting for around 40% of the country’s AIDS cases, they include; Chiang Mai, Lamphun, Lampang, Mae Hong Song, Chiang Rai and Phayao (UNDP, 2007). One of the crucial factors in dispersal of the infection was the active and multifaceted population movement (Herdt, 1997). Herdt identified another key factor in the spread of the HIV epidemic, the internal and international migration of sex workers (Herdt, 1997). Since prostitution was an acceptable career in the north, these women represented the largest category of female commercial sex workers in Thailand (Bond, Celentano, Phonsophakul, & Vaddhanaphuti, 1997). Wongkhomthong and colleagues (1995) highlighted that the cycle and spread of HIV began when these commercial sex workers migrated from their home in the north, they continued to work until some contracted HIV when they returned home. New workers from the same area were recruited and the cycle began again, as a result HIV prevalence continues to remain in the north (Wongkhomthong, Kaime-Atterhog, &

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

Ono, 1995). By 1989, HIV prevalence as high as 43% had been found in one survey of brothel-based sex workers in Chiang Mai (UNDP, 2004).

According to the UNAIDS/WHO Epidemiological Fact Sheet-2004 Update, as of January 2004, 231,712 AIDS cases were reported, of whom nearly 80% were in the 20-39 year age group (reproductive years), moreover the report predicts that there will be 50,000 new AIDS cases in Thailand every year.

Even though Thailand can boast relative success in reducing new HIV infection, the number of children with at least one parent who lives with HIV has gradually increased (UNDP, 2007). Studies suggest that approximately 3,000 Thai children contract HIV each year. One-seventh of new infections occur in children. The Ministry of Public Health and UNAIDS (2005) released figures that showed the number of children in Thailand living with HIV to be estimated at 23,000. In Chiang Mai city, there are approximately 1,122 children under 14 infected with HIV (Chiang Mai Provincial Public Health Office, 2007).

HIV/AIDS in children

All people infected with HIV experience, to a greater or lesser degree, physical, psychological, and socioeconomic suffering as a result of the disease. For children this can seem magnified (UNICEF, 2005). Each day, some 1,500-2,000 children under 15 years become infected with HIV (WHO, 2006). In 2007, around half a million children under 15 were infected with HIV/AIDS and 400,000 died (UNAIDS, 2007). Moreover, roughly 14 million children have lost one or both parents due to AIDS (UNAIDS/UNICEF, 2005).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

According to the WHO factsheets on HIV/AIDS for nurses and midwives (WHO SEARO, 2002), almost all HIV-infected children acquire the virus from their mothers before or during birth or through breastfeeding, however some children as well as adults have been infected through transfusions with blood or blood products contaminated with HIV. A small number of children also have been infected through sexual or physical abuse by HIV-infected adults (UNAIDS, 2002). Most mother to child transmissions (MTCT), estimated to cause more than 90% of infections worldwide in infants and children, probably occur late in pregnancy or during birth. The risk of MTCT is significantly increased if the mother has advanced HIV disease, increased levels of HIV in her bloodstream, or fewer numbers of CD4+ T cells (WHO SEARO, 2002). One in six people dying of HIV-related illness worldwide is a child under 15 years and this is due largely to the failure to introduce programmes for preventing MTCT of HIV on the scale needed (WHO, 2006).

Without appropriate HIV care, including ART, the progression of HIV infection in children is particularly aggressive (WHO, 2006). Children infected with HIV have increased frequency of common childhood illnesses and they tend to be more persistent and severe, without correct treatment, care and support, HIV multiplies and destroys the defences leaving the child less able to resist pneumonia and other opportunistic infections (UNICEF, 2005). In addition, infected infants often do not respond well to treatment and they commonly suffer fatal complications (The National Institute of Allergy and Infectious Diseases [NIAID], factsheet, June 2004). Children living with HIV have higher nutritional requirements and malnutrition can weaken the immune system and allow HIV infection to progress more quickly (UNICEF, 2005).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

Furthermore, the mother and child with HIV usually are not the only family members with the disease. More often than not, the mother's sexual partner is infected, and other children in the family may be infected as well. Frequently, a parent with AIDS does not survive to care for his or her HIV-infected child (The National Institute of Allergy and Infectious Diseases [NIAID], factsheet, June 2004). Levine, Foster, & Williamson in an excerpt their book 'A Generation at Risk: The Global Impact of HIV/AIDS on Orphans and Vulnerable Children' point out that HIV/AIDS impacts children, families, and households in numerous ways. The impact usually starts with an HIV infected parent, the child's life is then limited due to the deterioration in the parent's health which then ultimately leads to death. The child's life is severely limited by financial burdens; they often have to take over as the breadwinner, caregiver of additional parent, they lose or have limited educational opportunities, and suffer psychosocial distress and many more difficulties that can ultimately lead worsening outcomes.

According to UNAIDS, the most effective way to reduce the number of children who become infected with HIV is to prevent HIV infection in parents-to-be and to prevent unplanned pregnancies in HIV infected women (UNAIDS, 2002).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

Treatment and care of HIV/AIDS

Every day, over 6,800 people become infected with HIV and over 5,700 die from AIDS, mostly because of inadequate access to HIV prevention and treatment services (UNAIDS, 2007). The only way HIV infection can be managed is through a combination of antiretroviral drugs and these have proven to be efficient in restoring strength to inflicted persons, even those who were close to death (Kelly, 2006). Once

started, antiretroviral treatment must continue for the rest of an individual's life (WHO SEARO, 2004). In addition, the virus can develop resistance to the drugs therefore observation of the individual must be conducted on a regular basis to guarantee that resistance has not developed or, if it has, to change or adapt medications (Kelly, 2006).

