Efficacy of the North American Guidelines for Children's Agricultural Tasks in Reducing Childhood Agricultural Injuries

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Objectives. We assessed whether active dissemination of the North American Guidelines for Children's Agricultural Tasks (NAGCAT) reduced childhood agricultural injuries.

Methods. In this randomized controlled trial, lay educators visited intervention farms to review NAGCAT. New York State farms with resident or working children were randomized. Control farms were visited only to collect baseline data. Data on childhood injuries, tasks, and hours worked were obtained quarterly for 21 months. Injury rates per farm were compared between the treatment and control groups, along with time span to occurrence of an injury and to violation of NAGCAT age guidelines.

Results. Intervention farms were less likely than control farms to violate NAGCAT age guidelines in the areas of all-terrain-vehicle use and tractor and haying operations. Cox proportional hazards regression models showed a significant protective effect of the intervention on preventable injuries after adjustment for important covariates.

Conclusions. Our results showed that dissemination of NAGCAT reduced rates of work-related childhood agricultural injuries. A comprehensive public health approach is needed to reduce non–work-related childhood injuries. (*Am J Public Health.* 2006;96:722–727. doi:10.2105/AJPH.2003.035428)

Annual rates of agricultural injuries among children living or working on farms are high, on the order of about 1.7 injuries per 100 farms.[1,2] For example, among young people less than 20 years of age, the rate of farm injuries requiring an emergency department visit increased 10% between the period spanning 1979 to 1983 (1551 per 100 000 child farm residents) and the period spanning 1990 to 1993 (1717 per 100 000).[3] Because hours worked is a proxy for exposure to agricultural injuries and young people often work part time, injury rates related to agricultural work can be expressed as injury incidents per 100 full-time equivalents (FTEs). Between 1995 and 1997, farm workers aged 15 to 17 years had an injury rate of 1.8 per 100 FTEs.[4]

In an attempt to reduce childhood agricultural injuries, and at the request of farm parents, the National Children's Center for Rural and Agricultural Health and Safety in Marshfield, Wis, created the North American Guidelines for Children's Agricultural Tasks (NAGCAT).[5] These guidelines (available online at http://www.nagcat.org), developed by a team of agricultural safety professionals, child development experts, farm parents, and adolescents using a job hazard analysis framework, consensus development methodology, and child development principles, are specifically designed to assist parents in matching a child's physical, mental, and psychosocial abilities with the requirements of certain farm jobs.

Targeting young people aged 7 to 16 years, the 62 guidelines address 7 categories of routine jobs: animal care, manual labor, haying operations, implement operations, specialty production, tractor fundamentals, and general activities. Each guideline includes color illustrations of the job, a description of primary hazards and safety equipment and recommendations for supervision, adult responsibilities regarding workplace safety, and a flow chart assessment of the child's ability to do the job.

A review of nonfatal childhood agricultural injury incidence and disability underscores the paucity of data available for evaluating efforts to prevent such injuries.[6] A systematic review of farm safety interventions revealed only 3 studies, none including children, in which injury incidence was used as an outcome.[7] The effectiveness of NAGCAT in reducing childhood agricultural injury has not been assessed. We evaluated the effect of active dissemination of NAGCAT on the incidence of childhood agricultural injuries as well as several intermediate outcomes.

METHODS

The intervention evaluated in this randomized controlled trial was active dissemination of NAGCAT to farms in central New York State beginning in January 2001. Lay educators with farming backgrounds visited intervention farms to review the guidelines. Control farms were visited only to complete the baseline survey. In the case of both control and intervention farms, farm visitors subjectively rated the participants' level of concern about childhood agricultural injuries using a 5-point Likert scale.

The Intervention

Before assessing the guidelines, educators reviewed fact sheets on childhood agricultural injuries with participants in the intervention group who scored low in terms of their level of concern regarding childhood agricultural injuries. This preintervention was used to increase participants' level of interest in NAGCAT. The educators then covered a core set of 4 guidelines, followed by 1 guideline selected by the farm family and 1 that addressed a job a child was currently doing on the farm.

