January 26, 2016

Thomas J. Nasca, MD, MACP
Chief Executive Officer
Accreditation Council for Graduate Medical Education
515 North State Street, Suite 2000
Chicago, IL  60654

Dear Dr. Nasca,

In 2002, the AAP Board of Directors adopted as Academy policy the following:

The AAP Board of Directors supports the Accreditation Council for Graduate Medical Education (ACGME) and their proposal to reform resident duty hours as an important step towards improving patient safety and resident working and learning conditions. This wording will be used in all AAP policy and official statements on this topic, in lieu of support for a state or federal legislative or regulatory approach to the reform of resident duty hours.

The AAP still firmly maintains that decisions regarding resident duty hours remain within the purview of the ACGME. Despite the laudable goals of the initial duty hours requirement, the AAP maintains that there have been some unintended consequences; and it is our position that these need to be addressed going forward. Therefore, we appreciate the opportunity to present our positions as part of the ACGME’s review of your accreditation requirements and key dimensions of the learning and working environment.

Annually, the AAP conducts a survey of graduating pediatric residents. This research endeavor has yielded two published articles (attached):


Also, a review of the recent literature was performed regarding the impact of the ACGME 2003 and 2011 duty hours requirements through a PubMed search. Articles published in 2013, 2014 and 2015 were reviewed.

Focusing on the pediatric-specific articles, we maintain that the intent for duty hours changes benefitted 2 groups: residents and patients. The articles offer insights into both of these. For the residents, the consistent downward trend in falling asleep in conference and while driving home is very reassuring. In large measure, much of this can likely be attributed to duty hour changes. Multiple reports (including AAP Graduating Resident Survey) have shown that residents, post the implementation of duty hours requirements, are not acquiring more sleep. However, it is suggested that additional time away from mentally taxing activities at the hospital, even if this time is not spent sleeping, is beneficial.
Anecdotally, resident members of the AAP Section on Medical Students, Residents and Fellowship Trainees also report increased participation in activities outside of the hospital including activities with family and friends with an overall improved work-life balance. Again anecdotally, residents report increased ability to participate in professional development activities including QI, leadership, research, advocacy and volunteering with professional organizations.

Some of the negative effects that have surfaced since the implementation of duty hours pertain to patients. AAP research over the past decade (2002-2013) demonstrates that reports about patient care errors improved, but then returned to a level not significantly different from 2002. Also, increased handoffs and increased patient load results in decreased knowledge of individual patients. Additionally, there is found to be less engagement in the management of the short-term patient admitted by their opposite team member. Finally, the implementation of duty hours has led to the creation of what is often cited as a “shift mentality” for physicians and their role in care.

To elaborate on these points, with the decrease in individual work hours, residents have assumed responsibility for an increased number of patients with each shift. Because of the increased patient load, coupled with arduous documentation responsibilities, there tends to be a reduction in amount of time spent with patients and their families, and learning about patients. This is an area of great risk when it comes to medical errors. To alleviate this, some institutions have increased the number of Advanced Practiced Providers (APP) caring for patients. Additional insights, specific to each of the duty hours requirements, are attached.

The AAP concludes that The ACGME Duty hour restrictions were intended to increase patient safety, increase resident wellness, and improve resident education. It is clear that the fears of worsening patient outcomes have not generally been realized. It is also clear that the hopes for improved patient outcomes have not been achieved. Furthermore, it is clear that resident wellness is improved. There are significant concerns from the medical education community including fear of a negative impact on patient safety due to a lack of continuity, transfer of information, and resident experience. There is additionally substantial concern regarding a negative impact on resident education, including procedural experience. Additional concerns include the development of a “shift mentality,” with a lack of patient ownership.

The AAP recommends that the ACGME should:

- Conduct studies of programs with standardization of process-similar scheduling methods should be performed using homogeneous outcome measures. The goal of these studies would not be to discourage innovation or flexibility, but rather to allow identification of true best practices which achieve the intended outcomes.
- Conduct comparisons, before and after implementation of the duty hours restrictions, assessing resident supervision; and direct the ACGME Review Committees in developing useful guidelines.
- Support and encourage the creation of systems of effective and efficient documentation to refocus the energy and hours of residents and allow more time for interaction with patients and their families. This system must also prepare the residents for future practice.
- Address the concerns of the medical education community pertaining to “shift mentality.”

The American Academy of Pediatrics is an organization of 64,000 primary care pediatricians, pediatric medical subspecialists, and pediatric surgical specialists dedicated to the health, safety, and well being of infants, children, adolescents, and young adults. Moreover, the Academy maintains that children require the highest quality health care. Education is central to this mission. Therefore, the Academy proactively endorses the importance of residency education and the concept of lifelong learning.
The Academy values its partnership with the ACGME and the Review Committee for Pediatrics. We look forward to continuing to collaborate on issues related to the graduate medical education enterprise. In 2002, the AAP supported the ACGME’s efforts to “reform duty hours.” Again, in 2016, the AAP supports your efforts to reform the current duty hours requirements. In this endeavor, we urge and encourage the ACGME to include representation from the AAP and the pediatric education community in the March Congress and in all future deliberations. It is imperative to ensure that the deliberations and decisions pertaining to the reform of duty hours requirements will not be solely driven by and focused upon adult medicine.

