Guidelines for Adolescent Preventive Services

The GAPS in Practice

Anne Gadomski, MD, MPH; Shannon Bennett, BS; Margaret Young, MD; Lawrence S. Wissow, MD, MPH

**Design:** Pre– and post–Guidelines for Adolescent Preventive Services (GAPS) comparison of outcomes gathered via chart audit.

**Setting:** A rural hospital-based general pediatric clinic.

**Participants:** Adolescents who underwent annual examinations between April 1, 1998, and March 31, 2001. A random sample of 441 medical records was reviewed.

**Intervention:** Training in the GAPS model and use of the questionnaire began in April 1998.

**Main Outcome Measures:** Detection of, discussion of, and referrals for GAPS-related risk behavior.

**Results:** The medical records of 162 younger adolescents (aged 11-15 years) and 279 older adolescents (aged 16-19 years) were audited. Detection of risk behaviors increased from 19% at baseline to 95% with the initial GAPS and 87% with the periodic GAPS. The most prevalent risk factor was having a rifle or gun in the home (younger adolescents, 47% and older adolescents, 39%). The mean number of risk behaviors and health concerns documented was higher in the initial GAPS (4.8 and 1.3, respectively) than in the periodic GAPS (3.8 and 0.7) (P=.01 and .006). The GAPS questionnaires detected lower levels of risk behavior compared with a local Youth Risk Behavior Survey. Controlling for sex, age, and clinician, discussion of psychosocial topics increased during the study period; however, there was considerable variation among clinicians regarding the topics addressed. The GAPS-related referral rate did not change significantly.

**Conclusion:** The GAPS model increases clinicians’ detection and discussion of risk behaviors.


Although the need for comprehensive adolescent health care has been well documented, implementation requires significant system change. Ten years ago, the American Medical Association (AMA) produced the Guidelines for Adolescent Preventive Services (GAPS) as a clinical service tool and model for the provision of comprehensive adolescent health care. The GAPS has several components, including recommendations for the organization and content of services, clinician training materials, and educational materials. The GAPS model includes questionnaires that streamline screening during the annual examination. Adolescents and their parents independently complete GAPS questionnaires that include an inventory of adolescent health concerns and risk behaviors. Thus, the GAPS model allows the clinician to work with both the parent and the adolescent to target the risk behaviors that are most relevant to the youth's life experience.

We adopted the GAPS model in our clinic to respond to what appeared to be a major unaddressed public health problem. In 1997, a local countywide Youth Risk Behavior Survey (YRBS) demonstrated risk behavior reporting comparable to and in some cases exceeding national YRBS averages. Our medical records contained parent-completed screening questionnaires for children from birth to school age, but none for adolescents. Regular use of the GAPS instruments promised to improve detection of risk behavior involvement, increase counseling, and increase risk-behavior–related referrals.

Our evaluation was designed to answer several questions about the effect of implementing GAPS screening. A pilot evaluation of the GAPS model involving 95 adolescents in an urban setting found that clinicians often addressed the risk behaviors the adolescent had checked during screening. However, the chance
that clinicians would address any particular risk decreased as adolescents checked greater numbers of risk factors or came to the visit with more than one or two health issues to discuss. In a study conducted at 5 community health centers, the use of the GAPS model, over the course of 15 months, was associated with increased adolescent receipt of health education materials, increased clinician discussion of risk behavior prevention, and increased documentation of screening and counseling. It is not known whether routine use of the GAPS model in a general pediatric setting can promote sustained increases in clinician counseling during annual visits. Prior studies also did not address whether GAPS screening leads to increased use of follow-up services for risk behaviors, or if it increases parental education regarding youth risk behaviors. Finally, we wanted to determine whether the prevalence of risk factors, as reflected by GAPS screening, would be comparable to the level suggested by the YRBS.

**METHODS**

**SETTING**

Bassett Healthcare, Cooperstown, NY, is a nonprofit, rural health network of physicians, midlevel clinicians, hospitals, and regional health care centers serving a population of 427,980 in 8 counties in central New York. The Bassett Pediatric Clinic is a hospital-based general pediatric clinic located in the center of this network. The clinic averages 15,000 visits per year by children aged 0 to 21 years and was staffed by 6 midcareer general pediatricians and 1 pediatric nurse practitioner during the study period. This study was approved by the Mary Imogene Bassett Hospital Institutional Review Board.

