

# The Pediatric AIDS Corps: A 5-Year Evaluation



**WHAT'S KNOWN ON THIS SUBJECT:** Demographic data concerning health care providers working long-term in resource-limited areas with religious groups or other government or nongovernment organizations are limited. Health outcomes from these programs vary with the focus of the individual program.



**WHAT THIS STUDY ADDS:** This study describes the composition and evaluation of a long-term global health corps program. Other groups interested in long-term physician placement in resource-limited areas will be able to use these data while developing their program.

## abstract

**BACKGROUND:** The Baylor College of Medicine International Pediatric AIDS Initiative at Texas Children's Hospital created a global health corps named the Pediatric AIDS Corps (PAC) in June 2005. This report provides descriptive details and outputs for PAC over its first 5 years.

**METHODS:** Demographic data were gathered about PAC physicians employed from July 2006 to June 2011. A 21-question survey was used to query PAC physicians about their experiences in the program. Data concerning clinical experiences and educational programs also were reviewed.

**RESULTS:** A total of 128 physicians were employed with PAC. The median duration served was 22.7 months. Eighty-seven percent indicated that experience affected their future career choice, with half continuing to work with children and families living in resource-limited areas after they left PAC. Patient care was identified as the most rewarding part of their work (73%), whereas deaths (27%) were the most difficult. Baylor College of Medicine International Pediatric AIDS Initiative enrollment of HIV-infected children and adolescents into care and treatment increased from 6107 to 103 731 with the addition of PAC physicians. Approximately 500 local health care professionals per quarter benefited from HIV clinical attachments that were not available before PAC arrival. PAC physicians visited outreach sites providing in-depth HIV mentoring of local health care professionals, leading to 37% of the sites becoming self-sufficient.

**CONCLUSIONS:** The positive evaluation by the PAC and the scale-up of clinical and educational programs support the recent calls for the development of a national global health corps program. *Pediatrics* 2014;133:e1548–e1554

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### KEY WORDS

global health corps, global health, HIV, acquired immunodeficiency syndrome (AIDS)

### ABBREVIATIONS

BCM—Baylor College of Medicine

BIPAI—Baylor International Pediatric AIDS Initiative at Texas Children's Hospital

IR—incidence rate

PAC—Pediatric AIDS Corps

Dr Schutze conceptualized, designed, and analyzed the Pediatric AIDS Corps (PAC) follow-up survey used in this manuscript, gathered the demographic data of the PAC physicians, and wrote the initial manuscript and all subsequent drafts; Drs Ferris and Schwarzwald, Mr Jones, and Mr Mizwa reviewed and interpreted the PAC survey data, and revised the initial manuscript; Dr Wanless gathered, analyzed, and interpreted the patient encounter and educational program data, and revised the initial manuscript; Ms Calles helped design and analyze the PAC follow-up survey, helped provide the demographic data of the PAC physicians, and revised the initial manuscript; Dr Kline helped design and analyze the PAC follow-up survey, helped draft the initial manuscript, and revised the initial manuscript; and all authors approved the final manuscript as submitted.

[www.pediatrics.org/cgi/doi/10.1542/peds.2013-2938](http://www.pediatrics.org/cgi/doi/10.1542/peds.2013-2938)

doi:10.1542/peds.2013-2938

Accepted for publication Mar 7, 2014

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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**FINANCIAL DISCLOSURE:** The authors have indicated they have no financial relationships relevant to this article to disclose.

**FUNDING:** Support for this program was from the Bristol-Myers Squibb Foundation, Secure the Future Program, and Baylor College of Medicine.

**POTENTIAL CONFLICT OF INTEREST:** The authors have indicated they have no potential conflicts of interest to disclose.

At the conclusion of 2005, ~2.3 million children were living with HIV/AIDS. Globally, children accounted for 14% of all new HIV infections and 18% of all deaths from HIV/AIDS. The largest burden of disease in children <5 years of age was in southern Africa, where HIV/AIDS accounted for more deaths than all other causes combined.<sup>1</sup> It was during this time that the Institute of Medicine recommended that the US federal government create and fund an umbrella organization called the US Global Health Service to mobilize US health care professionals to fight HIV/AIDS.<sup>2</sup>

In parallel with this call to action, the Baylor College of Medicine International Pediatric AIDS Initiative (BIPAI) at Texas Children's Hospital announced the creation of a global health corps named the Pediatric AIDS Corps (PAC). This program was developed to address the critical shortage of physicians trained in the care of infants and children infected and affected with HIV/AIDS in Africa and other parts of the world.<sup>3</sup> The program was designed not only to expand existing health professional capacity for providing care and treatment in several hard-hit African countries, but also to institute training programs to supply local providers with the skills and confidence needed to take care of HIV-infected infants and children.