Sincerely,

Benard P. Dreyer, MD, FAAP
President

BPD/hm

Attachments:


Perspectives on the specific duty hours requirements from the AAP Committee on Pediatric Workforce

cc: Lauren Gambill, MD, FAAP, Chair
AAP Section on Medical Students, Residents, and Fellowship Trainees

Susan Guralnick, MD, FAAP, Chair
AAP Committee on Pediatric Education

William Moskowitz, MD, FAAP, Chair
AAP Committee on Pediatric Workforce

Karen Remley, MD, FAAP
AAP Executive Director/CEO

Daniel Schumacher, MD, FAAP, Lead Author
AAP research articles on residency education and duty hours
The 2011 ACGME Standards: Impact Reported by Graduating Residents on the Working and Learning Environment

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From the Boston Combined Residency Program in Pediatrics (Boston Children’s Hospital/Boston Medical Center), Pediatric Emergency Medicine, Boston Medical Center, Boston, Mass (Drs Schumacher and Jain); Department of Research, American Academy of Pediatrics, Elk Grove Village, Ill (Ms Frintner and Dr Cull); and Boston Combined Residency.

The authors declare that they have no conflict of interest.

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ABSTRACT

OBJECTIVE: Changes in Accreditation Council for Graduate Medical Education (ACGME) requirements, including duty hours, were implemented in July 2011. This study examines graduating pediatrics residents’ perception of the impact of these standards.

METHODS: A national, random sample survey of 1000 graduating pediatrics residents was performed in 2012; a total of 634 responded. Residents were asked whether 9 areas of their working and learning environments had changed with the 2011 standards. Three combined change scores were created for: 1) patient care, 2) senior residents, and 3) program effects, with scores ranging from 1 (worse) to 1 (improved). Respondents were also asked about hours slept and perceived change in hours slept.

RESULTS: Most respondents felt that several areas had worsened, including continuity of care and senior resident workload, or not changed, including supervision and sleep. Mean change scores that included all study variables except those related to sleep all showed worsening: patient care (mean −0.37); senior residents (mean −0.36), and program effects (mean −0.06) (P < .01). Respondents reported a mean of 6.7 hours of sleep in a 24-hour period, with the majority (71%) reporting this amount of sleep has not changed with the 2011 standards.

CONCLUSIONS: In the year after implementation of the 2011 ACGME standards, graduating pediatrics residents report no changes or a worsening in multiple components of their working and learning environments, as well as no changes in the amount of sleep they receive each day.

KEYWORDS: duty hours; handoffs; residents; supervision; workload

WHAT’S NEW

Since implementation of the 2011 ACGME standards, graduating residents report worsening in areas including care continuity and workload and no change in others, including supervision and sleep. Attention to each of these elements is vital given their importance in delivering optimal resident education and patient care.

In 2009, THE Accreditation Council for Graduate Medical Education (ACGME) formed the Task Force on Quality Care and Professionalism to develop new ACGME standards, which include new requirements for duty hours that: 1) limit the consecutive hours of interns to 16, 2) cap the consecutive hours of more senior residents to 24 plus an additional 4 hours for transition, 3) require a minimum of 8 hours (with 10 hours recommended) between shifts, and 4) mandate a minimum of 14 hours off after a 24-hour in-house call for senior residents. These standards also maintain previous requirements of the following, all averaged over 4 weeks: no more than 80 hours on duty each week, in-house call not more frequently than every third night, and 1 day off every 7 days. Much like an Institute of Medicine (IOM) report preceding these standards, the 2011 ACGME standards also included standards addressing components of a resident’s working and learning environment beyond duty hours, including a focus on supervision, transitions of care, clinical responsibilities, professionalism, personal responsibility, patient safety, teamwork, alertness management, and fatigue mitigation.

Although there are reports that the number of consecutive hours worked by residents affects patient safety as well as residents’ own safety and education, the literature to date has not been uniform. With mixed reports about the impact of limiting resident work hours, it is important to continue to evaluate the impact of changes in duty hours on components of the resident working and learning environment and on the amount of time residents report they spend sleeping. Although initial efforts give insight into some aspects of this across
specialties after implementation of the 2011 ACGME standards, to our knowledge, no previous study focuses solely on pediatrics or seeks to understand changes in sleep for pediatrics residents with these most recent changes. Thus, the focus of this study was to examine a national sample of 2012 graduating pediatrics residents’ perceived changes in their working and learning environment and in their sleep hours in the first year after implementation of the 2011 ACGME standards. The 2012 graduating residents completed 2 years of residency before implementation of these standards, allowing comparison, and then experienced the 2011 standards for 1 year before finishing residency.