HAART (Highly Active Antiretroviral Therapy)

Over the last five or so years there have been dramatic changes in treatment approaches, treatment has moved from mono-therapy and by-therapy to triple drug therapy (Horizons Population Council, 2004). Highly Active Antiretroviral Therapy (HAART) is the treatment regimens recommended by HIV experts to aggressively decrease viral duplication and progress of HIV disease (WHO, 2006). The usual HAART treatment combines three or more different drugs and these treatment regimens have been shown to reduce the amount of virus so that it becomes undetectable in a patient's blood. There is no doubt that HAART is one of the most celebrated treatment advances in recent medical history (WHO, 2003). It has led to significant reductions in morbidity and mortality as well as enhancing disease-related quality of life for many infected persons (Bartlett, Demasi, Quinn, Moxham, & Rousseau, 2001).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

The goal of HAART is to attain maximum and enduring suppression of virus replication, which in turn reduces the destruction of CD4 cells and consequently slows disease progression (Horizons Population Council, 2004). Because of HAART, many people with HIV/AIDS are living longer, more constructive and normal lives. Successful HAART can change HIV disease from an illness that was almost always a

death sentence into a chronic (long-term), but usually manageable condition. However, although access to antiretroviral (ARV) treatment has increased fivefold in 2006, almost 700,000 people received treatment for the first time, by December 2006 it was estimated that 2,015000 (1.8−2.2 million) people living with HIV/AIDS were receiving treatment in low- and middle-income countries, representing 28% (24%−34%) of the estimated 7.1 million (6.0−8.4 million) people in need (WHO SEARO & UNAIDS, 2002). In East, South and South-East Asia, 280,000 (225,000−335,000) people are now on treatment and coverage is estimated at 19% (13%−28%); although Asia represents 21% (17%−25%) of global treatment need, only 14% (13%−15%) of people on treatment in low- and middle-income countries live in this region (WHO SEARO, 2007).

In Thailand, the Ministry of Public Health (MOPH) launched an ART program in 2001 through government hospitals. Initially, branded drugs were used, but an increase in the production of cheap generic drugs within Thailand has allowed the government to obtain the medicines at a much lower price (www.avert.org). The government was determined to provide an insurance scheme for people living with HIV/AIDS (PLHA) to get access to antiretroviral treatment as well as put ART into the universal coverage of health insurance in 2005, this resulted in many more Thai PLHAs having the opportunity to access ARV (UNGASS Country Progress Report, 2008). According to the UNGASS report as of September 30th, 2006 and 2007, the numbers of PLHA under the antiretroviral treatment reached 95,620 and 133,539 persons respectively. In parallel with these efforts, patient groups and nongovernmental organizations (NGOs) have been working to provide PLHA with enough knowledge to make informed decisions on treatment (WHO, 2004).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

However, in people with HIV/AIDS, these multidrug regimens result in HIV treatment having the most complicated regimens that have ever been prescribed for conditions requiring continuous open-ended treatment (Chesney, Morin, & Sherr, 2000). It is important that once antiretroviral therapy has been initiated, adherence is such that adequate serum drug levels are maintained to reduce viral replication, decreasing the chances of mutations, and reducing the likelihood that a drug resistant strain of HIV will develop (Ickovics & Meisler, 1997). Maintaining adequate serum drug levels requires that antiretroviral drugs be taken exactly as prescribed, there is minimal space for error in adherence to the therapy as it requires nearly perfect adherence for success (Ickovics & Meade, 2002).

The treatment of HIV infected persons with HAART is often challenging due to the presence of factors that can affect adherence, including economic instability, inadequate social support, high pill burden, complex regimen schedules, dietary instructions, adverse side effect and limited access to care (Ammassari et al., 2002).

HAART in children

The care of children with HIV infection is complex (Sharland, Blanche, Castelli, Ramos, & Gibb, 2004). HIV/AIDS is particularly aggressive in children, without proper treatment, care and support, HIV multiplies and destroys the defences to infection, leaving the child less able to resist pneumonia and other opportunistic infections (UNICEF, 2005). Nevertheless, less than 5% of young HIV positive children in need of pediatric AIDS treatment are receiving it (UNICEF, 2005), out of the estimated 23,000 children living with HIV in Thailand, only 6,687 were receiving

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

HAART in 2007 (UNGASS Country Progress Report, 2008), therefore children are missing out on measures to keep them healthy. In countries where ART has been successfully introduced, it has changed the face of HIV infection (WHO 2006).

The HIV disease develops differently in children than in adults, a child's growing immune system is not as strong as an adult's. Firstly, the disease progresses much more rapidly in children, secondly, children have higher viral loads than those usually seen in adults. Thirdly, children have recurrent invasive bacterial infections more often and lastly, opportunistic infections are often present as primary diseases with a more aggressive course because of the lack of prior immunity (WHO SEARO, 2002). Despite these differences, children's cellular responses to HIV are similar to those of adults, and they respond almost as well to aggressive, multi-drug antiretroviral regimens, however ≥ 95% adherence to these drugs is vital and children must depend upon caregivers to correctly administer the medicines (Nicholson, Mellins, Dolezal, Brackis-Cott, & Abrams, 2006).