The PAC recruited board-eligible/certified pediatricians, internists, and family medicine physicians for long-term assignments ( $\geq 1$  year) in Africa. Physicians were employed by Baylor College of Medicine (BCM) and were linked to BIPAI's Clinical Centers of Excellence or other nongovernment organizations in African countries hard hit by HIV/AIDS. The recruitment, placement, and training of the PAC has been described in depth in previous publications.<sup>4,5</sup> Support for the first 5 years of this program was provided by

the Bristol-Myers Squibb Foundation, Secure the Future Program, and BCM. The purpose of this report was to provide descriptive details and outputs for this unique program over the first 5 years of its existence.

## METHODS

Basic demographic data were gathered from application files for all PAC physicians employed from July 2006 to June 2011. A 21-question survey was developed and used to query all PAC physicians about their experiences in the program. A link to this survey (SurveyMonkey at [www.surveymonkey.com](http://www.surveymonkey.com)) was sent to each PAC physician on 4 occasions over a 2-month period. Data concerning clinical experiences were obtained through reviews of de-identified summary data from an electronic medical record. Local records were reviewed for educational endeavors. Incidence rates (IR) for depression and mental health evacuation were calculated using 239.94 PAC-years. This was the number of years served by the physicians responding to the survey. Based on physicians coming into the program without a history of tuberculosis, 2664.5 PAC-months were used to calculate the IR of tuberculosis, which was defined as a new positive tuberculin skin test. The study was reviewed and approved by the institutional review board for human subject research for BCM and affiliated hospitals.

## RESULTS

A total of 128 physicians were employed with PAC between July 2006 and June 2011 (Table 1). One physician worked in Malawi in 2006–2007, left the program and completed a pediatric hematology-oncology fellowship, and returned to Malawi for 2010–2011. The median duration of service in PAC was 22.7 months (range: 8.8–59.5 months). The

12 countries where the PAC physicians worked are listed in Table 2. There were 107 doctors who worked in 1 country each, whereas 16 worked in 2 countries, 4 worked in 3 countries, and 1 worked in 4 countries. Most PAC physicians worked at BIPAI's Clinical Centers of Excellence and/or outreach clinics in Botswana, Burkina Faso, Lesotho, Malawi, Swaziland, and Tanzania. These centers focused on the care and treatment of children and their families with HIV/AIDS. A small number of physicians were linked with other nongovernment organizations working with pediatric HIV/AIDS in Tanzania and Mozambique (Elizabeth Glaser Pediatric AIDS Foundation) and South Africa (Harvard University). In Ethiopia, physicians worked at the Gondar University Hospital in the Department of Pediatrics to teach medical students and train interns in general pediatrics. This program was in conjunction with the American Joint Jewish Distribution Committee and funded by the Mary L. and William J. Osher Foundation. One PAC physician worked for BIPAI as a consultant in India for 6 months under an agreement with UNICEF to evaluate all of the pediatric HIV/AIDS clinical centers in that country.

The Bristol-Myers Squibb Foundation's Secure the Future Program provided

**TABLE 1** Characteristics of 128 Physicians Participating in PAC, 2006–2011

Characteristic	n (%)
Gender	
Female	79 (62)
Male	49 (38)
Specialty	
Pediatrics	98 (76)
Medicine/pediatrics	14 (11)
Family medicine	10 (8)
Internal medicine	6 (5)
Just completed residency/ subspecialty training	85 (66)
Pediatric subspecialty training <sup>a</sup>	10 (8)

Degrees of the physicians included the following: MD (121), DO (5), MBChB (1), MBBS (1).