**METHODS**

We used data from the American Academy of Pediatrics (AAP) 2012 Annual Survey of Graduating Residents for this study. The sample was randomly selected from an AAP database that includes all US pediatrics residents. Residents who were not in their third year of a categorical pediatrics residency and those from combined programs were excluded, leaving 2747 eligible residents. A random sample of 1100 residents was drawn from this population. A pilot version of the survey was sent to 100 residents from this sample in March 2012, and the survey was revised on the basis of responses (n = 25). The final survey was fielded to the national sample of 1000 third-year graduating pediatrics residents between May and August 2012 up to 4 times by mail and up to 4 times by e-mail. Requests alternated between mail and e-mail until the resident responded or a total of 8 requests were made. This number of requests is similar to other surveys. An identification number on the survey allowed tracking of respondents and resending surveys to nonrespondents. Mail and e-mail requests included information about the survey, approximate completion time (20 minutes), and a statement that resident responses would not be linked to their programs. E-mails also included a link to the online survey. Mailed surveys included a postage-paid return envelope; a $2 incentive was provided in the first mailing. The survey was determined to be exempt by the AAP institutional review board.

**Survey Content**

The AAP Annual Survey of Graduating Residents includes core questions on residents’ demographics, training experiences, residency program size, and career intentions that are asked each year. The 2012 survey also included additional questions focused on perceived changes in their working and learning environment and hours slept since the ACGME standards were implemented in July 2011. Similar questions were asked on the 2002 and 2004 Annual Survey of Graduating Residents around implementation of the 2003 ACGME standards and were developed in consultation with both residents and program directors. The slightly modified questions for the current survey were pilot tested as described above.

Residents were asked how 9 components of their working and learning environment had changed since implementation of the 2011 ACGME standards (“Based on your experiences over the past 3 years, how have the following factors changed in your program since the new ACGME limits on resident duty hours became effective?”), as follows: continuity of patient care, quality of patient care, patient handoffs, senior resident well-being, senior resident workload, senior resident education, resident supervision, resident/program director relationship, and program morale. Response options included much improved, somewhat improved, no change, somewhat worse, and much worse. These were collapsed into 3 categories for analysis: improved, no change, and worse.

Residents were also asked about their sleep practices using the same question that has been asked on the National Health Interview Survey (NHIS) since 2004 (“On average, how many hours of sleep do you get in a 24-hour period?”) and how these had changed with the 2011 ACGME standards (“How has the amount of sleep you get changed since the new ACGME limits on resident duty hours became effective on July 1, 2011?”). The first question required free-text entry, and response options for the latter included much more, somewhat more, no change, somewhat less, and much less. These were collapsed into 3 categories for analysis: more, no change, and less. To be consistent with the NHIS, hours of sleep were analyzed as whole numbers, rounding 30 minutes or more up to the next whole hour and dropping 29 or fewer minutes.

**ANALYSES**

Respondent characteristics, resident perceptions of change, and sleep were summarized using frequencies for categorical variables and means for continuous variables. A 1-way analysis of variance (ANOVA) examined for differences in reported sleep across program size. The chi-square test was used to examine the reported change in amount of sleep by program size.

To consider residents’ reports of the impact of the 2011 ACGME standards on specific components of their working and learning environment, 3 combined change scores were created on the basis of the 9 areas described above: 1) patient care (continuity of care, quality of patient care, patient care handoffs), 2) senior residents (well-being, education, workload), and 3) program effects (resident supervision, resident/program director relationship, and program morale), with scores ranging from −1 (worse) to 1 (improved). Although supervision could be classified in either the patient care or program effects category, it was included in program effects because the other patient care variables are more directly related to care and the structure of supervision is a product of the program. A 1-sample t test was used to examine whether scores were significantly different from 0 (or no change). A mixed-design, repeated-measures ANOVA examined for differences in the perceived impact of the standards on patient care, senior residents, and program effects for differences across program class size: small (<10 residents), medium
(10 to 19 residents), and large (20+ residents), and for the interaction of change scores and program size. Bonferroni adjustment was used for follow-up comparisons.

Study nonresponse bias was assessed in multiple ways. For gender and age, information was available about the population through the AAP administrative database, and respondents were directly compared to the nonrespondents in the random sample and to all 2012 graduating US pediatrics residents in the AAP database using chi-square or t tests. Study respondents were also compared to data for 2012 third-year residents from the American Board of Pediatrics (ABP) for gender using 1-sample proportion tests.

The number of cases in each statistical analysis varied slightly because of missing values for specific questions. P values of .05 or less were considered statistically significant for all inferential tests.

RESULTS

Sixty-three percent of the 1000 graduating residents in our randomly selected sample responded (n = 634), consistent with previous administrations of the AAP Annual Survey of Graduating Residents.

RESPONDENT CHARACTERISTICS

Table 1 provides characteristics of respondents. There was no significant age difference between sample respondents and the sample nonrespondents (P = .26) or between sample respondents and all 2012 graduating residents in the AAP database (P = .39). There was a gender difference between sample respondents and nonrespondents (76% women and 67% women, respectively, P < .01) but no significant gender difference between respondents and all 2012 graduating residents in the AAP database (P = .19) or between respondents and the ABP data. P = .24. Respondents attended residency programs of various sizes, with 12% reporting a small class size, 43% a medium class size, and 45% a large class size.