**IMPLEMENTATION FIDELITY**

To prepare for the use of the GAPS questionnaires, our clinic manager attended an AMA GAPS train-the-trainer program in Chicago, Ill, and returned to lead our staff (clinical and office) in a 1-day training. This training was boosted by several adolescent risk-behavior–related 1-hour training sessions and a 6-hour video conference that included a GAPS presentation by Arthur Elster, MD, principal author of the GAPS model. Clinic protocols and procedures were changed to accommodate the GAPS model using the Implementation and Resource Manual as a guide, and the medical record committee approved GAPS forms for inclusion in medical records. Copies of the GAPS topic sheets and educational materials for parents were produced and made available for distribution.

When age-appropriate patients arrived for an annual health maintenance visit, they and their parents received GAPS questionnaires to complete while they were waiting. To underscore the voluntary nature of GAPS questionnaire completion, the nurse informed the adolescent to answer only those questions he or she felt comfortable answering. The adolescent and parent completed the forms in separate rooms (parent in the waiting area and adolescent in the examination room), unless the parent and adolescent wanted to remain together for the physical examination. Subsequently, clinicians used a structured encounter form, including the history, physical examination, assessment, and plan, to document the visit. Because the use of structured encounter forms is associated with significantly higher levels of both documented and observed performance in pediatric primary care, the planning section of the clinician form includes a list of GAPS topics to prompt clinician action and documentation. The GAPS topic sheets and parent information packets were available for use by clinicians to reinforce counseling. Limited resources precluded having a designated prevention educator; therefore, clinicians did their own counseling, arranging follow-up and referrals.

The GAPS screening forms come in 2 versions, an initial form for first health maintenance encounters between a given patient and clinician and a shortened form for subsequent annual visits. Feedback from clinicians during discussions about using GAPS led us to shorten both versions by omitting items that were rarely endorsed on the locally administered YRBS. Omitted questions included moderate physical activity, helmet and seat belt use, body piercing, ever been pregnant or gotten someone else pregnant, when you get angry do you violent things, and would you like to get counseling about something on your mind. These omissions reduced the initial GAPS questionnaire from 74 to 69 items and the periodic (subsequent annual visit) questionnaire from 61 to 48 items.

The GAPS screening began in stages after clinicians and staff had been trained. In April 1998, half the clinicians began using GAPS forms for older adolescents (aged 16-19 years). A year later, in April 1999, all clinicians began using GAPS forms for both older and younger (aged 11-15 years) adolescents.

**CHART AUDIT**

Clinic registration databases were used to identify patients aged 11 to 19 years seen by a clinician in the Pediatric Clinic from April 1, 1998, to March 31, 2001. This database contains an indication of the type of visit (eg, acute, annual, neonatal, or return). A list of medical record numbers was then generated for those who had had an annual visit during the study period. Given that older adolescents are likely to have a larger proportion of endorsements, sampling was weighted toward older adolescents (2:1) to abstract a smaller proportion of medical records with negative screens than positive. To measure an increase from 15% to 30% in positive endorsements for emotional problems between year 1 and 2 on a 2-tailed test with type I error probability of 0.05 and a power of 0.80, a minimal sample size of 146 adolescents was required per year. Thus, of the 3854 annual visits during the 3-year period, a random sample of 450 annual visits was generated. Duplicate medical record numbers were replaced with unique ones; therefore, the sample contained 430 unique adolescent annual visits. Most (86%) of these were annual visits for established patients; only 14% were for patients who were new to the clinic. The random sample in year 1 included 14% of adolescents who were seen that year for annual visits, whereas years 2 and 3 included 11% each year.

Data from each medical record were entered in a confidential manner preserving anonymity. The chart audit took place within the Pediatric Clinic and was performed by one of us (S.B.), who followed abstracting protocols and resolved data abstraction issues with the lead author (A.G.).

Four outcomes were sought during the chart audit. First, is there a GAPS screening form present and complete? Second, if so, what risk behaviors were checked off by the adolescent? If not, what risk factors were mentioned in the structured medical note? Third, was there any indication on either the GAPS questionnaire or the clinician checklist that risk factors disclosed were discussed, and, if so, what happened? Options included documentation of discussion during the visit, follow-up visit for the risk behavior, referral, or no action recorded. And fourth, for those medical records with endorsement of 1 or more GAPS risk behaviors, visits up to 1 month after the GAPS index visit were reviewed to see if there was documentation of the problem being resolved, addressed, or referred. The correspondence section of the medical record was
also reviewed to see if the patient was seen elsewhere (eg, specialist or community-based services). All referrals, as well as GAPS-related referrals, were recorded.