<sup>a</sup> Cardiology (2), hematology-oncology (2), infectious disease (6).

**TABLE 2** Countries Where the 128 PAC Physicians Were Stationed for >1 Month, 2006–2011

Country	No. Physicians <sup>a</sup>
Botswana	29
Burkina Faso	5
China	2
Ethiopia	5
India	1
Lesotho	28
Malawi	30
Mozambique	1
South Africa	1
Swaziland	30
Tanzania	19
Uganda	6

<sup>a</sup> Twenty-one physicians worked in >1 country.

\$22.5 million to support the program's administration and physicians' salary, training, living, and travel expenses. Eighty-seven (68%) of the PAC physicians came into the program with educational debt. The total amount of debt owed by this cohort was \$10 262 426 (mean: \$117 958 per person; range: \$31 326–\$228 007). At the conclusion of the 5-year program, BCM had provided \$6 057 518 in loan repayments and 26 (30%) became debt-free through their participation in the PAC program.

A total of 126 PAC physicians (2 were deceased) were contacted with a survey link and 111 (88%) completed the survey. Sixteen percent of the physicians were currently working for BIPAI under a revision of the program referred to as the Texas Children's Global Health Corps, 22% had left PAC <1 year before, 37% had been out from 1 to 3 years, and 25% had been out for >3 years. The experience of the PAC physicians was noted to have affected further career choices in 87% (Table 3). Of those who had their career choice affected, 71% indicated that global health would remain a focus of their career, whereas half of those who pursued additional training included training in public health alone (eg, master's or doctorate degrees, Epidemic Intelligence Service) or in addition to subspecialty training. Subspecialty

**TABLE 3** Selected Questions From the 21-Question Survey to PAC Physicians About Their Experience, 2006–2011

Question ( <i>n</i> = Number of Responses to the Question)	Positive response or "Yes" (%)
Did your experience in PAC affect your career goals when you left PAC? ( <i>n</i> = 106)	92 (87)
Did you pursue additional training after working with PAC? ( <i>n</i> = 106)	55 (52)
Are you working with resource-limited populations internationally now? ( <i>n</i> = 109)	61 (56)
Are you working with resource-limited populations in the United States now? ( <i>n</i> = 107)	47 (44)
Was it recommended for you to take malaria prophylaxis based on your country assignment? ( <i>n</i> = 110)	45 (41)
Did you ever take postexposure prophylaxis after a blood or body fluid exposure to prevent HIV? ( <i>n</i> = 110)	18 (16)
Was your transition home difficult? ( <i>n</i> = 95)	39 (41)
Did you have a problem securing a job on your return? ( <i>n</i> = 95)	9 (9)
Are you happy with your decision to have been a PAC physician? ( <i>n</i> = 111)	111 (100)
Would you recommend this experience to a colleague? ( <i>n</i> = 111)	110 (99)

training pursued included infectious diseases (9), emergency medicine (4), hematology-oncology (3), cardiology (2), pulmonology (2), academic pediatrics (2), unspecified (2), neonatology, critical care, integrative medicine, preventive medicine, and combined hematology-oncology-infectious disease. Approximately half continue to work with children and families living in resource-limited areas domestically or abroad. Seventy-three percent of responding physicians indicated that patient care was the most rewarding part of the PAC experience; program development was identified by 15%. The most difficult experiences identified were the number of deaths (27%), difficulty in accepting the limitations of the local health care system (24%), and managerial decisions made at the local clinics (21%). The most important accomplishments identified by PAC physicians were in the categories of infrastructure building (33%) and education (31%). The nonclinical endeavors the PAC physicians participated in are outlined in Table 4.

Forty-one percent of PAC physicians had problems transitioning home, and the most common areas identified were classified as personal issues (53%) and job-related difficulty (22%). The work

(62%) and the relationships that were developed (36%) were identified as the best parts of being a member of PAC. Administrative issues, either locally (35%) or in Houston (19%), were the most common items mentioned as something that needed to change. Despite these issues, all physicians surveyed stated that they were happy to have been a member of PAC and 99% said that they would encourage others to participate in the program. The 1 physician who indicated that he or she would not recommend this program noted the fact that research experience was not the major focus of the program and those interested in a research career might find another venue that would be a better fit.