The core set of guidelines included a chart of recommended ages for tractor operation by size of tractor and task and guidelines on driving a farm tractor with no implement attached, working with large animals (e.g., horses, cattle), and operating farm equipment (e.g., barn cleaner, silo unloader). On farms where there were no animals, the core set included guidelines on operating tractors, hitching and unhitching trailed implements, and baling hay (dropping or throwing small square bales). At the conclusion of the visit, a parent resource booklet containing 52 guidelines (10 specialty production guidelines were excluded) was left with the intervention farm families.

Several booster interventions followed these farm visits. In May 2001, a postcard with the NAGCAT logo and a safety message was mailed to intervention farms to remind families to use the guidelines during the high-risk summer season. In December 2001, a calendar depicting 12 NAGCAT jobs (produced by the Marshfield National Children's Center) was mailed to intervention farms. Included in this mailing was a refrigerator magnetic photograph frame on which appeared the NAGCAT logo and Web address as well as a "Nag Cat" saying "Picture me doing the job safely."

Enrollment

Of the 6829 farms contacted, 1373 farms were eligible. Of those, 931 farms were recruited and randomized; 462 farms were allocated to the intervention group and 469 were allocated to the control group. In the intervention group, 46 farms dropped out before the farm visit and 15 farms dropped out before the end of the study. In the control group, 40 farms dropped out before the farm visit and 20 farms dropped out before the end of the study. Thus, 401 intervention and 409 control farms completed the study. Eight hundred forty-five central New York farms were recruited, randomized (via simple random assignment), and enrolled in the study. We used the US Department of Agriculture definition of a farm: any place from which $1000 or more of agricultural products are produced and sold, or normally would have been sold, during a given year.[8] To be included, a farm had to have 1 or more resident children, or 1 or more nonresident children had to have been employed at least 45 days during the year of the study. Many farms were ineligible because they did not have resident or employed children.

Mail and telephone listings obtained from the Bassett Research Institute, the New York State Department of Agriculture and Markets, and local farm media were used to identify farms in the 15-county study area. An advance notice describing the study was mailed to farms, followed by a phone call from study recruiters. In addition, farm families were personally recruited at agri-business shows, farm equipment open houses, and youth day camps. Advertisements were placed in mailings targeting the local farm population. Also, farm families enrolled in the study provided word-of-mouth referrals.

Surveillance

Telephone injury surveillance of the study farms began in April 2001 and ended in October 2003. Calls were made every 3 months, with the date of the farm visit used to set the quarterly interval. Surveillance included review of the number of children working or living on the farm, the tasks performed by these children, the number of hours they worked, and a description of any childhood injuries that had occurred on the farm during the quarter. An injury was defined as any condition occurring on the farm that resulted in at least 4 hours of restricted activity or required professional medical treatment. Surveillance telephone callers were unaware of the intervention status of the farms. Most primary respondents were parents (82%) or other relatives (11%).

Injury Coding

All injuries were coded to assess whether adherence to the NAGCAT guideline in question would have prevented the injury. A coding methodology developed by Marlenga et al.[9] was used to assess whether injuries were associated with a specific NAGCAT guideline ("NAGCAT-related injury") and whether use of NAGCAT would have prevented the injury ("NAGCAT-preventable injury"). Coders were unaware of the farms' intervention status.

Potential Cointerventions

To correctly attribute observed effects to the study intervention, we recorded potential cointerventions (i.e., safety day camps or tractor safety training) at quarter 1 (the first 3-month period) and among new children living or working on a farm in any given quarter. Changes made to the farms during the study period (e.g., adding a roll-over protection structure or adding or repairing a power takeoff to a tractor) were included in quarter 6 surveillance calls. Respondents were also asked questions from an earlier NAGCAT evaluation (e.g., whether they set limits on the amount of time children worked between breaks, provided more supervision to children while they were working, or prevented children from doing a particular job).[10]

