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## Effectiveness of a training program to increase the capacity of health care providers to provide HIV/AIDS care and treatment in Swaziland

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### Abstract

Implementation of HIV care and treatment programs in sub-Saharan Africa is a complex undertaking that requires training of health care providers (HCPs). Many sub-Saharan African countries have introduced training programs to build human resources for health. Evaluation of the ongoing trainings is warranted so that programs can be improved. The purpose of this study was to evaluate Baylor International Pediatric AIDS Initiative's (BIPAI) HCP-training program in Swaziland. The specific aims were: 1) to assess coverage and delivery of the training program, and 2) to determine the impact of the training program on health care providers' knowledge about HIV and pediatric practices, attitudes towards HIV/AIDS patients, and self-efficacy to provide ART. The evaluation was a multimethod design with two types of data collection and analysis: 1) one-group pretest-posttest survey with 101 HCPs, and 2) semi-structured in-depth interviews with seven trainers from Baylor College of Medicine and sixteen local HCPs in Swaziland. Quantitative data were analyzed using Stata Statistical Software version 8.2 for descriptive and multivariate analysis while factor analysis was done using Statistical Program for Social Sciences (SPSS) version 14. The transcribed interviews were analyzed using a didactic approach. Process evaluation showed that the training had good coverage, was delivered as intended, and improved as the work progressed. The training program led to a significant increase ( $p=0.0000$ ) in HCPs' knowledge about HIV/AIDS, antiretroviral therapy, and relevant clinical pediatrics practices between pre-test (mean 68.7% SD 13.7) and post-training (mean 84.0% SD 12.0). The training program also increased trainees' self-efficacy to provide antiretroviral therapy and their attitudes towards AIDS patients ( $p=0.0000$  and 0.02 respectively). In conclusion, BIPAI training program in Swaziland had good coverage of all health care facilities and HCPs in Swaziland. The training was effective in imparting knowledge and skills to HCPs and in their attitudes towards HIV/AIDS patients.

### Keywords

effectiveness; training; health care provider; antiretroviral therapy; sub-Saharan Africa

### INTRODUCTION

The Kingdom of Swaziland, with an adult HIV prevalence rate of 26%, has the highest HIV prevalence globally (Central Statistical Office Swaziland and Macro International Inc. 2007;

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UNAIDS, 2007). The government of Swaziland has responded by declaring AIDS a national disaster and has promulgated a national strategic plan to combat the epidemic. The National Emergency Response Council HIV/AIDS (NERCHA) has identified three thematic areas in its national strategic plan for a comprehensive approach to the crisis: 1) prevention, 2) clinical care and support of those infected, and 3) impact mitigation. The core to this comprehensive care is antiretroviral therapy.

Highly active antiretroviral therapy (HAART) imposes a requirement for higher standards of care for HIV/AIDS even among the developed countries (Landon et al., 2005, Heath et al., 1997). In resource limited countries the resource to meet this requirement is compounded by brain drain as health care workers migrate to better offers outside their borders and especially to the U.S. and Europe, the loss of workers to the AIDS epidemic, and the fact that there were few trained and qualified staff before the AIDS crisis (Gumodoka, Favot, Berege, & Dolmans, 1997; Hosseinipour, Kazembe, Sanne, & van der Horst, 2000). Provision of antiretroviral therapy is also relatively new in resource limited countries and as such health care providers have not accumulated enough experience in HIV/AIDS care. Many of the countries most affected by the HIV/AIDS epidemic, Swaziland included, therefore recognizes the need to increase the number of health care providers and to train the existing health care providers in order to increase the capacity to cope with the need for quality HIV/AIDS care.

In conjunction with the Ministry of Health and Social Welfare, Baylor International Pediatric AIDS Initiative (BIPAI) has undertaken to provide care to children living with HIV/AIDS and to train health care providers to increase their ability to provide HIV care and treatment to children. Health care provider training programs have been shown to increase health care providers' knowledge about HIV and ART (Poindexter, Lane, & Boyer, 2002; Stiernborg, Zaldivar, & Santiago, 1996) and improve positive attitudes to HIV/AIDS patients by increasing the quality of care delivered to HIV patients (Golin, Smith, & Reif 2004; Ezedinachi et al., 2002).