The health and safety of the PAC physicians also was evaluated (Table 5). Forty-two percent indicated that they had been a victim of robbery/theft/violent crime or sexual assault while serving abroad. Sexual assaults involved groping. Malaria prophylaxis was required for PAC physicians working in malaria-endemic areas (Table 3). Of the 45 PAC physicians who commented on their malaria prophylaxis, 7 (16%) reported that they never took it, 26 (58%) reported that they took it intermittently or stopped it

**TABLE 4** Nonclinical Care Activities Carried Out by 111 PAC Physicians, 2006–2011

Activities	No. Who Participated (%)
Grant writing	35 (32)
Operational research	40 (36)
Abstract presentations at scientific meetings	25 (23)
Manuscript preparation and submission	30 (27)
Fund-raising	24 (22)
Policy development	42 (38)
Guideline writing	63 (57)
Monitoring and evaluation	54 (49)
Community mobilization projects	47 (42)
Project administration	59 (53)
Human resources	28 (25)
Volunteerism	44 (40)
Training of health professionals, staff, or lay people	111 (100)
Creation of training materials	84 (76)
Other	12 (11)

prematurely, and only 12 (27%) stated that they took it regularly. Seven individuals had been treated for malaria at least once (Table 5).

Eighteen physicians required post-exposure prophylaxis for occupational exposure to HIV (Table 3). These 18 physicians had 27 high-risk events, such as mucous membrane exposure with body fluids (14) or needle sticks (13). Five individuals reported 2 separate events, whereas 2 individuals reported 3 events. Completion of the prescribed course of antiretroviral prophylaxis was reported for 12 (44%) of the episodes. Gastrointestinal problems (nausea, vomiting, and distress) were the most common reason for

**TABLE 5** Health and Safety Events for 111 PAC Physicians, 2006–2011

Event	n (%)
Serious motor vehicle accident	6 (5)
Illness requiring medical attention	20 (18)
Illness requiring hospitalization	7 (6)
Diagnosed with malaria	7 (6)
Diagnosed with latent tuberculosis infection	7 (6) <sup>a</sup>
Problems with depression while abroad	12 (11)
Family member requiring medical attention for serious event	10 (9)
Victim of robbery or theft	40 (36)
Victim of assault	5 (4)
Victim of sexual assault	2 (2)
Other type of significant event to the PAC physician or family member	13 (12)

<sup>a</sup> Data based on 115 physicians.

discontinuation of prophylaxis. One physician sustained 2 different splash exposures near the eye and took prophylaxis with the first event but did not take it for the second. No PAC physician reported seroconversion to HIV after these events or after working with PAC.

Thirteen PAC physicians had a history of tuberculous disease before joining the program. All others were screened with a tuberculin test by using purified protein derivative before leaving for their assignments and yearly while abroad. Seven were subsequently diagnosed with latent tuberculosis infection while abroad or within 6 months after returning home. Each of the 7 had a positive tuberculin skin test with negative chest radiographs (Table 5; IR for latent and active tuberculous disease were 2.62 per 1000 PAC-months abroad and 0 per 1000 PAC-months abroad, respectively). Six were treated with isoniazid alone, and 1 received a course of pyrazinamide and ethambutol because of concern for multidrug-resistant organisms.

Eleven percent of those surveyed identified depression as a problem while serving abroad (Table 5; IR: 50 per 1000 PAC-years abroad). Two physicians required evacuation from their assigned country to South Africa for stabilization of psychiatric illness (IR: 8.3 per 1000 PAC-years abroad) before

returning home. For the 12% who responded that there were other significant events that affected their health or safety or a family member's, most were medical illnesses in a family member (eg, diarrheal disease, malaria).

Before the deployment of PAC in July 2006, BIPAI had enrolled 6107 patients into HIV/AIDS care. By June 2011, BIPAI had enrolled 103 731 children and adolescents into care and treatment.<sup>6</sup> Parents of children (10 771) also were brought for care at specially created family care clinics. Approximately 42% were treated at the BIPAI Centers of Excellence, whereas the remainder were cared for at BIPAI satellite sites or in outreach locations visited by PAC doctors. At 4 of the centers (Botswana, Lesotho, Malawi, and Swaziland) where the PAC provided most of the care, >92 000 patients were enrolled with ~48% of HIV-infected patients receiving antiretroviral therapy (Table 6).