Statistical Analyses

Demographic characteristics and work exposure variables at baseline were compared between the intervention and control farms to assess whether the randomization procedure was successful. The mean number of child work hours was higher for intervention than control farms; thus, in subsequent comparisons, we had to adjust for this imbalance by calculating injury densities. Because the farm was the unit of analysis, we calculated injury incidence density for each farm by dividing the number of injuries occurring among employed or resident children by the total number of 40-hour FTEs. To maintain independence of the units of statistical analysis, we compared injury densities, computed as per farm averages, between the treatment and control groups using a 2-group analysis of variance. We weighted these models using a farm's total number of child work hours. Although study inclusion required that children either reside or be employed at the farm, only children with work hours were included in the analyses.

We used Cox proportional hazards regression models to compare the intervention and control groups on time to first assignment of a task involving a NAGCAT age violation.[11] We conducted these analyses separately for 16 specific NAGCAT jobs, including all of those from the core set (e.g., working with large animals, operating a tractor, and baling hay). The unit of analysis for these NAGCAT age violation models was the farm; the outcome was the time, in months, to first assignment of a NAGCAT task to the oldest working child below the recommended NAGCAT age for that task.

The age cutoff used for a given task was the NAGCAT minimum supervision age for the task minus 2 years. The single exception was tractor use, for which the actual minimum age of 12 years was used. For example, age cutoffs were younger than 7 years for doing any tasks on the farm, younger than 12 years for hitching or unhitching trailed implements on a tractor and baling hay, and younger than 14 years for using all-terrain vehicles (ATVs). NAGCAT recommends a minimum age only within the tractor matrix, which covers all tractor jobs. For all other jobs, assessments must be made via the NAGCAT checklists; however, supervision is recommended on the basis of age ranges.

Thus, we took the minimum age for supervision and subtracted 2 years to be conservative as well as to allow for developmental variation among children (being true to the intent of NAGCAT, which focuses on "developmentally appropriate work" rather than "age-appropriate work"). A farm was considered at risk for a given age violation outcome if at least 1 child was present who was too young to perform the task and had not yet performed it. Models were adjusted for child age at baseline, acres per child, and number of children older or younger than the index child, because these covariates were significantly related to outcomes at the univariate level.

We also compared time to NAGCAT-preventable injuries between the intervention and control groups, at the farm level, using Cox proportional hazards regression. In this model, each farm was considered to have reached the endpoint at the time of the first injury to any child. We included all children workers so that we could detect spillover effects of the guidelines to children younger than 7 years and older than 16 years. The model also controlled, via covariance correction, for acres per child, average FTE per child, and percentage of children (0–19 years of age) currently employed on the farm. SAS (SAS Institute Inc, Cary, NC) was used in conducting all statistical analyses.

RESULTS

Intervention Implementation

Farm visits began in January 2001 and ended in December 2001. The mean length of the intervention (review of NAGCAT) was 40 minutes (range: 5–90 minutes). During these sessions, the father was present at 55% of the control farms and 62% of the intervention farms; mothers were present at 51% of the control farms and 55% of the intervention farms; and both parents were present at 30% of the intervention farms and 27% of the control farms. Young people were rarely present (9% at the control farms and 18% at the intervention farms). Thirty-seven percent of the intervention farms required preintervention (i.e., review of fact sheets on childhood agricultural injuries).

Intervention and control farms were evenly distributed in the 15-county study area. At baseline, control and intervention farms were equivalent with respect to most demographic and farm variables (Table 1). However, children on intervention farms were slightly older. In addition, more children lived or were employed on these farms (particularly in the NAGCAT target age range of 7–16 years), and children accrued a higher median number of work hours. Also, more intervention farms had bulls. At baseline, there were 2446 employed or resident children on the intervention and control farms; by the end of the study, there were 2514 employed children.