PERCEPTION OF WORKING AND LEARNING ENVIRONMENT

Over half of the respondents thought that continuity of care, handoffs, and senior resident workload had worsened with the new requirements (Table 2). The majority also reported that 4 aspects had not changed, including supervision and quality of care.

The means of the 3 combined change scores were all negative: patient care (mean score −0.37), senior residents (mean score −0.36), and program effects (mean score −0.06) (Fig. 1). Each of these negative scores was significantly different from 0 (or no change) (P < .01). Mean change scores were significantly worse for senior residents and patient care than for program effects (P < .001). This pattern of worsening was seen for all program sizes (Fig. 2), with no significant effect of program size overall (P = .15). Despite no overall effect, the impact on patient care and senior residents was significantly worse than the impact on program effects for medium and large programs (P < .001), and the impact on senior residents was significantly worse than the impact on program effects (P < .05) for small programs.

PERCEPTION OF SLEEP AND CHANGES IN SLEEP

Most respondents (n = 620, 98%) provided an answer to the free-text question about number of hours slept. They reported a mean of 6.7 hours of sleep in an average 24-hour period (95% confidence interval 6.6–6.8; median 7 hours), with 6% reporting less than 6 hours, 35% reporting 6 hours, 41% reporting 7 hours, 17% reporting 8 hours, and 1% reporting more than 8 hours. Mean sleep did not vary by program size (P = .84).

Most residents (71%) reported that the amount of sleep they got did not change with the 2011 ACGME standards.

Table 2. Graduating Pediatrics Residents’ Perception of Changes in the Working and Learning Environment After 2011 ACGME Standards Implementation (n = 626)

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Improved, %</th>
<th>No Change, %</th>
<th>Worse, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient care</td>
<td>16</td>
<td>29</td>
<td>55</td>
</tr>
<tr>
<td>Quality of patient care</td>
<td>13</td>
<td>59</td>
<td>28</td>
</tr>
<tr>
<td>Continuity of patient care</td>
<td>10</td>
<td>23</td>
<td>67</td>
</tr>
<tr>
<td>Senior residents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior resident well-being</td>
<td>11</td>
<td>46</td>
<td>43</td>
</tr>
<tr>
<td>Senior resident education</td>
<td>9</td>
<td>60</td>
<td>31</td>
</tr>
<tr>
<td>Senior resident workload</td>
<td>7</td>
<td>30</td>
<td>63</td>
</tr>
<tr>
<td>Program effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resident supervision</td>
<td>21</td>
<td>69</td>
<td>10</td>
</tr>
<tr>
<td>Program morale</td>
<td>16</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>Resident/program director relationship</td>
<td>9</td>
<td>81</td>
<td>10</td>
</tr>
</tbody>
</table>

ACGME = Accreditation Council for Graduate Medical Education.
Some reported less sleep (17%); a few reported more sleep (12%). The percentage who reported less sleep varied by program size, with 18% of residents in small programs, 12% in medium programs, and 21% in large programs reporting less sleep ($P = .03$).

**DISCUSSION**

In the first year after implementation of the 2011 ACGME standards, 2012 graduating pediatrics residents perceived a worsening or a lack of improvement in several components of their working and learning environments compared to their 2 years of residency training before these standards. Concomitantly, they reported no change in daily sleep.

**PERCEPTION OF IMPACT ON PATIENT CARE: WORSE CONTINUITY AND HANDBOFFS**

Graduating resident respondents in this study report no change in patient care quality and worsening of continuity of care and handoffs after implementing the 2011 ACGME standards. Interestingly, reports of worse continuity of care were also made by residents after the previous limitation of duty hours in 2003. Reported worsening in both continuity and handoffs in this study may be capturing the same aspect of the working and learning environment and providing triangulation around a single variable of worse continuity of care in which more handoffs are performed. Indeed, creating schedules in which interns cannot work more than 16 hours places the number of handoffs required to provide continuous patient care at risk of being increased. Additionally, these aspects may be unrelated, with a perception of both worsening in continuity of care as well as poorer quality of the same number of handoffs. In the worst case, these reports convey less continuity of care along with both an increased number of handoffs as well as a lower quality of those handoffs. Supporting the possibility of this final scenario, patients suffering potentially preventable adverse events have been shown to be more likely under the care of cross-covering residents, especially interns, and the number of resident handoffs has been reported as high in resident work structures trialing the 16-hour limits now in place for interns.

**PERCEPTION OF IMPACT ON SENIOR RESIDENTS: WORSE WORKLOADS**

Although most graduating resident respondents in this study reported no change in senior resident well-being or education with implementing the 2011 ACGME standards, the majority reported worsening of senior resident workload. This finding is consistent with the concern that limitation of duty hours may have the unintended consequence of work compression, resulting in higher workloads. In other words, limiting hours does not decrease the work to be done, only the time in which to complete it. Thus, workload increases in an effort to finish the work in less time. Indeed, such effects have been demonstrated with 16-hour duty restrictions such as those implemented for interns with the 2011 ACGME standards.