Logistic regression was used to evaluate the predictors of risk behavior discussion. Because screening for most of the problems on the GAPS forms occurred only when the forms were used, the documentation of those problems and the use of GAPS were highly correlated. Therefore, whether GAPS screening was done or was not dropped as a variable and replaced with the time period, ie, the year of study. Dummy variables were created for each clinician and for visit type. Age was entered as 2 groups (11-15 and 16-19 years). Patient’s sex was included as a covariate.

**RESULTS**

**USE OF THE GAPS QUESTIONNAIRE**

We reviewed the medical records of 162 younger adolescents (aged 11-15 years) and 279 older adolescents (aged 16-19 years) from April 1998 to March 2001. Nine records were not included because they were missing during the medical record audit. For the entire study period, a parent or adolescent refused to complete the GAPS questionnaires in 1% of the annual visits sampled.

**CHANGES OVER TIME**

Detection of 1 or more risk behaviors increased from 19% of annual visits in the year the GAPS was introduced to 95% with the initial GAPS and 87% with the periodic GAPS by the end of the study period. The mean number of risk behaviors and health concerns was higher with the initial GAPS form (4.8 and 1.3, respectively) than with the periodic GAPS form (3.8 and 0.7) (P = .01 and .006).

The percentage of visits with a completed GAPS form increased from 33% during 1998 to a peak of 94% in 1999 and leveled off at 90% in 2000 (Figure). The percentage of parental GAPS forms completed was lower than that for adolescents, reflecting the fact that parents do not always accompany adolescents to annual visits. Among the visits with a GAPS questionnaire completed by an adolescent, 67% had a parent-completed GAPS questionnaire. One third of parents who completed the GAPS form requested parenting or developmental information about adolescence.

**RISK FACTOR PREVALENCE**

The 6 most prevalent risk factors endorsed by older adolescents included having a rifle or gun in the home (39%), friends using tobacco (39%), friends ever having sex (36%), friends drinking alcohol (29%), household tobacco use (28%), and friends using marijuana (22%). Among younger adolescents, a similar risk behavior prevalence was observed: having a rifle or gun in the home (47%), household tobacco use (40%), friends tried alcohol (34%), friends tried tobacco (24%), seen a violent act (24%), and have tried alcohol (22%).

The least prevalent risk factors for older adolescents were steroid use (0%), ever had a sexually transmitted disease (1%), concerns about sexually transmitted diseases, sex, or relationships (1%), worry about violence or safety (1%), abused (2%), and attracted to own sex (2%). For younger adolescents, the least prevalent risk factors were other drug use (0%), ever used marijuana (1%), thinking of having sex (1%), thoughts or plans for suicide (1%), and abused (1%).

Girls reported higher mean (SD) total numbers of risk behaviors (3.6 [3.6]) and health concerns (1.0 [1.8]) than did boys (risk behaviors, 2.9 [3.0]; P = .02 and health concerns, 0.5 [1.3]; P = .003). Girls had a higher mean number of GAPS-related diagnostic assessments (0.6) than did boys (0.4) (P = .004).

Within our clinical sample of adolescents who completed the GAPS questionnaire, 41% of older adolescents and 34% of younger adolescents attended the local high school. The GAPS questionnaire yielded lower levels of risk behavior reporting compared with those obtained in the YRBS at this school and the aggregated results for the county overall. Table 1 displays results for those questions that are the most similar in wording in the 2 questionnaires. The level of certain risk behaviors reported through the GAPS forms in our clinical sample is often half that reported in the YRBS at the local school and in the county as a whole.

**Figure**

Trends in completed Guidelines for Adolescent Preventive Services (GAPS) forms and referrals since introduction of GAPS screening in April 1998 for younger adolescents (aged 11-15 years), older adolescents (aged 16-19 years), and their parents. Referrals are the percentage of GAPS-screened annual visits with a documented referral of any kind within 1 month of the GAPS visit.
Documentation of discussion of most of the GAPS topics increased during the study period. The topics for which GAPS helped the most in terms of increasing documentation were exercise, body image, sexuality, peer relations, and parent conflicts (Table 2). Multivariate equations used to predict the likelihood that documentation of a discussion of a GAPS risk behavior topic occurred also demonstrated increased likelihood of discussion during the study period. For example, even controlling for sex, age, and clinician, discussion of psychosocial topics increased during the study period as reflected by the increased odds ratio for the variable “study year.” The odds ratio (95% confidence interval) for study year was 2.68 (1.54-4.63) for predicting discussion of diet, 2.52 (1.45-4.38) for exercise, 2.21 (1.24-3.93) for school performance, 4.81 (2.84-8.16) for peer relations, 2.31 (1.21-3.55) for smoking, 3.19 (1.91-5.32) for sexuality, and 1.88 (1.09-3.26) for emotional health issues. These statistically significant odds ratios suggest that documentation of the discussion of these topics increased significantly during the study period. One notable exception was substance abuse, for which the corresponding odds ratio, 1.56,
was not statistically significant, suggesting a lesser increase in likelihood of discussion during the study.