TABLE 1—Baseline Demographic and Agricultural Characteristics: Control and Intervention Farms, Central New York State, 2001

	Control	Intervention	*P*
No. of farms	429	416	. . .
Median no. of acres	276	300	.2009
Acreage range	1–3000	1–5000	.3706
No. of farms with resident children	398	394	. . .
No. of child work hours	130 404	144 240	. . .
Children per age group, y, no. (%)			
0–6	250 (21)	200 (16)	. . .
7–16	744 (63)	816 (65)	.0031[a]
17–19	196 (16)	240 (19)	. . .
Mean age of children, y (SD)	11.9 (4.0)	12.5 (3.3)	.0360
Median child work hours per farm	192	282	.0039
Farm features, %			
Dairy cows	67	68	.7247
Bulls	41	50	.0069
Tractors	99	97	.1182
Power takeoff	91	92	.5186
All-terrain vehicles	50	48	.5510
Youth handling tractor	72	77	.0695
Youth involved in hitching/unhitching tractor implements	70	73	.2830
Youth involved in haying operations	77	82	.1081
Youth caring for large animals	85	87	.4322
Emergency room visit for farm injury in past year	22	24	.7498

[a]Probability derived from a 3×2 χ^2 test, reflecting a significant difference in the distribution of age groups at baseline.

Attrition

The attrition rate was similar in the 2 study groups; 810 farms completed the study, representing 95.8% of our original sample. The leading reason for attrition (12.8%) was cessation of farming. Loss of a working telephone and departure of the respondent or children who lived or were employed on the farm accounted for 12% of attrition. The remaining attrition was attributed to reasons classified as "other" (e.g., worries about how the study might raise liability and insurance costs, fatigue over tracking working hours for children or answering surveillance calls, family conflict).

Injury Severity and Incidence

Overall, 185 childhood agricultural injuries were reported in 7 quarters. One (0.5%) injury resulted in a permanent disability, and 46 (24.9%) resulted in a temporary disability (normal activities restricted for 7 or more days). Most of the injuries (42.5%) were soft tissue injuries (scrapes, abrasions, bruises, contusions, sprains, strains, or torn ligaments), whereas 22.1% were fractures or dislocations; 22.8% were cuts, lacerations, punctures, or stabs; and 4.2% were burns. Eight percent of these injuries required hospitalization. There was no significant difference in injury severity between the study groups.

A quarterly plot of overall childhood agricultural injury incidence density by study group showed no significant difference between the intervention and control farms. Also, there was no significant difference in mean cumulative injury incidence density per 100 FTEs (i.e., 0.55 in the control group vs 0.45 in the intervention group; $P=.85$). In the case of all age groups, mean cumulative incidence densities for strictly work-related injuries were 0.44 in the control group and 0.34 in the intervention group ($P=.31$).

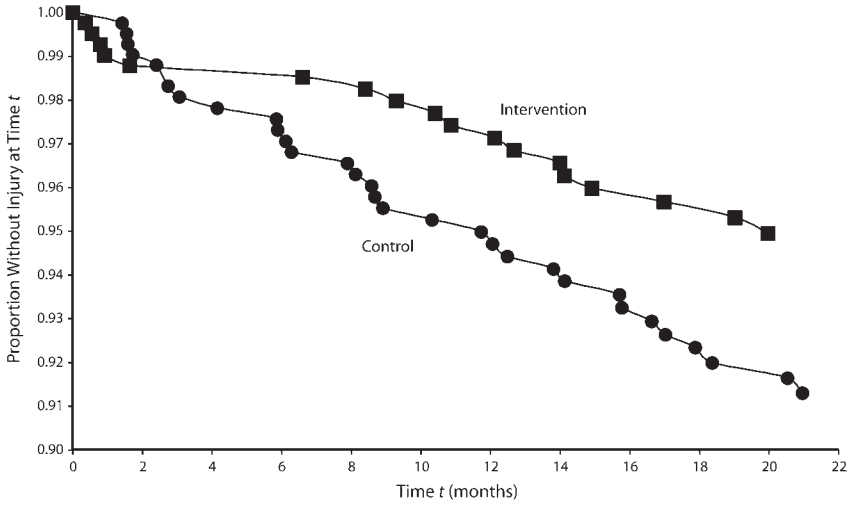
Children younger than 7 years had the highest injury incidence densities (1.36 per 100 FTEs in the control group and 1.27 per 100 FTEs in the intervention group), but the difference in this age group between the intervention and control farms was not statistically significant ($P=.77$). Control group children aged 7 to 16 years had a higher injury incidence density (0.63) than did their counterparts in the intervention group (0.50), but again the difference was not significant ($P=.96$).