The purpose of this study was to describe the evaluation of a training program to improve the capacity of health care providers to provide HIV/AIDS care and treatment in Swaziland. We addressed two questions: 1) Was the program delivered as intended? 2) What was the impact of the training program on knowledge, attitudes and skills of health care providers to provide HIV/AIDS care?

## THE PROGRAM TO BE EVALUATED

The government of Swaziland action to combat the HIV/AIDS crisis has involved identifying international collaborating partners. The government identified Baylor International Pediatric AIDS Initiative (BIPAI), a center in the Retrovirology Section, department of Pediatrics Baylor College of Medicine as a partner in building human resource capacity in the provision of antiretroviral therapy to children. In conjunction with host countries, BIPAI operate clinical care centers in Botswana, Uganda, Lesotho, Malawi, Swaziland, Burkina Faso, and Romania to provide HIV/AIDS care and treatment to pediatric patients. BIPAI's goal in each country is to offer the best possible HIV care to pediatric patients and to build human resources needed to achieve this goal. This is accomplished through: 1) family focused Pediatric HIV/AIDS care and treatment centers, 2) didactic training and clinical mentoring of health care providers, 3) deployment of pediatricians from the U.S.A to these countries to create a critical mass of the human resource in the form of pediatricians to undertake the above duties. Collectively, BIPAI has currently over 8,472 children under antiretroviral therapy in these countries and has trained over 4,634 health care providers (Kline, October 2007).

In Swaziland, BIPAI has partnered with the Ministry of Health and Social Welfare, United Children's Education Fund (UNICEF), churches, individual hospital management teams and

departmental heads to implement health care provider training. The training is designed to increase Health Care Providers (HCPs) ability to initiate children on ART, monitor their progress, and manage associated complications.

This evaluation covers the trainings sessions held between March 2005 and March 2006. The trainings were facilitated by a Baylor College of Medicine pediatrician. Providers from all over the country were invited for these centralized 5 days didactic in-house training. The trainees were all accommodated in a hotel for the full week of the training. Until now, this training program has not been formally evaluated.

The main resource for the training curriculum is a training manual developed by BIPAI in collaboration with regional partners (Baylor International Pediatric AIDS Initiative [BIPAI], 2006). It comprises of the following modules offered as PowerPoint presentations: epidemiology of HIV infection, pathophysiology of HIV, clinical manifestations of HIV/AIDS, diagnosis, prevention of mother to child transmission of HIV, primary care of HIV-infected child, values clarification, assessing readiness and adherence for ART, ART in children, communicating with children, nutritional management of the HIV-infected child, and a train-the-trainer module that aims to build local health care providers as regional trainers. In addition the training offers case study presentations and discussions, role modeling and an “adherence to antiretroviral drugs” module. A total of 101 health care providers: 64 registered nurses, 15 nurse assistants, 6 nurse clinicians, and 6 counselors, and 10 doctors completed the training.

The training was offered by a team of seven experienced HIV/AIDS BIPAI clinicians, comprising of pediatricians, social workers, and two program coordinators. This team was also responsible for delivery of similar trainings in Lesotho, Botswana, Uganda, Zambia, South Africa, and Tanzania.

## METHODS

This paper triangulates information from two sources to describe the effectiveness of a training program to enable health care providers in Swaziland to implement antiretroviral therapy to pediatric patients. First, we analyzed data from a pre and post training questionnaire administered, before and after the training. After the training, semi-structured in-depth interviews were conducted with program trainers and trainees to assess program coverage and delivery.

### Survey

A one-group pretest-posttest design was used. A single pretest observation was taken on a group of trainees just before the commencement of the training. This was followed by an intervention (the training) and a single posttest observation on the same group of participants using the same measure was administered on the final day of the training.