**CLINICIAN AND PATIENT FACTORS ASSOCIATED WITH DISCUSSIONS**

Multivariate modeling demonstrated significant variation among the 7 clinicians conducting the screening regarding the GAPS topics addressed. For example, some clinicians always documented discussion of diet, and some never did in all visits sampled. Only 1 clinician was significantly more likely to discuss exercise (odds ratio, 4.67; 95% confidence interval, 1.25-17.50), whereas most clinicians had increased likelihood for discussing tobacco use during the study period as reflected by significantly increased odds ratios for this topic.

As might be expected, older patient age was significantly associated with discussion of tobacco use, acquired immunodeficiency syndrome or sexually transmitted diseases, reproductive health, and driving.

**EFFECT ON REFERRALS AND ASSESSMENTS**

Although reporting increased significantly for both risk behaviors and health concerns, there was little detectable effect on action, as it was defined in this study (Table 3, Figure). The GAPS-related diagnostic assessments and referrals related to risk factors at the time of the index visit or 1 month later did not change significantly during the study period. Specifically, GAPS-related referrals occurred for 12.5% of annual visits in year 1, 9.6% in year 2, and 8.5% in year 3 (P = .23). There was also no change in the number of adolescents referred for any reason during the study period.

There was a significant correlation between the number of health concerns raised and the number of actions taken to address risk behaviors (for the 441 cases examined: Pearson correlation, 0.198; P = .01). This direct relationship suggests that health concerns raised by the adolescent at the annual visit did not distract the clinician from addressing risk behaviors.

The increase in documentation of risk behaviors varied and depended on the clinician and the patient’s age or sex. Specific changes in referral rates or follow-up visits were not detected by this study.

Within-practice didactic training in the GAPS model and use of the questionnaire may be insufficient to produce change in referral rates or follow-up visits for adolescents endorsing risk behavior. However, rural areas are limited in services available to adolescents. Thus, the outcomes of screening could be limited if there is no service available to address newly disclosed problems. This is particularly true in rural settings, which historically are underserved areas in terms of medical, mental, dental, and preventive care. The AMA pilot study of the GAPS was conducted in 7 clinical sites in the Chicago area and included 15 clinicians and 95 adolescents. In this urban and more ethnically diverse setting, about one third of adolescents screened with the GAPS were likely to require follow-up or referral for mental health, diet, and/or substance abuse. Our referral rates for GAPS-related problems were lower and drifted downward from 12.5% at the beginning of the study period to 8.5% in year 3. The lower referral rates in our study may be a function of differences in adolescent risk profiles, service availability, and clinical training between these 2 studies.

Low rates of screening for sexual intercourse, substance abuse, eating disorders, exercise, and peer involvement in risk behavior have been documented in other studies. In our study, large increases in clinician discussion of exercise, body image, sexuality, peer relations, and parent conflicts occurred following the use of the GAPS questionnaire, a finding that underscores the clinical utility of this tool in addressing difficult topics. Increases in discussions regarding parent conflicts and school performance may be particularly important, given the protective effects of parent-family connectedness and perceived school connectedness documented by the National Longitudinal Study on Adolescent Health.

The high rates of risk behaviors in the county revealed by the 1997 YRBS survey motivated us to adopt the GAPS model to better serve our local population. We expected the GAPS questionnaire results to approximate the level of risk behaviors reported in the YRBS by adolescents in our community who are also served by our clinic, but it did not. One possible reason is that the validity of the GAPS may be limited by the adolescent’s will-

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**Table 3. Selected Outcomes of Using the Guidelines for Adolescent Preventive Services (GAPS) Questionnaire by Year of Chart Audit**