NAGCAT-Related and NAGCAT-Preventable Injuries

All injuries were reviewed to assess whether the guidelines were applicable (NAGCAT related) and whether the NAGCAT guideline in question would have prevented the injury had it been applied (NAGCAT preventable). Of the 86 NAGCAT-related injuries, 48% could have been prevented if the guidelines had been followed. An additional 17% fell into the gray area of "may have been prevented" if the guidelines had been followed, and 35% were deemed not preventable by adherence to NAGCAT. Among the injuries reported, 54% (100 of 185) fell into the "no relevant guideline exists" category for the following reasons: (1) the child was younger than 7 years (either employed or not employed; 21%), (2) the child was playing or engaging in leisure activities at the workplace (58%), (3) the child was a bystander and not performing work at the time of the injury (9%), and (4) no guideline exists for the job that was being done (12%).

Among 7- to 19-year-olds, a 52% reduction in NAGCAT-preventable injury incidence densities was seen in the intervention group compared with the control group (0.07 vs 0.13); however, this finding did not achieve statistical significance ($P=.68$). Similarly, incidence densities of all NAGCAT-related injuries among 7- to 19-year-olds were higher in the control group (0.27) than in the intervention group (0.18), but again this result was not statistically significant ($P=.46$).

In the 0-to-19-year age group, there was a significant difference between the intervention and control farms in time to occurrence of a NAGCAT-preventable injury, and this difference favored the intervention farms (hazard ratio=0.52; 95% confidence interval [CI]=0.29, 0.92; $P=.03$) (Figure 1). This model included acres per working child, percentage of working children (0 to 19 years), and mean number of hours worked by these children.



Note. NAGCAT = North American Guidelines for Children's Agricultural Tasks.

FIGURE 1—Time to occurrence of NAGCAT-preventable injuries among 0-to-19-year-olds: central New York State farms, 2001.

Changes on the Farm

At quarter 6 (18 months after the farm visit), more respondents in the intervention group than in the control group (25% vs 16%) reported that they had set limits on the amount of time a child could perform work between breaks (intervention $P<.01$) and provided more supervision to children while they were performing work (42% vs 36%; $P=.06$). Most parents (61% in both study groups) reported having prevented their children from doing a particular job. There was no difference between the 2 groups in percentages adding a roll-over protection structure during the study period (intervention, 3.5%; control, 2.9%; $P=.89$) or adding or repairing a power takeoff (intervention, 25%; control, 24%; $P=.76$). Overall, intervention farms made more safety-related changes (mean=1.57) than did control farms (mean=1.39; $P=.03$).

Violations of NAGCAT Minimum Age Guidelines

Intervention farms were less likely than control farms to violate NAGCAT-recommended minimum age guidelines on using ATVs and tractors, hitching and unhitching trailed implements to tractors, and baling hay. The distribution of time to first assignment of a task that violated these age