The questionnaire consisted of the following components: demographics, clinical care knowledge questions, categorical knowledge of HIV/AIDS questions, self-efficacy to treat HIV patients questions, social norms items, attitudes towards AIDS items and barriers to provision of ART questions. The scale measuring clinical care knowledge had 13 multiple-choice questions that address knowledge of HIV, clinical manifestations of HIV, diagnosis, treatment planning and clinical pediatric care. It was scored as the percentage of correct answers. No psychometric properties of the scale had been reported prior to this study. Exploratory factor analysis was done using Statistical Program for Social Sciences (SPSS-14). We computed factor analysis using principal axis factoring to extract the factors and with Promax rotation (Nunnally & Berstein, 1994). Two of the 13 items were excluded from factor analysis because they had a variance of zero. Using a scree plot to interpret the number of

factors, we retained a five factor solution that explained 68.9% of the variance of the scale. The Kuder-Richardson (K-R) internal consistency reliability for this scale was 0.67. We did not interpret the five factors because of the small number of items; each factor would have averaged about two items.

The self-efficacy scale used in this study has been used in the Nigerian intervention trial to increase HCPs' comfort in providing care to HIV patients (Ezedinachi et al., 2002). Ten items are measured on a 5-point Likert scale. These 10 items captures essential skills required in the clinical process of managing an HIV positive patient including: assessment of clinical manifestations of HIV/AIDs, HIV counseling and testing, selection and evaluation of antiretroviral drugs, and care and psychosocial support. No psychometric properties have been reported prior to this study. Exploratory factor analysis was done using principal axis factoring, Promax rotation, and a scree plot to interpret the number of factors. We retained a one factor solution that explained 42.8% of the variance of the scale. The self-efficacy scores were therefore analyzed as a summative scale by adding the score for each of the 12 items.

Attitudes towards AIDS were assessed using a 12 item scale (Trochim, 2004). The items assess verbal statement of affect, belief and of behavior towards people living with AIDS assessed as a two point agree-disagree scale. No psychometric properties of the scale have been reported in the literature. The scale had a low Kuder-Richardson internal consistency reliability of 0.23. This may have been explained by low variance and the binary scoring. Because of low variance and the number who responded to all questions (n=62). We interpreted the scale score as an equal appearing interval scale Thurstone (Trochim, 2004) where each item scored as agreed by the subject had a score ranging from 1 (most negative) to 12 (most positive score). A set of questions were used to assess barriers to ART provision using guidelines for measurement of perceived behavioral control, a construct in the Theory of Planned Behavior (TPB) (Montano et al., 2002).

Data entry, cleaning and statistical analysis were done using Stata statistical software version 8.2 (Stata Corp., 2006). The analytical procedures carried out included: descriptive statistics (i.e. professional cadre, age, gender and years of practice), bivariate analysis (including student's two-sample t-test comparing pre and posttest means for knowledge, attitudes, self-efficacy, and barrier measures), one-way ANOVA and post hoc tests. Factor analysis and internal consistency reliability for the knowledge, attitude and self-efficacy measures were also computed using Statistical Program for Social Sciences (SPSS-14).

Ethical approval to conduct the training was obtained from relevant institutional review board. Informed consent was obtained from the participants before participation in the study. Failure to participate in the survey did not affect participation in the training. Confidentiality of the information obtained was ensured at all times.

### **Interviews to assess coverage and delivery**

All seven trainers from BIPAI (comprising four pediatricians, one registered nurse and two social workers) and sixteen health care providers (five doctors and eleven nurses) from Swaziland who had attended the one week trainings participated in the in-depth interviews. The protocol for open-ended questioning included coverage and delivery questions. These were administered to the trainers and trainees by the PI (HMK). All the interviews were conducted in a private setting in English language-the language that was used in the training. Informed consent to participate voluntarily was obtained from each participant. The interviews were audiotape-recorded and took about one half hour to one hour to complete.

The audiotape recorded interviews were transcribed verbatim in Microsoft word files. The transcriptions were coded using a deductive approach (Bernard, 2006). The first step involved

listening to the audiotapes, and reading the field notes and the transcripts. Next, the transcribed text was coded into categories to facilitate comparisons and aid in answering coverage and delivery questions.

## RESULTS

### Baseline characteristics

One hundred and one health care providers who underwent the training between March 2005 and March 2006 had completed the pre-post trainings questionnaire (Table 1). The trainees had an average of 8.6 years of professional experience. Eighty-two percent of the trainees were female and 76% had attended a previous training. Ninety-four percent of those who had attended previous training had attended only one other previous training. Ninety-two percent of the health care providers had treated HIV positive patients although only 9% worked in an HIV dedicated clinic.