As a result of training activities carried out by PAC doctors by June 2011, ~500 local health care professionals per quarter were benefiting from clinical attachments of at least 1 week at the Centers of Excellence, whereas >700 health care professionals per month were attending didactic training sessions on HIV/AIDS, either at the centers or at outreach sites.<sup>6</sup> In addition, PAC doctors were visiting outreach sites between 1 and 4 times per month, providing in-depth mentoring of local health care professionals. Clinical progress at these outreach sites was monitored, and when a set of established criteria for standards of care were met, sites were graduated. By June 2011, 52 (37%) of 142 sites had graduated across the network. Of the 4 major sites with physician shortages that required the use of PAC physicians to scale up the clinical work in 2006 (Botswana, Lesotho, Malawi, and Swaziland), by June 2011, 2 (Botswana,

**TABLE 6** Cumulative Patient Numbers at 4 Centers (Botswana, Lesotho, Swaziland, and Malawi) Where PAC Provided the Most Care, 2006–2011

Date	HIV Infected Without ART	HIV Infected With ART	HIV Exposed	Total Patients
June 2006 <sup>a</sup>	9492	1984	809	12 285
June 2007	16 661	3966	2745	23 372
June 2008	21 917	6494	7174	35 585
June 2009	25 791	8787	9953	44 531
June 2010	38 036	16 609	12 557	67 202
June 2011	49 594	23 787	19 306	92 687

ART, antiretroviral therapy.

<sup>a</sup> Numbers of patients receiving care before the arrival of PAC.

Lesotho) were able to retain local physicians in numbers to be self-sufficient. The success of these 2 programs in building local capacity was in large part because of the work of the PAC physicians.

A total of 106 research studies either had been completed or were ongoing, with 34 publications at the conclusion of the 5 years. PAC physicians contributed substantially to the development of national treatment guidelines for HIV/AIDS in a number of African countries as well as other relevant issues affecting maternal-child health (eg, guidelines for the prevention of mother-to-child transmission of HIV, care of the HIV-exposed infant). In addition, PAC physicians worked as part of committees or writing groups at the invitation of Ministries of Health in preparing applications to the Global Fund to Fight AIDS, Tuberculosis, and Malaria.

## DISCUSSION

The 5-year history of PAC demonstrates that a global health corps can catalyze a rapid scale-up of clinical services and build local health professional capacity for pediatric health care in resource-limited settings. Securing of the operational funds and recruitment of physicians in the later part of 2005 with a July to August 2006 training and deployment for the first PAC physicians was a logistical feat. This rapid scale-up and deployment allowed PAC physicians to become an integral part of each country's antiretroviral therapy rollout

for children, but was also most likely a reason behind the administrative challenges noted in the survey. Besides exceeding expectations in the areas of clinical service and education, a collateral benefit of this program was the involvement of PAC in numerous non-clinical care activities (eg, participation in guideline writing, project administration) that helped define health care delivery in each of the countries. The experience also helped shape the future career goals of the physicians as it relates to global health, as well as working with children living in resource-limited settings domestically. Despite the health and safety issues encountered, 100% of participants were happy with their decision to join this program.

The PAC program was established so that children with HIV/AIDS could receive quality health care and have access to antiretroviral therapy. The large number of physicians placed in countries allowed for the establishment of robust educational programs that achieved the goal of building local clinical capacity for the treatment of infants and children with HIV/AIDS and other serious or life-threatening medical conditions. In addition to the HIV-focused programs, the placement of pediatricians in Ethiopia helped address a poor student-to-teacher ratio that was jeopardizing the quality of education provided to medical students and interns in pediatrics. PAC physicians collaborated with Ethiopian pediatricians in re-designing the med-

ical education program to meet student performance standards, instituting and shaping a pediatrics residency program. PAC also became active in other important nonclinical activities, such as national and global policy development, teen clubs, community health programs, and guideline writing that extended beyond HIV/AIDS.