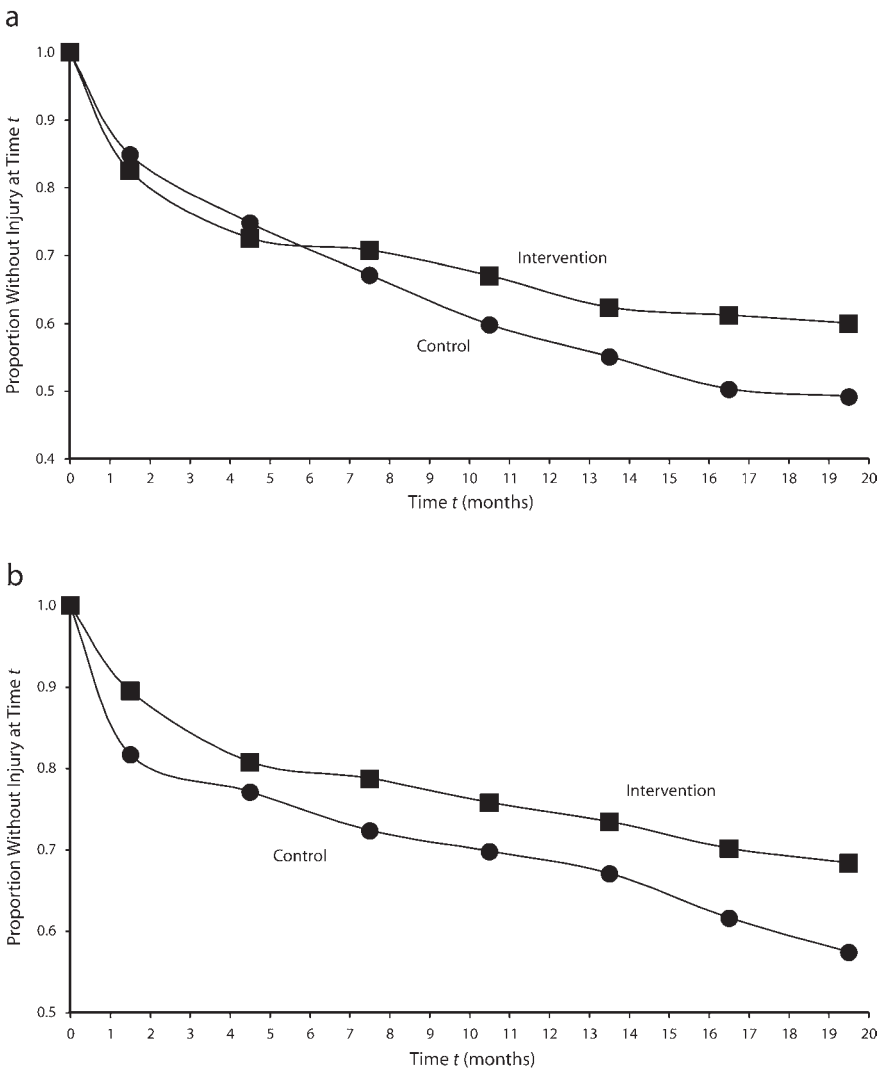


FIGURE 2—Times to occurrences of age violations, (a) for ATV use and (b) for hitching or unhitching implements to tractors: central New York State farms, 2001.

guidelines differed between the intervention and control farms for use of ATVs and hitching/unhitching of trailed implements to tractors (Figure 2). Results approached statistical significance for operating a tractor (hazard ratio=0.76; 95% CI=0.55, 1.04; *P*=.09) and baling hay (hazard ratio=0.32; 95% CI=0.10, 1.06; *P*=.06).

Although all of the tasks included in the core set were tested, operating tractors, hitching/unhitching trailed implements, and baling hay were the only tasks that demonstrated differences between the intervention and control groups. Analyses of the remaining 12 tasks, including assessments of age violations among children aged younger than 7 years, revealed no differences between the groups.

Potential Cointerventions

Only 2.5% (63 of 2514) of children with work hours recorded in this study had attended a safety day camp in the past year. Similarly, only 7.5% of children with work hours reported having taken a tractor certification course. Notably, only 11% (87 of 805) of children who drove a tractor had taken a tractor safety training course. There were no significant differences between the study groups in the percentages of children taking part in these types of training.

DISCUSSION

This study demonstrates the efficacy of a single NAGCAT face-to-face educational encounter during a farm visit followed by modest intervention boosters. Active dissemination of these guidelines halved the incidence of NAGCAT-preventable injuries among 7- to 19-year-olds on intervention farms in comparison with control farms. In the 0-to-19-year age group, there was a significant increase in the time span to an occurrence of a NAGCAT-preventable injury in the intervention group compared with the control group. The guidelines also appeared to influence several important intermediate variables, such as setting limits for the amount of time a child does a task, providing more supervision, delaying initiation of ATV use, and making more safety-related changes on the farm.