The baseline characteristic score of the measurement used are shown in Table 2. One-way ANOVA showed that the mean percentage knowledge score and self-efficacy score were significantly different among the cadres ( $p < 0.05$ ). The attitude score did not differ with cadre, age, years since graduation, and gender.

### Impact of the training

The training significantly increased health care providers' knowledge about HIV and clinical pediatric care, self-efficacy to provide ART and attitudes towards people with AIDS ( $p < 0.05$ ) Table 3. One-way ANOVA analysis showed significant difference of knowledge and self-efficacy score between pretest and posttest by cadre,  $F = 31.25$  and  $6.78$ , respectively, and  $p > 0.05$ . The interaction term between cadre and the waves (pretest and posttest) had significant effect ( $p = 0.07$ ;  $\alpha = 0.2$ ) (Rosner, 2006) on the self-efficacy score across wave and was included in the final model. The interaction term between the wave and knowledge was not significant ( $p = 0.38$ ) and was therefore not included in the final model.

Overall the training resulted in a significant increase in knowledge about HIV and pediatric care among health care providers. A significant increase in knowledge was found among doctors, registered nurses, nurses and counselors but not among nurse clinicians ( $\alpha = 0.05$ ). Lack of significant difference between pretest and posttest among nurse clinicians may be explained by the low number of nurse clinicians (6) in the survey.

All cadres except the counselors had a significant increase in self-efficacy score. Counselors had the highest self-efficacy score at baseline and lack of significant change may be explained by a ceiling effect on regression to the mean. Another plausible explanation was the low number of counselors (6) in the survey.

Availability of antiretroviral drugs was ranked the least important barrier to delivery of ART among Health Care Providers (HCPs) in Swaziland, followed by lack of knowledge about HIV, lack of laboratory tests, poor patients' adherence to medication, inadequate training, and high workload (in order of increasing importance). There was a significant reduction in health care providers' reported occurrence of lack of training as a barrier to ART provision ( $p < 0.05$ ) between pretest and posttest. Additionally, we found a reduction in the reported lack of knowledge as a barrier to ART provision between pretest and posttest, although this was not significant ( $p > 0.05$ ). As expected, there was no change in the frequency of other reported barriers between pretest and posttest as these were not targeted by the intervention.

## Coverage and Delivery of the Training

Coverage and delivery was evaluated from the interviews with the trainers and trainees. BIPAI training program systematically attempted to focus its training to meet the target health care facilities' need. Though the facilitator did not hand-pick the trainees, contact with relevant Ministry of Health and Social Welfare, local hospital and departmental heads was made to ensure that all health care facilities' managers and departmental heads were aware of the training. The training gave priority to health care providers involved in direct pediatric HIV/AIDS care. Only after the direct care providers were covered was the training extended to other indirect providers, such as nurses working in in-patients care units. Most trainees indicated training was improved by offering multiple trainings because they took turns at the departmental level to attend the training. Offering one-week residential training with food and accommodation provided at the venue of the trainings, greatly improved attendance (reported at over 90%). The training was largely consistent across the various sites because it was facilitated by the same trainers from BIPAI.

Overall the trainees had very positive assessment of the trainings. Trainee health care providers reported that the language of instructions was clear, that the trainers were knowledgeable and had useful "practical tips" because they were experienced providers. Most indicated that the training was very interactive. The training was reported by many of the trainees to have been better than any other training previously attended.

## Main Shortcomings of the Training

Some shortcomings were however noted. No structured training needs assessment was done prior to the training in Swaziland. Though the curriculum that was used in the training had been developed through a long collaborative effort between BIPAI and sub-Saharan African partner countries, there was a need to assess the needs of health care providers before starting the training. A needs assessment would have given direction to the training content and the desired level of training. This would also have given the participants an opportunity to voice their opinions on other contextual barriers to provision of HIV/AIDS care and treatment to pediatric patients.

Most interviewees stated that they would not do anything differently if they were asked to re-vamp the training. However, lack of a clinical component was mentioned as an important shortcoming of the training. This is consistent with suggestions from Quach, Mayer, McGarvey, Lurie, & Do (2005) that HCPS' training should offer opportunities for contact with patients during the training.