<table>
<thead>
<tr>
<th>Selected Outcomes</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean No. of risk behaviors reported per visit</td>
<td>1.3</td>
<td>4.5</td>
<td>3.9</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mean No. of specific health concerns reported per visit</td>
<td>0.2</td>
<td>1.1</td>
<td>0.9</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mean No. of actions taken on risk behaviors reported per visit</td>
<td>0.6</td>
<td>0.7</td>
<td>0.7</td>
<td>.54</td>
</tr>
<tr>
<td>Mean No. of referrals at time of index annual visit/No. of annual visits</td>
<td>0.22</td>
<td>0.24</td>
<td>0.24</td>
<td>.94</td>
</tr>
<tr>
<td>Mean No. of GAPS-related referrals at time of index annual visit/No. of annual visits</td>
<td>0.12</td>
<td>0.10</td>
<td>0.08</td>
<td>.95</td>
</tr>
<tr>
<td>Mean No. of referrals at time of index annual visit with GAPS screening/No. of GAPS-screened annual visits</td>
<td>0.16</td>
<td>0.24</td>
<td>0.24</td>
<td>.23</td>
</tr>
</tbody>
</table>

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**COMMENT**

This study examines the effectiveness of integrating the GAPS questionnaire into routine medical care. Introduction of the GAPS questionnaire was a success in terms of increasing documented discussion of risk behaviors.

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Riding to disclose in a clinical setting, particularly in a rural setting, where anonymity is not guaranteed. The observed differences might also arise from the healthcare-seeking population that supplied the GAPS data vs the more universal sample that supplied the YRBS data. Other studies that have tried to compare clinically based data (ie, the Health Plan Employer Data and Information Set) and survey-based data (ie, the Behavioral Risk Factor Surveillance System) also found that clinical data produced rates that were lower than those from survey data.13 Future studies need to address whether the method by which GAPS is administered maximally promotes disclosure.

The clinician variation in discussing risk behaviors documented in this study illustrates a common clinical problem. The source of variation among our clinicians is a matter of conjecture because we have not specifically studied this issue. Most likely, it is a reflection of clinician training and comfort level. Clinical preventive services offered to adults have been shown to vary among clinicians, services offered, and clinics, thus illustrating a haphazard and idiosyncratic approach to prevention.13 The variation we have documented most likely points to the need for a more standardized response to disclosure of risk behaviors and continued training in addressing risk behavior management,19 including skill-based training specifically focused on substance abuse management.15

The periodic GAPS form showed a decrease in detection compared with the initial GAPS form. It is unclear if this is due to respondent fatigue. This sample does not permit a longitudinal analysis to ascertain if reporting of risk behaviors decreases over time. Studies in adult populations suggest that discussion of psychosocial topics is greatest at initial visits; doctors seem to ask fewer psychosocial questions and get less psychosocial information at follow-up visits.16-18 A longitudinal study is needed to demonstrate if a decrease in problems identified at subsequent visits is attributable to a therapeutic effect (problem resolution), respondent fatigue, or other factors. Future studies should address the reliability and validity of the GAPS model used as a screening tool over time.

The AMA pilot study of the GAPS model found that when more than 10 risk factors were reported and when competing health concerns were also raised, the clinician was less likely to address the risk profile. This suggests that a large number of health concerns can distract clinicians from addressing risk behaviors. However, our study produced lower rates of risk behavior and health concern reporting than did other studies. The high correlation between the number of health concerns and the number of actions taken to address risk behaviors suggests that experienced clinicians can deal with both.

Only one third of parents requested parenting or development information. Because this study did not address parental perceptions, we cannot explain the lack of interest in the GAPS parenting materials. However, studies of parental attitudes toward psychosocial problems suggest that parents may not expect their general pediatricians to deal with these issues.19,20 Thus, clinicians may need to actively promote use of parenting information.

Limitations of this study include those inherent in the use of the medical record as a primary source of data. The accuracy of chart audit is limited by the completeness of medical record documentation of counseling, discussion, further action such as scheduling of referrals, referrals to outside services, and follow-up appointments. Chart documentation is less likely to capture the extent or effectiveness of clinician counseling vs the disclosure of risk behavior involvement in the GAPS questionnaire. Chart audits also cannot capture several potential outcomes, eg, facilitated or enhanced communication between physician and patient, physician and parent, or patient and parent. However, the use of structured encounter forms in our clinic serves as a cue to the clinician not only to address the risk behavior but also to document the counseling using the anticipatory guidance list. Thus, the structured encounter form should increase documentation of any response to the GAPS screening tool and thus may improve the sensitivity of chart audit for detecting clinician counseling.

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Corresponding author: Anne Gadomski, MD, MPH, Research Institute, Bassett Healthcare, One Atwell Road, Cooperstown, NY 13326 (e-mail: gadomski@usa.net).
REFERENCES