The success of NAGCAT in reducing work-related childhood agricultural injuries is an encouraging start, but these guidelines address only 1 source of such injuries. Because 50% of the childhood agricultural injuries recorded in our study were not NAGCAT related, it is not surprising that the guidelines did not significantly decrease the overall incidence of injuries. Rates of injury among children living or employed on farms are high, and such injuries occur not only while children are performing work but also while they are in the presence of others who are performing work (e.g., preschoolers accompanying their parents during farm work) or using the farm workplace for leisure activities.

For example, in our study, the highest incidence of agricultural injuries was observed among children in the youngest age group (0–6 years), whose involvement in agricultural work is not recommended by NAGCAT. Preschool children require constant supervision in virtually all settings to prevent injuries.[12,13] Agricultural settings are no exception; in fact, they may represent one of the most dangerous environments to which young children can be exposed.[14,15]

Delay in children's use of ATVs on farms is an important intervention effect observed in this study. Increasing percentages of ATV-related injuries are requiring inpatient care, with hospitalization rates rising 79% between

1997 and 2000 among children younger than 19 years.[16] Similar increases in hospitalizations for severe pediatric ATV-associated injuries have been documented in Ohio[17] and Utah.[18] Thus, delaying use of farm ATVs, whether for leisure or for work, may also be an important strategy for preventing ATV-related childhood injuries.

Child safety on farms has typically been the responsibility of parents or farm operators. Farm children often begin tasks at younger ages and at lower levels of supervision than those recommended by NAGCAT. For example, 1 study showed that between 8.5% and 37% of children operating tractors are below the NAGCAT-recommended age levels.[19] In addition, Pickett et al. found that, even after receipt of the guidelines, 26% of parents still assigned tractor jobs to their children in violation of NAGCAT.[20] Some farm parents believe that earlier exposure to work leads to farm children being smarter, safer, more productive, less apt to be injured, and less in need of supervision than hired help.[21] Thus, changing farm families' beliefs regarding age of task initiation may help reduce work-related agricultural injuries.

Although historically educational efforts alone have not been very effective in changing behaviors and decreasing injury rates in community-based injury prevention programs, the efficacy of NAGCAT in this study represents a promising initial strategy. Given the variety of possible sources of injury to children working or living on farms, childhood agricultural injury prevention efforts need to target a broader range of risk factors.

Drawing from other examples in the literature, effective prevention efforts can range from active interventions that promote behavioral change to passive measures focusing on product design, engineering changes, or safety devices.[22] As an example, legislative approaches have been somewhat successful in increasing the use of bicycle helmets; however, legislative measures have been resisted by farm families for years and will be difficult to enforce. Hazard reduction is another effective means of reducing rates of childhood injury, as demonstrated by the reductions in childhood injuries seen after environmental changes to playground surfaces and equipment.[23] Expanding the array of injury prevention strategies is the next step in reducing childhood agricultural injuries. ■

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Contributors

A. Gadomski originated and supervised the study, trained the educators, performed the injury coding, and led the writing. S. Ackerman assisted with training of the educators, supervised fieldwork, and assisted with injury coding and analyses. P. Burdick and P. Jenkins conducted the analyses. All of the authors reviewed analyses and drafts of the article.

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Human Participant Protection

This study was approved and monitored by the institutional review board of Mary Imogene Bassett Hospital. Participants provided written informed consent.

References

1. *1998 Childhood Agricultural Injuries.* Washington, DC: Agricultural Statistics Board, US Dept of Agriculture; 1998.

2. Hard DL, Myers JR, Gerberich SG. Traumatic injuries in agriculture. *J Agricultural Safety Health.* 2002;8:51–65.

3. Rivara FP. Fatal and nonfatal farm injuries to children and adolescents in the United States, 1990–3. *Inj Prev.* 1997;3:190–194.