**PERCEPTION OF IMPACT ON PROGRAM: NO CHANGE IN SUPERVISION PROVIDED**

Equal numbers of graduating resident respondents in this study report no change and worsening of program morale with most reporting no change in resident supervision or the program director/resident relationship after 2011 ACGME standards implementation. No change in program morale or program director/resident relationship may be the ideal report from graduating residents; however, this may not be true for supervision. Although the report of no change in resident supervision could indicate that current supervision is optimal and no change is needed, this seems unlikely. Indeed, enhancing supervision is a major focus the 2009 IOM report and the 2011 ACGME standards, the 2 largest efforts to focus on improving resident working and learning environments in recent years. With previous research demonstrating the benefits of attending supervision of residents’ patient care, ensuring optimal supervision is paramount. The call for improved supervision from the IOM and ACGME paired with subsequent report of no change in supervision by graduating resident reports in this study is potentially concerning.

**PERCEPTION OF IMPACT ON SLEEP: NOT SLEEPING MORE**

Most of the graduating residents in this study did not think that their sleep had changed with the implementation...
of the new standards. The most notable duty hour changes in 2011 were focused on interns, so perhaps changes in senior resident sleep would not be expected.

Although no worsening in sleep is reassuring, the amount of sleep these residents report compares unfavorably with both the general population and young pediatricians. While 41% of respondents in this study reported less than 7 hours of sleep per night, only 30% of adults aged 18 to 44 years in the 2010 National Health Interview Survey of the general population and 26% of young physicians in the AAP Pediatric Life and Career Experiences Study reported less than 7 hours.31,32

LIMITATIONS

There are a few limitations for consideration in this study. First, this study reports the perceptions of graduating residents in the first year after implementation of the 2011 ACGME standards. Future studies must analyze trends in these data as these standards become more embedded in residents’ working and learning environments, ensuring adequate time to implement and capture changes, and must also compare these resident reports with objective outcomes-focused data on the impact of these standards. Second, in the nonresponse bias analyses, 1 of the 3 approaches used showed a gender bias, so it might be that women were more likely than men to participate in the survey. However, no gender difference was observed when compared to ABP data on 2012 graduating residents.33 Third, participants in this survey were graduating residents. Therefore, their reports may not represent the view of all pediatrics residents, which was beyond the scope of this study but which warrants further study in the future. Fourth, regarding the questions about sleep and change in sleep, it is unclear whether simply changing residency training years may affect the amount of sleep residents receive and thus affect these responses. Fifth, this study did not seek to determine the impact of systems factors, financial support, or the availability of support services on the working and learning environment. Future study should include focus on these areas, which can facilitate or thwart optimally addressing the areas in which respondents in our study report worsening or no change. Finally, program director, faculty, and intern views were not included in this study and should be the focus of future study. With the most notable changes in hours occurring for interns with the 2011 ACGME standards, this group is particularly interesting to investigate.

CONCLUSIONS

In the year after 2011 ACGME standards implementation, graduating pediatrics residents in this study report several areas of their working and learning environments have worsened, including continuity of care and senior resident workload, or not changed, including supervision and sleep. Interestingly, the 2011 ACGME standards include several non-duty-hours standards, including requirements for transitions of care; clinical responsibility, which inherently includes workload; and supervision.1,2

The overlapping report of graduating residents in this study related to these factors and their inclusion in the 2011 ACGME standards may serve as a call to action to commit clear focus to these areas with the hope of enhancing patient care and resident education to the fullest extent possible.34

ACKNOWLEDGMENTS

Supported in part by the American Academy of Pediatrics.

REFERENCES


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Graduating Pediatrics Residents’ Reports on the Impact of Fatigue Over the Past Decade of Duty Hour Changes

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ABSTRACT

OBJECTIVE: Concern about resident and patient safety has led to changes in Accreditation Council on Graduate Medical Education requirements over the past decade, with duty hour limitations in 2003 and 2011. This study examines pediatric residents’ experiences on the impact of fatigue before, during, and after this time.

METHODS: An annual survey of graduating pediatrics residents was administered to a national, random sample in 2002, 2004, and 2013. Respondents were asked about the impact of fatigue. Multivariable logistic regression was conducted to compare differences between survey years.

RESULTS: The combined response rate for all 3 years was 62.6% (1,251 of 2,000). In multivariable analyses, residents were less likely in both 2004 and 2013 than in 2002 to fall asleep during an educational conference (adjusted odds ratio [aOR] 0.61, 95% confidence interval [CI] 0.41–0.91 and aOR 0.32, 95% CI 0.22–0.45, respectively) and to fall asleep while driving from work (aOR 0.55, 95% CI 0.37–0.81 and 0.43, 95% CI 0.31–0.60, respectively). Residents were less likely in 2004 than in 2002 to report making an error in patient care due to fatigue (aOR 0.46, 95% CI 0.27–0.76); however, in 2013 resident report of making an error in patient care due to fatigue returned to levels similar those reported in 2002.

CONCLUSIONS: Surveys of graduating pediatrics residents over the past decade (2002–2013) indicate overall reduced fatigue effects. During this same time frame, however, reports about making patient care errors improved but then returned to a level not significantly different from 2002, a finding warranting further exploration.