A wide range of professional expertise is needed in the treatment of HIV as it is a complex task. Control of HIV replication is the goal of treatment in both children and adults (Working Group on Antiretroviral Therapy and Medical Management of Infants, Children and Adolescents with HIV Infection, 2001). Studies of the pharmacokinetics of most antiretroviral drugs indicate that young children require substantially more medication per body unit of weight than does the typical adult (UNAIDS, 2002). Adherence to treatment regimens is particularly difficult in young children because many antiretroviral liquid preparations are unpalatable (Farley, Hines, Musk, Ferrus, & Tepper, 2003), lack of pediatric formulations, high pill burden, frequent dosing requirements, dietary restrictions and side effects (WHO,

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

2006). Moreover the successful treatment of a child requires the commitment and involvement of a responsible caregiver (WHO, 2006).

Adherence

Since the introduction of HAART there has been a dramatic reduction in HIV-associated morbidity and mortality, however extremely high levels of adherence to such therapies are required to ensure optimal treatment benefit (Paterson, Swindells & Mohr, 2000). Adherence to medication is the extent to which a patient follows medical instructions (Shah, 2007). According to WHO in the manual on 'Adherence to Long-Term Therapies: Evidence for Action' (WHO, 2003), most research of adherence is focused on adherence to medication, however it suggests that adherence also encompasses numerous health related behaviours that extend beyond just taking prescribed pharmaceuticals. DiMatteo and colleagues stated that the terms adherence and non-adherence are meant to be nonjudgmental, statements of fact rather than expressions of blame towards the patient or provider (DiMatteo, Giordani, Lepper, & Croghan, 2002). Moreover DiMatteo and colleagues highlighted that non-adherence to medication is very common and that typical adherence rates for medications prescribed over long periods of time are around 50-75% (DiMatteo, Giordani, Lepper, & Croghan, 2002). Although effective adherence levels for HAART have not been defined in concrete, levels of adherence below 95% have been associated with poor virological and immunological response (Paterson, Swindells & Mohr, 2000), other data suggest that levels of 100% achieve even greater benefit than adherence below 100% (Mannheimer, Friedland, Matts, 2002). Sherr called adherence the 'Achilles heel' of ART as the consequences of low adherence are serious for the individual, for

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

public health and for the optimal use of limited health care resources (Sherr, 2000). Lower levels of adherence in an individual are associated with the development of viral resistance, treatment failure, and an increased risk of disease progression (Paterson, Swindells & Mohr, 2000; Ickovics & Meade, 2002). From a public health and health economics perspective, low adherence can result in increased use of second-line and salvage regimens which are generally more expensive, moreover low adherence can increase the risk of opportunistic infections which are costly (Poppa et al., 2003).

Ickovics and Meade (2002) contend that adherence is critical to obtain the full benefits of HAART, including maximal and durable suppression of viral replication, reduced destruction of CD4 cells, prevention of viral resistance, promotion of immune reconstitution and slowed progression to AIDS. Both the difficulty and importance of adherence to HIV medication are well documented and research has shown that nonadherence to prescribed regimens is common whether the patient population is adult or pediatric (DiMatteo, Giordani, Lepper, & Croghan, 2002).

Measuring adherence

Adherence to treatment is critical for medication to be successful however measuring adherence is problematic as there is no single method to assess adherence accurately (Horizons and Population Council, 2004). There is no 'gold standard' for measuring adherence behaviour, however accurate assessment of adherence behaviour is necessary for effective and efficient treatment planning, and for ensuring that changes in health outcomes can be attributed to the recommended regimen (WHO,

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

2003). According to Poppa and colleagues (Poppa et al., 2004) adherence to HAART can be measured using a range of methods however a lack of a standard approach to measuring adherence and the lack of an agreement of what constitutes a clinically effective level of adherence are important challenges for the field.

Of those suffering from HIV, approximately one-third take their medication as prescribed (WHO, 2002). However according to Bangsberg et al., (2000), despite the relationship between adherence and positive health outcomes, reports indicate that among adults, adherence to antiretroviral therapy is variable, ranging from 28 to 90%, depending on the method of assessment as well as the specific regime. Even when patients fully understand the consequences of non adherence to medications, adherence rates are suboptimal (WHO, 2002). The understanding of factors associated with high adherence and low adherence are less clear, and the literature concerning interventions is remarkably scarce (Poppa et al., 2004). Wrubel and colleagues state that distinctions between adherence and nonadherence are hard to predict, therefore devising effective and appropriate means of identifying and predicting who will be likely to adhere poorly has become a challenge for health care professionals (Wrubel, Moskowitz, Richards, Prakke, Acree, & Folkman, 2005). A large proportion of the literature on adherence to HIV therapies reflects this (Poppa et al., 2004).

According to Watson & Farely, (1999) previous studies have mostly focused on single methods of measuring adherence, which can show varying levels of adherence depending what method is used. The principal techniques used are patient self-report, pill counts, electronic pill-container caps such as the Medication Event Monitoring System (MEMScaps), biological assays, or occasionally, the judgement of

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

professionals (aidsmap.com). According to some researchers MEMS appear to be the most sensitive method for detecting non-adherence (Golin et al., 2002: Paterson et al., 2002: Paterson et al., 2000).