Safety and health issues were identified as important components of the PAC experience. Robbery/theft and other violent crimes, in addition to motor vehicle accidents, are well recognized events leading to injury and death among international travelers and other humanitarian workers.<sup>7–11</sup> Issues relating to health and safety are addressed in the pretravel training that PAC physicians receive before leaving for their assignments abroad.<sup>5</sup> Despite a focus of the pretravel program on malaria prevention, it was concerning to note that there were physicians working in malaria-endemic regions that did not take chemoprophylaxis. Most of these physicians were concerned about the impact of long-term exposure to malaria prophylaxis on their health and chose to rely on bednetting and personal protection strategies. Those who chose not to take chemoprophylaxis were encouraged to have medications for self-treatment with them at all times.

Our data demonstrate that PAC physicians have higher rates of tuberculin skin test conversion when compared with US Peace Corps volunteers (1.283 per 1000 volunteer-months) but lower rates of active tuberculous disease (0.057 per 1000 volunteer-months).<sup>12</sup> When skin test conversion data for the Peace Corps is limited only to Africa (1.464 per 1000 volunteer-months) or to the same 9 countries where our physicians worked (1.36 per 1000 volunteer-months), the incidence of conversion is still higher among the PAC physicians. The reason for this is not known, but the fact that members

of PAC are supplying direct HIV/AIDS patient care certainly may play a significant role. In a recent study of skin test conversion in travelers from the Netherlands, investigators found a skin test conversion incidence of 3.5 per 1000 person-months traveled.<sup>15</sup> If health care workers were eliminated, the incidence was still high, at 2.8 per 1000 person-months traveled. Interestingly, if limited only to Africa, the incidence was 4.49 per 1000 person-months traveled.

Depression was identified as a problem in 11% of PAC physicians. Issues with mental health among long-term travelers, Peace Corps volunteers, and missionaries have been reported.<sup>14–16</sup> A wide range of incidence rates from 41 per 1000 missionary-years to 87 per 1000 Peace Corps volunteer-years have been reported and are certainly similar to the incidence reported in this cohort of PAC physicians (50 per 1000 PAC-years abroad).<sup>15,16</sup> Our incidence rate for mental health evacuation was similar to that described for British missionaries (8.3 per 1000 PAC-years versus 8.19 per 1000 missionary-

years).<sup>16</sup> Physicians who treat children in resourced countries are not exposed to the large-scale death encountered in resource-limited areas. This fact and the long work hours in a new country and unfamiliar culture no doubt contribute to the mental health issues encountered. The importance of mental health problems, including post-traumatic stress disorder, depression, and anxiety, are becoming recognized more commonly but are still underappreciated for individuals doing this type of work.<sup>17</sup>

Beginning in July 2011, the name of our program changed from PAC to the Texas Children's Global Health Corps. This name change not only reflects a change in funding, but also indicates that the program is expanding the clinical focus to include treatment of common childhood cancers, sickle cell disease, malnutrition, tuberculosis, and malaria. An additional 38 physicians have joined the program since July 2011. One was in the second group of PAC physicians and worked for 1 year in Lesotho and returned after hematology-oncology training to work

in Botswana. Another physician was from Botswana, trained in pediatrics in the United States, and has returned to Botswana to work at the BIPAI Center of Excellence. These new global health corps physicians include not only the specialties of pediatrics, internal medicine, and family medicine, but also obstetrics/gynecology and general surgery. Physicians were assigned not only to Botswana, Ethiopia, Lesotho, Malawi, Swaziland, and Tanzania, but also to Equatorial Guinea, Angola, Liberia, Colombia, and Papua New Guinea.

## CONCLUSIONS

PAC was envisioned and developed as a measure to aid and expand capacity in areas of the world that were combating the worst epidemic in human history. The positive evaluation of the program by the physician participants, and the documented scale-up of clinical and educational programs, provides evidence in support of the recent calls for the development of a national global health corps program.<sup>18,19</sup>

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*Pediatrics* 2014;133:e1548

DOI: 10.1542/peds.2013-2938 originally published online May 26, 2014;

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DOI: 10.1542/peds.2013-2938 originally published online May 26, 2014;

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<http://pediatrics.aappublications.org/content/133/6/e1548>

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American Academy of Pediatrics

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