4. Centers for Disease Control and Prevention. Youth agricultural work-related injuries treated in emergency departments—United States, October 1995–September 1997. *MMWR Morb Mortal Wkly Rep.* 1998;47:733–737.

5. Lee B, Marlenga B, eds. *Professional Resource Manual: North American Guidelines for Children's Agricultural Tasks.* Marshfield, Wis: Marshfield Clinic; 1999.

6. Reed DB, Claunch DT. Nonfatal farm injury incidence and disability to children: a systematic review. *Am J Prev Med.* 2000;18:70–79.

7. DeRoo LA, Rautiainen RH. A systematic review of farm safety interventions. *Am J Prev Med.* 2000;18:51–62.

8. *Census of Agriculture.* Washington, DC: US Dept of Commerce; 1994. Report AC92-A-51.

9. Marlenga B, Pickett W, Brison R, Berg R, Zentner JL. Evaluation of the North American Guidelines for Children's Agricultural Tasks using a case series of injuries: interim results. Paper presented at: Annual Meeting of the American Public Health Association, November 2003, San Francisco, Calif.

10. Pickett W, Marlenga B, Berg R. Randomized controlled trial to evaluate dissemination methods for the North American Guidelines for Children's Agricultural Tasks: influence on childhood safety practices on the farm. Poster session presented at: Annual Meeting of the American Public Health Association, October 2001, Atlanta, Ga.

11. Cox DR. The analysis of exponentially distributed life-times with two types of failure. *J R Stat Soc.* 1959;21:411–421.

12. Peterson L, Ewigman B, Kivlahan C. Judgments regarding appropriate child supervision to prevent injury: the role of environmental risk and child age. *Child Dev.* 1993;64:934–950.

13. Powell EC, Tanz RR. Adjusting our view of injury risk: the burden of nonfatal injuries in infancy. *Pediatrics.* 2002;110:792–796.

14. Gadomski A, Burdick P, Ackerman S, Jenkins P. Preschoolers working on the farm: tasks, hours and injury rates. *Pediatr Res.* 2003;53:341.

15. Brison R, Pickett W, Marlenga B, Berg R. Fatal farm injuries among Canadian children: there is no "golden hour" for young farm kids. Poster session presented at: Annual Meeting of the American Public Health Association, November 2002, Philadelphia, Pa.

16. Killingsworth JB, Tilford JM, Parker JG, Graham JJ, Dick RM, Aitken ME. National hospitalization impact of pediatric all-terrain vehicle injuries. *Pediatrics.* 2005;115:e316–e321.

17. Gittelman MA, Pomerantz WJ, Smith GA. Severe pediatric all terrain vehicle injuries: a statewide perspective. *Pediatr Res.* 2003;53:110A.

18. Cvijanovich NZ, Cook LJ, Mann NC, Dean JM. A population-based assessment of pediatric all-terrain vehicle injuries. *Pediatrics.* 2001;108:631–635.

19. Marlenga B, Pickett W, Berg RL. Assignment of work involving farm tractors to children on North American farms. *Am J Ind Med.* 2001;40:15–22.

20. Pickett W, Marlenga B, Berg RL. Parental knowledge of child development and the assignment of tractor work to children. *Pediatrics.* 2003;112:e11–e16.

21. Neufeld S, Wright SM, Gaut J. Not raising a "bubble kid": farm parents' attitudes and practices regarding employment, training and supervision of their children. *J Rural Health.* 2002;18(2):57–66.

22. Klassen TP, MacKay JM, Moher D, Walker A, Jones AL. Community-based injury prevention interventions. In: Behrman RE, ed. *The Future of Children: Unintentional Injuries in Childhood.* Los Altos, Calif: Packard Foundation; 2000:83–110.

23. Silbert J, Mott A, Rolfe K, et al. Preventing injuries in public playgrounds through partnership between health services and local authority: community intervention study. *BMJ.* 1999;318:1595.