By analysing studies measuring adherence, Gill and colleagues found large discrepancies between the different methods used on the same groups (Gill et al., 2005). With this information they constructed a relative hierarchy of adherence measurement methods, with physician assessment and self-report being the least accurate, pill counts intermediate, and electronic drug monitoring the most accurate surrogate adherence marker (Gill et al., 2005). An example of this is the progressive study of 140 individuals in a public hospital HIV clinic in the US who were followed for a year after initiation of ART. The investigators assessed adherence using three methods: computer chip embedded in a specially designed pill-bottle cap (MEMS caps), pill count, and self-report. The researchers calculated a composite adherence rate including all three measures and the mean adherence rate was 71%: only 6% of the patients took ≥95% of their medications (Golin, et al., 2002).

Research has shown judgement and opinions of doctors to be an unreliable way to measure adherence (Paterson 2000; Liu 2001). For example, a study conducted by Miller (2002) found that clinicians over-estimated adherence by 9% and correctly detected poor adherence in only 24-66% of cases, depending on the definition of non-adherence used. Non adherence can take many different forms and it is not difficult for health professionals to miss adherence problems because patient or caregiver self reports of adherence tend to be exaggerated (Gao et al., 2000), perhaps due to a recall bias and a desire to please the provider and avoid criticism. Paterson, Potoski, & Capitano also identified that physicians and other health care

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

providers routinely make predictions of adherence and that they are poor estimators (Paterson, Potoski, & Capitano, 2002). In a study in the US comparing physician prediction with adherence measured by electronic monitoring, 51% of patients in whom physicians predicted <80% actually had >80% adherence, however only 21% had >95% (Paterson et al., 2000). In a similar study, Bangsberg and colleagues found that the sensitivity and specificity of provider estimates of nonadherence (defined as <80% of pills taken by pill count) were just 40% and 85%, respectively (Bansberg et al., 2001).

According to Paterson, Potoski, & Capitano, reviews of pharmacy records can be a convenient measure of adherence assessment in situations which a patient has a single source of ARV medication (Paterson, Potoski, & Capitano, 2002). In the event that refills are not obtained in a timely fashion, it is assumed that the patient is not taking medication between refills or is missing doses in a way that allows the medication to last longer than it should (Turner, 2002). A number of studies in the treatment of HIV and other diseases have used pharmacy refill records to assess adherence and Paterson and colleagues highlight that this method can provide a less intrusive means of measuring adherence than most others (Paterson, Potoski, & Capitano, 2002).

Patient self report is a method used to gain assessment of ARV medication, the most common being face-to-face inquiry or patient-completed questionnaires (Paterson, Potoski, & Capitano, 2002). The most commonly used method for measuring self-reported adherence was developed by a multidisciplinary team at the Adult AIDS Clinical Trials Group and this tool has been validated repeatedly and has been modified in a number of ways to increase the sensitivity and accuracy (Chesney,

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

Ickovics, Chambers, Gifford, Neidig, Zwickl, et al., 2000). Self-report is widely used in adherence studies mostly because it a convenient method, however self-report measures tend to overestimate adherence (Frey & Naar-King, 2000). A study conducted by Naar-King and colleagues (2005) assessed the utility and validity of caregiver report of adherence, caregiver and child 24-hour recall, physician report and pill count, they hypothesized that parent and physician reports would be more feasible than pill counts or child report, and that higher adherence would be associated with viral load. The results showed that, as hypothesized, pill counts were difficult to accurately obtain unless a guarantee can be made that all medicines were turned in prior to the study. Furthermore, child reports were not feasible for children under 8 or children with learning difficulties, and children's 24-hour recall was not associated with outcome. Parents reported high rates of adherence and their reports were associated with lower concurrent viral loads (Naar-King, Frey, Harris, & Arfken, (2005). Other alternative means of assessing self reported adherence which may encourage more honest answers include computer assisted self interviewing (Bangsberg, Bronstone, & Hofmann, 2002).

It has been recognised that individual adherence behaviour can vary during a given period and usually deteriorates over time; a single adherence assessment provides only a glimpse of adherence behaviour (Paterson, Potoski, & Capitano, 2002). Reviewed studies have suggested that regimen knowledge assessment, pharmacy refill history and pill count may be the best methods available for adherence assessment within the clinical setting (Marhefka et al., 2004).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

HAART adherence in children

Measuring adherence to treatment of pediatric HIV is a major challenge for researchers (Naar-King, Frey, Harris, & Arfken, 2005). Steele and Grauer noted that adherence in children with HIV is complicated by the fact that adherence involves and interaction between parent and child as children with HIV infection rarely take care of themselves (Steele & Grauer, 2003). However, adherence is particularly critical with HAART in the treatment of pediatric HIV infection (Simoni, Montgomery, Martin, New, Demas, & Rana, 2007). In contrast to the literature on adherence to ARV drugs among adults, relatively few estimates of adherence to ART among children have been published (Steele & Grauer, 2003). Byrne, Honig, Jurgrau, Heffernan and Donahue (2002) note that this lack of investigation into the predictors and correlates of adherence limits interventions to improve children's adherence to ART. Furthermore, unlike most children with serious or chronic illnesses, the majority of children with HIV also have a parent with HIV (UNAIDS, 2002) a fact that may have significant implications for the child and potentially his or her health care. The data on HAART for pediatric HIV infection, suggest that medication adherence is a strong predictor of therapeutic impact (Feingold, Rutstein, Meislich, Brown, & Rudy, 2000). For example, Wiener, Riekert, Ryder, & Wood (2004) observed that among children with an HIV-1 RNA viral load <10,000, 75% had taken 100% of their medication doses in the previous week, whereas among those with a viral load of ≥10,000, only 36% reported taking all of their medication. Evidence of drug resistance, increasing viral load and decreasing CD4 count are commonly considered signs of nonadherence, but they are not well represented as assessment strategies in research studies of pediatric HAART adherence (Simoni, Montgomery, Martin, New, Demas, & Rana,