KEYWORDS: duty hours; fatigue; residents


WHAT’S NEW

Duty hour limitations were implemented in 2003 and expanded in 2011. Across these changes, graduating residents in this study report overall improvement regarding the impact of fatigue. However, reports about patient care errors improved but then worsened to previous levels.

ACGME changes have demonstrated mixed results for achieving these goals. At the time of initial duty hour reduction in 2003, trainees in all programs at 2 teaching hospitals with reduced hours were less likely to report fatigue had affected the care they provided or the safety of their patients. In 2011, they implemented further restrictions, most notably capping the continuous duty of interns at 16 hours and encouraging strategic napping after 16 hours of continuous duty for senior residents.

Duty hour limitations purportedly prevent fatigue that places patient safety and resident education at risk. However, studies looking at duty hour limitations across both specialties in 2003, including caps of 80 hours per week and 30 consecutive hours. In 2011, they implemented further restrictions, most notably capping the continuous duty of interns at 16 hours and encouraging strategic napping after 16 hours of continuous duty for senior residents.

Duty hour limitations purportedly prevent fatigue that places patient safety and resident education at risk. However, studies looking at duty hour limitations across both specialties in 2003, including caps of 80 hours per week and 30 consecutive hours. In 2011, they implemented further restrictions, most notably capping the continuous duty of interns at 16 hours and encouraging strategic napping after 16 hours of continuous duty for senior residents. Studies focused on the effects of limitations that were implemented for interns in 2011 also show variable results. For example, residents working more than 24 consecutive hours, often compared to working 16 hours or less in these studies, have been shown to be more likely to commit medical errors, make diagnostic errors, experience failures in attention, experience a sharps injury at work, and suffer a motor vehicle crash while driving.
home from work. However, another study has uncovered essentially equal daytime sleepiness when residents worked 12 to 16 hours versus 24 hours.

Studies to date suggest a variable impact of duty hour limitations on fatigue. To our knowledge, no study has looked at fatigue and its potential consequences in any given specialty across multiple time points from before duty hour limitations to the present. Thus, the purpose of this study was to examine the changes in graduating resident reported outcomes related to fatigue from before initial duty hour limitations through both changes in the past decade within pediatrics.

**METHODS**

We analyzed data from 3 years (2002, 2004, and 2013) of the American Academy of Pediatrics (AAP) Annual Survey of Graduating Residents (GRS). Data about the impact of fatigue have been previously reported for the 2002 and 2004 surveys and are included here for comparison and analysis with 2013 data. The survey was fielded to a random sample of 500 graduating pediatric residents in 2002 and 2004 and 1,000 graduating pediatric residents in 2013 during and following their last months of training (May to September). Third-year residents were randomly selected from an AAP database, regardless of AAP membership status, that includes all residents from ACGME-accredited categorical pediatrics programs in the United States. Those from combined training programs, such as medicine/pediatrics, were excluded.

Residents were contacted up to 4 times by mail in 2002 and 2004 and up to 8 times by mail and e-mail in 2013. In 2002 and 2004, no remuneration was provided; in 2013, the first mailed survey included a $2 bill. The GRS includes core questions that are repeated each year and thematic questions that vary from year to year. In 2002, 2004, and 2013, three theme-based questions focused on resident fatigue were asked: “Has fatigue from work caused you to do any of the following in the past year?: 1) fall asleep during an educational conference, 2) fall asleep while driving from work, or 3) make an error in patient care. These questions were developed in 2002 in consultation with residents and program directors and were identical on all 3 surveys. Residents were also asked questions about their demographic characteristics and training. These questions were identical on all 3 surveys, with the exception of race, which varied slightly. However, responses from all 3 years were collapsed into the same categories: white/non-Hispanic, Asian, minority (Hispanic, black or African American, Native American) and other.

All surveys were approved by the AAP institutional review board.

Data on sex and age were available in the AAP database from which the samples were drawn. We used chi-square and t tests to compare sex and age of the respondents to those of nonrespondents to assess potential response bias.

We used Pearson chi-square to test for differences in response rates by year and differences between the survey years (2002 vs 2004, 2004 vs 2013, and 2002 vs 2013) for the 3 resident-reported outcomes: 1) fall asleep during an educational conference; 2) fall asleep while driving from work; and, 3) make an error in patient care. We used linear by linear chi-square tests to examine for trends across survey years for the resident-reported characteristics and the 3 outcomes.

We used multivariable logistic regression to examine whether any differences across survey years held in the 3 resident-reported outcomes when potentially important differences in resident and program characteristics between survey years were controlled for statistically, including age (<31 years or ≥31 years), sex (male or female), race (white, non-Hispanic; Asian; minority—Hispanic, black, or Native American; or other), marital status (married or unmarried), educational debt (<$150,000 or ≥$150,000; debt includes college, medical school, and if married, spouse educational debt, and adjustments for inflation were performed using the yearly Consumer Price Index to convert all values to 2013 dollars), medical school location (IMG: outside the United States and Canada; or USMG: United States/Canada medical school), and program size (<10; 10 to 19; or >19 residents per class). These characteristics were chosen because they provide a demographic profile of residents and/or their proportions have changed over time.