Trainees also felt that nutritional aspects of pediatric HIV/AIDS was not given enough emphasis in the training. This is despite a nutritional model being included in the training program. Trainees also felt that decentralization of the training will improve access of all health care providers to the training. In addition, doctors attending the training expressed a need for a more advanced training for their cadre.

## DISCUSSION

The goal of this pediatric-focused training was to build human capacity to initiate more children on ART as children were underrepresented in general ART patient population; children formed only about 8.5% of the population of Swazis ever started on ART by the end of 2006 (Ministry of Health and Social Welfare, 2007). Building capacity to provide pediatric HIV/AIDS care is not an easy task in a human resource constrained setting because few health care providers (HCPS) are specialized in pediatric care. In the case of Swaziland the few available HCPS routinely rotates from one department to another (e.g. from in-patients to outpatient



department, or from surgical in-patient care wards to internal medicine wards). Therefore, every health care provider in Swaziland would have been in need of training in HIV/AIDS care.

Recognizing that training all HCPs in the country was difficult, the training program facilitator used a systematic process to identify the potential trainees. This process involved the facilitator of the training program communicating with hospital managers and heads of the departments about the pediatric focus of the training and allowing them to identify and refer the trainees. Health care facility's training needs were therefore easily met by the BIPAI training program.

We found that all HCPs were generally unprepared to deliver ART. Furthermore, there was no significant difference in knowledge about HIV/AIDS, knowledge of pediatric-related clinical care, or in self-efficacy to provide ART among HCPs who had attended previous government-initiated trainings. This was true whether the HCP worked in an HIV/AIDS dedicated clinic or not. Souville et al. (2003) found a similar situation in Cote d'Ivoire where about a third of the physicians working in referral centers for prescription and surveillance of antiretroviral treatments did not have a clear understanding of biological criteria for initiation of HAART. There is a serious need for upgrading the knowledge, skills, and practices of all HCPs regardless of their workplace.

The training program increased doctors' and nurses' knowledge about HIV, antiretroviral drugs and Pediatric HIV/AIDS care. It also increased their self-efficacy to provide ART. The training also helped HCPs to adjust their attitudes to be more positive towards people living with HIV. Training seem to have made health care providers realize just how much training and, by extension, knowledge they lacked. There was a significant reduction in health care providers' rating of lack of training as a barrier to ART provision between pretest and posttest. The knowledge measure did not proportionately include all the modules presented in the training so assessment of knowledge gain may have been different in some competency areas.

While they gave very positive feedbacks on the trainers, the trainees were of the opinion that gaps exist between the reality at the health services delivery sites and the expectations of the trainers. These gaps would have been identified had follow-up visits been included. Such follow-up visits would serve to establish the extent to which pediatric units benefited from the training and/or how the trainees were coping practically.

This study is not without some limitations. While the study provide useful inputs in trying to design standardized training protocol in resource-limited settings, the results may not be generalized to other health care workers in resource limited settings. Triangulation of data from the survey and in-depth interviews strengthened the evaluation design. However, the one-group pretest-posttest design of the survey offers some threat to internal validity, mainly: history, maturation, and testing. The short duration between the pretest and posttest of four days however, reduced the threats to history and maturation leaving testing as the main threats to internal validity. Threat from testing posed by this design would have been resolved by having a control group that did not go through the training, this would have eliminated the possibility the improvement in the scores was not due the pretest feedback. It was however, not possible to have a control group in this evaluation as we used real time data captured during the training. In addition, the attitude scale used in this study had low internal consistency reliability due to low variance on a number of items and the binary scoring which also minimizes variance. Even though self-efficacy is a good proxy for care provision, the evaluation design did not describe the more distal impact of quality of care.

## Conclusions

Baylor International Pediatrics AIDS Initiative training program in Swaziland was effective in imparting knowledge and skills in HIV/AIDS care to health care providers. The training also increased health care providers' self-efficacy to provide antiretroviral therapy and their attitudes towards AIDS patients. BIPAI training had a fairly good coverage of all health care facilities and health care providers in Swaziland. However, given the general lack of specialty training of health care providers in Swaziland, many pediatric HIV/AIDS patients are probably still receiving HIV care and treatment from health care providers who have not had any or adequate training in pediatric HIV/AIDS care and treatment. There is a need to improve the scales used in the evaluation. Each of the modules that are taught in the training should have at least three questions for inclusion in the pretest and posttest. This will ensure that the result of the knowledge test represents the breadth of the training. Training of trainers should also be accelerated so as to speed up a build up of local doctors and nurse as trainers. There is also a need to decentralize future trainings and transition the classroom-based didactic training into clinical mentoring at the health facilities.