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

2007). Consistent with the adult literature, adherence estimates among children are variable, but indicate generally suboptimal adherence. Based on care-giver or self-report between 26% and 59% of participants indicated missing doses over the past week (Feingold et al., 2000; Reddington et al., 2000; Murphy et al., 2001) although the actual number of doses missed per week is not discernable from these investigations.

Using five separate methods, Medication Events Monitoring System (MEMS), pharmacy refill, provider assessment, care-giver self-report, and appointment keeping), Farley and colleagues (2003) assessed adherence among 26 children aged 21 months to 12.5 years. Median adherence was found to be higher according to caregiver report (100%) and clinical attendance (100%) than pharmacy refill (92%) and MEMS (81.4%). In a similar study among 42 patients aged 4 months to 18 years, Byrne et al., (2002) used 4 methods of assessing adherence. They noted full adherence in the 7 days before assessment for 97% of the sample according to caregiver report, over 90 days, they noted full adherence for 88% according to clinical attendance and 100% according to pharmacy refill. Two other studies also concluded that caregivers generally overestimated adherence compared with other methods (Naar-King et al., 2005: Steele et al., 2001).

In a paper reviewing the pediatric HIV literature on adherence, Steele and Grauer (2002) describe 13 studies addressing the rates and predictors of adherence. Mean adherence rates described in these studies identified by Steele and Grauer are suboptimal, typically ranging from <50% to >95%, depending on the method of assessment. When objective measures of adherence such as MEMS caps or pharmacy refill data were included, mean adherence ranged from <50% to 75%. For example,

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

one study used pharmacy data and laboratory markers to assess adherence over the first 180 days of treatment and found that only 58% of participants achieved an adherence rate of >75% (Watson, & Farley, 1999).

In an additional review of 13 studies of pediatric adherence, Simoni, Montgomery, Martin, New, Demas, & Rana (2007) highlighted the results of these studies where caregiver and patient reports were the sole source of adherence data; adherence estimates varied greatly. In the 13 studies 34% to 100% of caregivers reported 100% adherence, and 84% to 89% reported 95% adherence. Moreover reports of mean adherence according to caregivers ranged from 88.4% to 96%.

Davies and colleagues in their study of adherence to ARV in young children in South Africa pointed out that research from affluent countries suggests that adherence may be more complex in children compared with adults due to many factors including reliance on caregivers who may themselves be ill or may not be the child's parent, complex dosing regimens, lack of availability of pediatric fixed dose combinations, poor drug palatability, difficulty of taking medication (tablets/capsules), and interference from daily routines (Davies, Boulle, Fakir, Nuttall, & Eley, 2008). Reddington et al., also stated that for HIV positive children, sustaining adherence is even more challenging. They identified that medication related factors such as volume, taste, diet requirements, intake of pills, timing and side effects are difficult to overcome for children (Reddington et al., 2000), in addition, Chesney (2000) points out that young children depend on caregivers to adhere to medication regimens.

Watson and Farley (1999) conducted a study to investigate adherence to therapy among 72 HIV infected children with the age ranging from 3 months to 12 years. They reported that just over half (52%) of the children maintained adherence

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

greater than 75%, these results were based on pharmacy records. In addition, the authors mentioned that adherence was at least 75% for almost all children who achieved and maintained a viral load of <400 copies/ml. Similarly, Feingold, Rutstein, Meislich, Brown and Rudy (2000) in their study among 70 children receiving ART, reported that 54% of the participants reported "good" adherence (missed less than 2 doses per week). Boni, Pontali, De Gol, Pedemonte, and Bassetti (2000) also examined caregiver-reported adherence among a small sample (n=25) of children with HIV. Similar to Feingold and colleagues (2000), Boni et al., asked respondents to indicate whether their child had missed doses in the last three days, and since the last visit. Twenty four percent reported missing at least one dose within the past 3 days, while almost half (44%) reported missing at least one dose since the last scheduled visit. Boni et al., did not evaluate the relationship between adherence and barriers to adherence, however they did report the percentages of caregivers supporting various reasons for non-adherence. These included difficulties with the medication itself (e.g., number of pills, difficulty swallowing medication, bad taste) as well as environmental problems (e.g., taking medication outside the home), and individual child behaviors (e.g., child refusal). However, Boni et al., and Feingold et al., reported only self-reports or caregiver reports to adherence therefore caution is needed when interpreting these studies with reference to "upper limit" estimations of adherence (Steele & Grauer, 2003).