The number of cases in statistical analyses varied slightly because of missing values for specific questions; P ≤ .05 was used to determine statistical significance.

**RESULTS**

For all 3 survey years combined, a total of 1,251 graduating pediatric residents responded to the survey (62.6%); 323 (64.6%) of 500 residents surveyed in 2002; 303 (60.6%) of 500 residents surveyed in 2004; and 625 (62.5%) of 1,000 residents surveyed in 2013 responded. Response rate did not vary significantly by survey year (P = .43). Significant differences were found between all survey respondents and nonrespondents for sex (71.8% vs 67.5% female, respectively, P = .05) but not for age (31.4 vs 31.5 years, respectively, P = .32).

Demographic characteristics of the residents for each of the 3 years are presented in Table 1. There were no significant differences in aggregate data across survey years for sex, age, or marriage; however, there were significant differences for race, educational debt, program size, and medical school location (P < .01).

As shown in the Figure, the percentage of residents who reported falling asleep during an educational conference decreased across survey years (81.1% in 2002, 73.2% in 2004, and 60.1% in 2013, linear-by-linear P < .001). A downward linear trend was also found for falling asleep while driving from work (31.9% in 2002, 20.5% in 2004, and 18.8% in 2013; P < .001). However, making an error in patient care decreased and then increased. The percentage of residents who reported making an error decreased from 17.0% in 2002 to 8.3% in 2004 (P < .01) and increased from 8.3% in 2004 to 13.6% in 2013 (P < .05).

In multivariable analyses, controlling for resident characteristics and program size, the odds for falling
asleep during an educational conference and falling asleep while driving from work were significantly reduced across years (Table 2). Residents were less likely in both 2004 and 2013 than in 2002 to fall asleep during an educational conference (adjusted odds ratio [aOR] 0.61, 95% confidence interval [CI] 0.41–0.91 and aOR 0.32, 95% CI 0.22–0.45, respectively) and to fall asleep while driving from work (aOR 0.55, 95% CI 0.37–0.81 and 0.43, 95% CI 0.31–0.60, respectively). Residents were also less likely in 2004 than in 2002 to report making an error in patient care due to fatigue (aOR 0.46, 95% CI 0.27–0.76).

**DISCUSSION**

This study found a steady decrease in graduating pediatric residents’ reports of fatigue leading them to fall asleep during educational conferences or fall asleep while driving from work across both duty hour limitations over the past decade. However, reports of making errors in patient care due to fatigue decreased remarkably with 2003 duty hour standards implementation but returned to a level not significantly different from 2002 after 2011 limitations.

**CONSISTENT DOWNWARD TRENDS: FALLING ASLEEP**

Across survey years, in multivariable analysis, we found a decline in reports of fatigue leading residents to fall asleep during educational conferences or while driving from work. This suggests duty hour limitations are accomplishing some of the goals they set out to achieve. Although this is a potentially anticipated trend, there was no evidence prior to duty hour restrictions that limiting hours would directly change fatigue. Indeed, residents still report notably less sleep than young physicians and the general public. The trends in this study are also reassuring given the possibility that increased workload described with duty hour changes could contribute to fatigue rather than diminish it.

**VARIABLE TRENDS: PATIENT CARE ERRORS**

Residents across survey years in our study reported fatigue contributed to making an error in patient care less in 2004, after 2003 duty hour standards implementation, but then more in 2013 (returning to levels not significantly different than 2002), after 2011 duty hour standards implementation. Several possibilities could be responsible for this trend. First, it is possible that 80 hour per week limitations implemented in 2003 led to decreased fatigue related errors but that these effects are now being diminished for senior residents (those in our study) as they assume more workload in a system where interns have been limited to 16 consecutive hours. Second, duty hour limitations might have led to a decrease in fatigue that leads to patient errors but that a concomitant increased focus on quality and patient safety over the past decade makes residents more aware of errors and thus more likely to report them. Indeed, today’s residents are encouraged to report latent and observed errors they encounter in their daily work. Third, it is possible that residents recognize and report errors related to handovers, magnified by increased handovers with duty hour restrictions, more in recent years given the increased focus on the relationship between handovers and errors. Fourth, decreased hours worked might lead to residents being less well prepared to assume patient care responsibilities and thus more likely to commit errors. Finally, there could be other variables influencing, and perhaps even dominating, this trend over the past decade. The increasing complexity of individual patient health care needs, need for

**Figure.** Graduating pediatric residents’ reported impact of fatigue.
team-based care where it may not be available, and intricacies of modern health care systems are all examples of potentially growing sources for error being introduced into resident working and learning environments.

LIMITATIONS

There are a number of limitations to consider for this study. All data came from self-reports of graduating pediatrics residents without independent measures of sleep, fatigue, or patient care errors collected for comparison. Furthermore, graduating residents or pediatrics residents may not be representative of residents from all training years or other specialties, respectively. Several components of residents’ working and personal lives can contribute to fatigue, and this study did not analyze these areas. The survey methodology differed in 2013 (sample size, remuneration, and online option), which could have an impact. However, the response rate for 2013 did not differ significantly from the 2002 or 2004 rate. Finally, we are unable to determine when change happened between 2004 and 2013: was change gradual, or did it occur immediately after the implementation of the 2011 standards?