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**Table 1**

Descriptive statistics.

	Physicians	Nurse Clinicians	Registered Nurses	Nurses	Counselors	Total
<b>Gender</b>						
Male	8	0	8	0	2	18
Female	2	6	56	15	4	83
<b>Age</b>						
<30	4	0	23	6	2	35
30–39	4	1	26	3	1	35
40–49	1	1	11	6	3	21
>50	1	4	4	0	0	9
<b>Years since graduation</b>						
0–4	3	1	26	7	3	40
5–9	4	0	17	0	1	22
>10	3	5	19	7	1	35
Missing			2	1	1	4
<b>Previous training</b>						
Yes	7	4	50	10	6	77
No	3	2	14	5	0	24
<b>Work in a Dedicated HIV Clinic</b>						
Yes	1	1	5	2	0	9
No	9	5	58	12	2	86
Missing			1	1	4	6
<b>Total</b>	10	6	64	15	6	101

Table 2

Baseline Characteristics

	Knowledge score		Self efficacy		Attitude score	
	Mean % knowledge score (SD)	n	Mean self efficacy scores (SD)	n	Mean attitude score (SD)	n
<b>Cadre</b>	* (p=0.0000)		* (p=0.02)			
Doctors	86.1(7.1)	10	37(9.1)	9	57.7(0.6)	3
Nurse clinician	62.8(5.8)	6	35.4(6.5)	5	52.8(6.2)	4
Registered/Nurses	68.8(12.7)	63	34.4(7.4)	54	56.3(5.9)	38
Nurses	61.5(10.9)	15	37.2(4.7)	10	56.0(10.3)	12
Counselors	52.5(15.7)	6	46.4(6.8)	5	50.8(10.4)	5
<b>Age</b>						
<30	66.8(15.6)	35	36.9(7.2)	30	54.4(6.8)	20
30-39	72.9(12.4)	35	34.3(8.7)	28	57.0(5.7)	19
40-49	64.1(11.7)	21	37.3(6.4)	17	56.5(8.7)	17
>50	64.1(13.3)	9	34(8.0)	8	53.3(8.7)	6
<b>Gender</b>						
Male	72.2(19.4)	18	38.5(8.0)	15	56.5(4.4)	10
Female	67.2(12.3)	82	35.2(7.5)	68	55.5(7.7)	52
<b>Previous training</b>	(p=0.06)					
Yes	69.6(13.6)	76	36.5(7.5)	64	55.4(7.2)	47
No	63.4(13.8)	24	33.5(7.9)	19	56.5(7.5)	15
<b>Work in HIV Clinic</b>						
Yes	67.5(10.0)	9	38.4(7.4)	5	55.5(3.5)	2
No	69.5(13.3)	85	35.1(7.4)	74	56.4(6.8)	55

\* p<0.05

**Table 3**

Effect of the Training on Knowledge, Self-efficacy, and Attitude

	Mean pretest score (SD)	Mean posttest score (SD)	p-value
<b>Knowledge (N=97)</b>	68.7(13.7)	84.0(12.0)	0.0000
Doctors	86.1(7.1)	93.8(8.7)	0.04
Nurse clinician	62.8(5.8)	73.1(9.4)	0.12
Registered/Nurses	68.8(12.7)	85.6(10.1)	0.0000
Nurses	61.5(10.9)	79.3(13.5)	0.0007
Counselors	52.5(15.7)	73.1(11.7)	0.0015
<b>Self-efficacy (N=72)</b>	35.8(87.7)	42.5(4.9)	0.0000
Doctors	37(9.1)	42.3(6.8)	0.02
Nurse clinician	35.4(6.5)	41.6(7.1)	0.02
Registered/Nurses	34.4(7.4)	42.2(4.6)	0.0000
Nurses	37.2(4.7)	42.6(4.0)	0.03
Counselors	46.4(6.8)	42.2(4.4)	0.22
<b>Attitude (N=50)</b>	55.3(7.3)	57.5(7.4)	0.02