In a study of the safety of protease inhibitors as antiviral medications among 21 children with AIDS or HIV infection, Temple, Koranyi, and Nahata (2001) examined adherence as indicated by pharmacy records and clinical pill counts. Even though the results suggested that some protease inhibitors possessed adequate

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

antiviral properties with relatively few side effects in children, adherence ranged from 19 to 95% with an average of 70%. The authors reported that patient-identified reasons for non-adherence included adverse drug events (e.g., adverse side effects), dosing characteristics (e.g., too many pills, too much time required), medication characteristics (e.g., pills too large, and "unwillingness to take or give a drug". The similarity of these barriers to those reported by Boni et al., (2000) is striking and suggests issues of significant clinical attention.

In addition, Reddington et al., (2000) examined adherence to ART among 90 children (median age = 7.9 years) with HIV/AIDS. Adherence was reported by parental/caregiver self report of the child's missed doses within the past 24 hours and within the previous week. The results indicated that 17% of the children missed a dose within the past 24 hours, while 43% missed at least one dose within the previous week. As expected, higher self-reported non-adherence was associated with higher viral load. Parents/caregivers of adherent children and non-adherent children differed significantly in their perceptions of their ability to administer the prescribed doses as well as in their perceptions regarding efficacy of the medication. The non-adherent group was significantly more likely to "strongly agree" with a statement regarding adherence inefficacy, whereas the non-adherence group was significantly more likely to agree with a statement regarding medication efficacy (e.g., 'I don't believe my child needs to take so many different medications').

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

Van Dyke et al. (2002) investigated adherence among a large sample (n=125) of children (mean age=6.3) who were being treated on the Pediatric AIDS Clinical Trial Group (PACTG) protocols. Adherence was assessed using the PACTG modules, which assess child or caregiver ability to name the prescribed doses of

antiretroviral medication, number of missed doses over the past three days, and barriers to full adherence. Van Dyke and colleagues dichotomized the outcome data to include children who were fully adherent (FA; no missed doses) and those not fully adherent (NFA; missed > 1dose over the past 3 days.) The results showed an over all FA rate of 70%.

Limited information is available on HIV infected children and non adherence ranges from 3% to 100% depending on the definition of adherence, the methods used to assess it and the study setting (Byrne, Hoing, Jurgrau, Heffernan, & Donahue, 2002: Albano, Spagnuolo, Berni Canani, & Guarino, 1999; Watson & Farley, 1999).

However, non-adherence in HIV infected children takes on particular weight because of the likelihood of the development of resistant viral strains when plasma concentrations of the antiretroviral agents are not sufficient to halt the replication of the virus. The development of resistant strains requires the use of more aggressive and often more difficult therapy, which has significant implications at individual, epidemiological and public health cost levels (Steele & Grauer, 2003).

Factors of adherence

Identification of adherence determinants is important for the development of effective interventions to improve adherence to HIV treatments (Ickovics & Meade, 2002). Wrubel and colleagues identified that in children with HIV, the research for factors affecting adherence is complicated by the lack of consistent methods of assessing adherence across studies (Wrubel, Moskowitz, Richards, Prakke, Acree, & Folkman, (2005). However, WHO has listed 4 types of factors that have generally

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

been found to predict problems with adherence to medication, namely; regimen characteristics, various patient and or caregiver factors, the relationship between the provider and the patient and the system of care. In addition, Chesney (2000) also categorized predictors of adherence into 4 domains, including; patient or individual factors, medication factors, the system of care, and the quality of the patient-caregiver relationship. Similarly, Ammassari and colleagues (2002) pointed out that medication adherence is a complex behaviour influenced by several determinants namely; the patient, the treatment, the disease state, the physician and patient-physician relationship, and the health care system. In a review investigating patient reported barriers to ART adherence, Mills et al., (2006) listed complicated regimens as a significant factor affecting adherence across both developed and developing nations. Similarly Ickovics and Meade (2002) created a 'Determinants of Adherence' model, which included patient variables, treatment regimen, disease characteristics, patient-provider relationship, and clinical setting.

Wang and Wu (2007) conducted a study in rural China to assess the levels of adherence to ART and determine the factors associated with suboptimal adherence. The instrument used was an interviewer administered questionnaire where the participants were asked to recall their medication taking in terms of prescribed doses in the previous three days before the interview, the researchers also studied six groups of factors that may have an impact on adherence: socio-demographics, clinical characteristics of ART, knowledge and perception of ART, behavioural characteristics, medication management skills, and health services-related characteristics and social support. Adherence was statistically associated with: correct knowledge of side effects, correct knowledge of non adherence leading to

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

treatment failure, perceived effectiveness of treatment, using reminder tools, perceived taking medication as no burden to their daily lives, doctor explaining regimen each time ART is dispensed, regular home visits by health care staff, and patients trust in their doctor. These results are similar to Remien and colleagues' study of 110 men and women with HIV as they found a gamut of factors affecting medication practices namely: medication beliefs, trust in care providers, side effects, toxicity, regimen difficulties, mood, substance abuse, and social support (Remien, Hirky, Johnson, Weinhardt, Whitter, & Le, 2003).