CONCLUSION

Overall, the effects of duty hour limitations on fatigue seem to be positive in this study. However, concerns about adequate training and variable fatigue effects reported with respect to patient errors continue to make this an important area for future research to guide continued understanding for how to best structure the resident working and learning environment for the safety and benefit of all within it.

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REFERENCES


Comments on the specific ACGME duty hours requirements.  
From the AAP Committee on Pediatric Workforce

VI.G.1. Maximum Hours of Work per Week
Duty hours must be limited to 80 hours per week, averaged over a four week period, inclusive of all in-house call activities and all moonlighting.

The implementation of duty hours has led to the creation of a shift mentality for physicians and their role in care. Most programs have implemented a dual-team approach to patient care with a day-time and night-time team responsible for the same patients. This system emphasizes completion of patient-care work in a 12 hour period, with minimal concern for transitions in patient status at the changeover points. While nursing has long had such a system, the impact is a focus on tasks and less on the well being of the patient and family. Moreover, nursing has accomplished the shift work by limiting the number of patients cared for by an individual nurse. Such restrictions in numbers of patients on a physician team has created a culture of dependence on hospitalists and ambulatory physicians that do not work in both hospital and ambulatory environments. This barrier in experience of care of the patient, either at home or in hospital, has not improved transitions from one setting to the other. It has fostered a false-specialization in the management of chronic illnesses.

PATIENT CARE
VI.A.1. Programs and sponsoring institutions must educate residents and faculty members concerning the professional responsibilities of physicians to appear for duty appropriately rested and fit to provide the services required by their patients.

Residents report that they are more rested and ready to work with the new duty hours. They also report less engagement in the management of the short-term patient admitted by their opposite team member. They are less engaged with the family and transitions between hospital and home or clinic. There are several studies that have been done that suggests that there is no difference in error rate between the fatigued resident of old and the new rested resident.

MEDICAL KNOWLEDGE

Clerical duties now dominate the resident’s day. The learning rate appears to have not improved with the rested resident. It is not clear whether the impact is on the breadth of patients seen, the increasing complexity of care of the hospitalized patient, or the burden of linking learning to engagement with the patient. The net effect is that cognitive testing on Board exams is neither improved nor worsened.

PRACTICE-BASED LEARNING AND IMPROVEMENT
VI.A.2. The program must be committed to and responsible for promoting patient safety and resident well-being in a supportive educational environment.

This is an area wherein the system has superseded the individual. The use of computerized power plans, to assure that all details in care are covered, leaves little incentive for the trainee to absorb and understand why the order set was created and the data behind it. Even including hyperlinks within the order set has not led residents to visit the background for the order set. The risk, then, is when the resident leaves this highly structured and supported environment and has to deal with a system that is not as well developed. How does the resident build on their supportive educational environment when the practice they enter is not as well developed and supported?

INTERPERSONAL AND COMMUNICATION SKILLS

Residents remain as bright, capable and engaged as ever. They have excellent communication skills between residents and faculty. Many come with extraordinary compassion and experience. However, the increase in administrative and paper work inhibit time spent with patients and families. The hidden priority to complete the hand-off check-list for the day or night team decreases time for interaction with families.
PROFESSIONALISM
Accountability to patients, society and the profession

A common complaint is that residents are so pushed to complete their paper tasks that they do not develop the deep and meaningful links to their patients as they did when less time constrained. Sometimes the resident is a mere caretaker for some patients and does not feel responsibility for moving care along.

VI.A.5.d) management of their time before, during, and after clinical assignments;

Residents remain at a phase of their life of coupling, becoming parents, and wanting to do other activities of daily living. Those demands are now given equal weight to their clinical time. The vast majority of residents continue to learn medicine in their off time. They are also given an expectation that there should be ‘balance’ between their work and personal life, instead of having the more realistic awareness that ‘balance’ is a personal decision and is often caught up in the day to day, moment to moment choices in life.

SYSTEMS-BASED PRACTICE
VI.B.1. Programs must design clinical assignments to minimize the number of transitions in patient care.

There are a number of published schemes focused on how to assist in describing the patient to the next resident taking on their care. These schemas seem to have a life of their own. Most are paperwork focused and do not encourage engaging the patient, family and physician in their joint effort to improve care. Nursing has met and dealt with this problem by offering a variety of shift lengths (8, 10, & 12 hours) and limiting the number of patients cared for by any individual.

VI.B.2. Sponsoring institutions and programs must ensure and monitor effective, structured hand-over processes to facilitate both continuity of care and patient safety.

This is the area where work hours as demanded has created the most turmoil. In order to accommodate patient care needs, most programs have increased the number of hand-offs of patient information over the 24 hours. Are we moving in the direction of limiting the number of patients for physicians? Can a physician successfully and safely care for 8, 10, 12, 15 or more patients on an inpatient service? How are these restrictions applied in a busy clinic setting? How does the resident learn about both inpatient and outpatient management of the patient’s needs? Where is the focus on facilitation of care from inpatient to outpatient care?