A number of potential predictors of adherence have been demonstrated in the empirical pediatric HIV literature (Steele & Grauer, 2003). Pontali (2005) grouped factors that were capable of influencing adherence in children into those related to the medication, health care system, and patient and family/caregiver. Pontali (2005) also cited such factors as the availability and cost of medication, accessibility of treatment, and health care providers' experience and relationship to the patient as health care system variables that are possibly associated with adherence. Boni, Pontali, De Gol, Pedemonte, and Bassetti (2000) reported the percentages of caregivers supporting various reasons for non-adherence. These included difficulties with the medication itself (e.g., number of pills, difficulty swallowing medication, bad taste) as well as environmental problems (e.g., taking medication outside the home), and individual child behaviors (e.g., child refusal). Giacomet and colleagues (2003) studies adherence determinants in Italian HIV infected children. They examined three determinants of adherence namely clinical, psychosocial and those related to individual drugs. They found that clinical features had little impact on adherence; no significant difference was found between adherent and non-adherent patients with

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

respect to gender, clinical class, severe or less than severe immune impairment and viral load.

Temple et al., (2001) and Belzer et al., (1999) identified medication and dosing characteristics as factors associated with non-adherence among children, in addition, Reddington et al., (2000) identified health beliefs and perceived social support as correlates of adherence among children. Whereas Chesney (2000) identified "individual characteristics" as the main domain of predictors of adherence, Martinez et al., (2000) reported environmental or systematic conditions (e.g., housing instability, living situations) as predictors of adherence. Hammami, Nostlinger, Hoeree, Lefevre, Jonckheer, & Kolsteren (2004) revealed that the ability to be adherent depended on 3 components: The necessary cognitive and technical skills to follow a medication scheme, caregiver's perceived self-efficacy, and problem solving capacity to overcome new challenges to adherence.

However, unlike their adult counterparts, children's adherence to antiretroviral medication necessarily involves the behaviors and/or perceptions of another agent, namely the parent or caregiver (Steele & Grauer, 2003). Although Steele et al., (2001) did not find a relationship between caregiver health beliefs and adherence, Reddington et al., (2000) identified caregiver perception of medication efficacy and dosing self-efficacy as significant predictors of child adherence. Beyond caregivers beliefs, Brouwer, Lok, Wolffers, and Seagalls (2000) concluded that parental psychological well-being "appears to be a prerequisite for compliance" with medical regimens.

Simoni and colleagues (2007) also highlighted that family/caregiver factors are crucial to pediatric adherence, because infants and younger children depend

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

almost entirely on a caregiver to administer medications; their adherence to treatment is largely determined by the resources and efficacy of their caregivers. The study by Van Dyke and colleagues also noted that children were more adherent if they received their medications from foster parents rather than biological parents or other relatives. Moreover in a study by Reddington et al., (2002) it was found that parents of adherent children reported higher perceptions of their ability to administer the prescribed doses and of the medication efficacy and less concern about others discovering their child's diagnosis.

Simoni and colleagues (2007) proposed that medication or treatment related factors that likely complicate pediatric adherence include the indefinite duration of treatment; multiple and precise dosing times; multiple medications; high pill burden; complex dietary considerations; storage requirements; low palatability; large pills, long and short-term side effects and long term toxicities. Similarly, Goode and colleagues (2003) informed that parents administering HAART clearly identify treatment factors such as the number and taste medications, frequency and ease of administration and the need to take medications outside the home as causing problems administering ART. The study by Byrne and colleagues (2002) also highlighted medication barriers to adherence. In their study, caregivers were asked to respond to specific questions to barriers and the study showed that taste (10%), volume (10%), child hiding medications (7.5%), forgetting, and frequent dosing (2.5%) were perceived barriers.

Some studies indicate that pediatric antiretroviral adherence was not related to gender, age, race, child's knowledge of HIV status, structural social support, satisfaction with social support or health status/virological or immunological factors

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

(Murphy, Wilson, Durako, Muenz, & Belzer, 2001: Van Dyke et al., 2002). However Polisset and colleagues (2008) in their study of the correlates of adherence to ART in HIV infected children in West Africa found that being female was a major factor of non-adherence.

Relatively few studies have covered the area of caregivers' knowledge in relation to HAART adherence, Weiss and colleagues (2003) studies HIV-related knowledge and adherence in adults and found that knowledge of HIV was associated with self-reported adherence. However Katko et al., (2001) study supports the use of knowledge assessment as an indicator of adherence. Katko et al., asked 35 caregivers to name or describe their children's ART medication and corresponding doses and dosing frequencies, only 54% of the caregivers were able to provide accurate medication information. Marhefka et al., (2004) conducted a multi-site study to find out caregivers' regimen knowledge, barriers to adherence and the relationship between adherence, regimen knowledge and barriers. They conducted the study using the Treatment Interview Protocol (TIP), which was developed by the researchers, and compared the TIP data with the information obtained from medical records and pharmacy refill histories. Only 49% of children were considered adherent, defined as $\geq$ 90% refill rate and this was significantly associated with virologic response. Interestingly, significant regimen knowledge deficits were observed among caregivers, and inaccurate identification of prescribed medications was significantly associated with adherence. In the study of Marhefka et al., (2004) caregivers reported 0.90 barriers to their children's adherence and these barriers were significantly and negatively correlated with pharmacy refill rates; caregivers who reported more barriers, tended to have children with lower pharmacy refill rates.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

Similarly, Nicholson, Mellins, Dolezal, Brackis-Cott & Abrams (2006) examined whether caregivers' treatment related knowledge and self-efficacy was associated with better clinical outcomes and ART adherence among HIV infected children. The results suggested that both knowledge and self-efficacy are important for empowering caregivers and both treatment-related knowledge and adherence self-efficacy were associated with better clinical outcomes, as measured by either CD4 count or viral load. However, in this study, neither were directly associated with caregiver reports of child's ART adherence.

Williams and colleagues (2006) note that adherence to medication in children with HIV infection is a complex process that is influenced by multiple factors, including demographic, health, medication characteristics, and psychological characteristics of the child and family. Wrubel et al., also noted that for pediatric adherence, viewing adherence from the perspective of the parent could illuminate the dynamic and interactive processes and their impact on adherence practices (Wrubel, Moskowitz, Richards, Prakke, Acree, & Folkman, 2005).

Study Framework

Ickovics and Meade's (2002) Determinants of Adherence to HAART Model was used as a framework to guide this study. The framework consists of five concepts related to medication adherence and these concepts are: patient characteristics, treatment characteristics, patient-provider relationships, clinical setting and disease characteristics. Ickovic and Meade's model (2002) suggest that these factors individually and collectively impact adherence (see Figure 1). For this

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

study, disease characteristics were omitted as the researcher is not a physician, moreover caregiver factors were used as the patient factors.

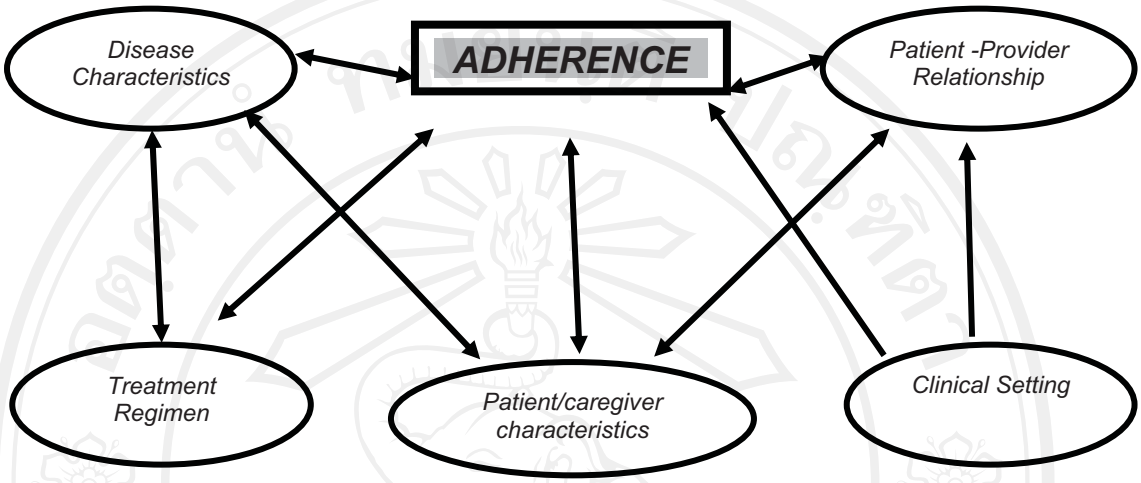

Figure 1. Determinants of Adherence to HAART Model (Ickovic & Meade, 2002)

Patient/caregiver characteristics: Socio-demographic factors have generally been found to have little predictive value in relation to adherence behaviour (Eldred et al., 1998), although some studies have found certain socio-demographic factors (higher income, male sex, white race, older age, higher education) do correlate with higher levels of adherence (Chesney et al., 2000: Gifford, et al., 2000). A number of psychosocial factors have found to impact adherence including depression and other psychiatric illnesses (Gifford, et al., 2000: Gordillo et al., 1999), active substance use, (Chesney et al., 2000: Gordillo et al., 1999), social support (Ickovic & Meade, 2002: Eldred et al., 1998), knowledge (Williams, 1997), attitudes and mood (Remien et al., 2003), and self efficacy (Chesney, 2000: Eldred et al., 1998: Gifford, et al., 2000). Moreover, Chesney (2000) stated that a person's knowledge of the

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

medication regimen and understanding of the relationship between non-adherence and build-up of resistance to medication can also predict better adherence.

Treatment regimen: One of the main challenges of HAART is that it involves a complex treatment regimen that may include more than 20 pills a day, with multiple daily dosing and specific dietary restrictions (Horizon and Population Council, 2004: Ickovic & Meade, 2002). In addition, medication related side-effects (Gao et al., 2000) and palatability (Albano et al., 1999) have been found to have a negative impact on adherence behaviour (Gao et al., 2000), and early toxicity contributes to lower adherence (Horizon and Population Council, 2004).

Patient-provider relationship: The patient-provider relationship plays an important role in improving adherence to prescribed medication and it is believed to be a motivating factor of adherence to HAART (Hall, et al., 1988: Ickovic & Meade, 2002). Ickovic & Meade (2002) identified specific aspects of the relationship that may be influential including: perception of the provider's competence, affective tone of the relationship, trust, open communication, cooperation, willingness to include the patient in treatment decisions, adequacy of referrals and overall satisfaction.

Clinical setting: Existing data is limited in this area (Horizon and Population Council, 2004), however aspects of the clinical setting may be associated with improved adherence. Bangsberg and colleagues (2000) identified aspects of the clinical setting that may be associated with improved adherence namely: availability of transportation and childcare, pleasantness of the clinical environment, convenience in scheduling appointments, and confidentiality.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved