

Quality of Care and Outcomes of Adults With Asthma Treated by Specialists and Generalists in Managed Care

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Background: The growth of managed health care in the United States has been accompanied by controls on access to specialty physician services. We examined the relationship of physician specialty to treatment and outcomes of patients with asthma in managed care plans.

Methods: We conducted a mail survey of adult asthma patients who were enrolled in 12 managed care organizations and had at least 2 contacts for asthma (*International Classification of Diseases, Ninth Revision, Clinical Modification* code 493.x) during the previous 24 months; we also surveyed their treating physicians. This report concerns 1954 patients and their 1078 corresponding physicians. Treatment indicators included use of corticosteroid inhalers, use of peak flow meters, allergy evaluation, discussion of triggers, and patient self-management knowledge. Outcome measures included canceled activities, hospitalization or emergency department visits, asthma attacks, workdays lost, asthma symptoms, physical and mental health, overall satisfaction with asthma care, and satisfaction with communication with physicians and nurses.

Results: Significant differences were noted for patients of specialists and experienced generalists compared with those of generalist physicians. Peak flow meter possession was reported by 41.9% of patients of generalists, 51.7% of patients of experienced generalists, and 53.8% of patients of pulmonologists or allergists. Compared with patients of generalists, outcomes were significantly better for patients of allergists with regard to canceled activities, hospitalizations and emergency department visits for asthma, quality of care ratings, and physical functioning. Patients of pulmonologists were more likely to rate improvement in symptoms as very good or excellent.

Conclusions: In a managed health care setting, physicians' specialty training and self-reported expertise in treating asthma were related to better patient-reported care and outcomes.

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WITH MANAGED health care, an established feature in the United States, worries about quality of care have increased. Because managed care organizations (MCOs) realize some of their efficiency by controlling access to specialty care, there is concern that these limitations will affect health outcomes, particularly for patients with serious or chronic illness. However, few published studies have shown differences in outcomes of care provided by generalist vs specialist physicians.

Studies suggest that specialist physicians are more knowledgeable about conditions that fall within their area of expertise¹⁻³ and are more reliable than generalists at diagnosing them.⁴⁻⁶ Some reports suggest that specialists treating acute illnesses obtain better patient outcomes,^{7,8} but for chronic illness the impact has been more

elusive. One report from the Medical Outcomes Study⁹ showed similar outcomes for patients with uncomplicated hypertension or type 2 diabetes mellitus treated by specialists (cardiologists and endocrinologists, respectively) vs generalists. Another report found better outcomes when depression was treated by mental health care providers.⁵

Asthma provides an excellent example for comparison of generalist and specialist care. Asthma is a common chronic illness that affects approximately 9 million to 12 million people in the United States and that is associated annually with approximately 1.8 million emergency department (ED) visits, 500 000 hospitalizations, and 3 million workdays lost.¹⁰ Asthma care is provided by generalists and specialists in a variety of treatment models. Studies of asthma care have shown that intensive treatment and education are related to better adher-

PATIENTS AND METHODS

This study was part of a project undertaken by the Managed Health Care Association Outcomes Management System Consortium. The asthma project involved several large employers and their managed care partners in a prospective cohort study to test the feasibility and usefulness of information on process and patient outcomes to improve the quality of health care.^{19,20}

STUDY POPULATION

Patients were selected from enrollees in each MCO by using claims data or administrative information to apply the following 3 inclusion criteria: (1) aged 18 years or older as of September 1, 1993; (2) enrolled in the MCO at the time of sampling; and (3) at least 2 medical care encounters (ED visits or hospitalizations) with a diagnosis of asthma (*International Classification of Diseases, Ninth Revision, Clinical Modification* code 493.x) in the previous 24 months. This analysis used a subset of patients from the overall study consisting of 1954 patients who completed the baseline and 2 follow-up surveys and their 1078 matched physicians who responded to a separate physician survey (patients were asked to name the physician principally responsible for managing their asthma care). Compared with patients with matching physician information, patients without matching physician information (n = 1533) were similar in sex, asthma symptoms, and number of workdays lost, but were more likely to be older and white. Since the most salient physician data were collected on the year 1 survey, the primary analysis examined baseline data, with outcomes assessed at year 2.

DATA COLLECTION

Information was obtained by means of mailed, self-administered patient and physician surveys. The patient questionnaires provided information on demographic char-

acteristics, general health status, asthma-specific health status, use of medical care resources, disability, and ratings of the quality of care. The physician survey provided information on specialty training and self-rated asthma expertise.

OUTCOME MEASURES

Nine outcome indicators assessed at year 2 included (1) canceled or rearranged activities due to asthma during the past 4 weeks (dichotomized as occurring at all vs not at all); (2) hospitalization or ED visits for asthma in the past 12 months (≥ 1 vs none); (3) frequency of asthma attacks (increased difficulty breathing accompanied by cough, wheezing, chest tightness, or other symptoms) in the past 4 weeks (≥ 3 attacks per week vs fewer); (4) workdays missed due to health in the past 4 weeks (≥ 1 vs none); (5) asthma symptom scores, based on 7 common asthma symptoms (cough, sputum production, chest tightness, wheezing, shortness of breath, nocturnal symptoms, and the chronicity of symptoms between attacks) in the past 4 weeks, with the symptom score calculated as a summary rating scale ranging from 0 to 5 and higher scores indicating more severe asthma symptoms; (6) changes in general health status assessed using the physical component score from the 36-item Short-Form Health Survey of the Medical Outcomes Study^{21,22} (higher score indicates better health); (7) changes in general health status using the mental component score from the same instrument; (8) rating of the quality of communication with physicians and nurses about asthma (good, fair, or poor vs excellent or very good); and (9) rating of satisfaction with the overall quality of care received for asthma during the past 12 months (good, fair, or poor vs excellent or very good).

PATIENT CHARACTERISTICS

Patient characteristics included age, sex, race, educational level (college graduate or postgraduate vs others), history of

Continued on next page

ence to clinical guidelines and to improved functional outcomes.^{11,12} However, the strategies tested have combined specialty care with intensive education and drug therapy, making the effects of the different components difficult to separate. A few studies that have looked specifically at the effect of the physician on treatment and outcomes suggest that patients treated by specialists¹³⁻¹⁵ or switching to specialist care¹⁶ had fewer symptoms and ED visits and improved quality of life, albeit at a potentially higher cost.¹¹ Inpatient studies of generalist and specialist care have also shown improved outcomes for patients treated by specialists.^{17,18} However, previous studies have not been adjusted for measures of disease severity or have lacked the patient's perspective. In addition, none have examined differences in outcomes between allergists and pulmonologists or between generalists with different levels of asthma management expertise.

In conjunction with a consortium of managed care companies and purchaser organizations, we conducted a large study of quality of care and outcomes of patients with asthma enrolled in managed health care.^{19,20} In this

study, we investigated whether there were differences in process of care and outcomes attributable to the specialty of the health care provider.

RESULTS

Overall, the mean age of patients was 47.4 years (range, 18-94 years) (**Table 1**). Of the 1954 patients, 69.3% were female, 84.9% were white, and 35.0% had a college degree or postgraduate education. At baseline, 35.8% reported also having chronic bronchitis or emphysema (COPD), and 48.9% had smoked cigarettes. The mean asthma symptom score was 2.6. The association between patient baseline characteristics and physician specialty are presented in Table 1. Patients treated by asthma-experienced generalists or specialists differed from the patients of generalists in several respects. Compared with patients of generalists, patients treated by asthma-experienced generalists were more likely to be white (89.5% vs 80.8%; $P < .003$). Patients treated by pulmonologists were more likely to be white (88.7% vs 80.8%; $P < .01$) and older (mean age, 52.2 vs 47.4 years; $P < .01$)

cigarette smoking (yes vs no), passive exposure to cigarette smoke (yes vs no), presence of chronic obstructive pulmonary disease (COPD) (yes vs no), and asthma symptom score (range, 1-5, with a higher score indicating more severe symptoms).

TREATMENT INDICATORS

Treatment indicators were based on National Heart Lung and Blood Institute National Asthma Education and Prevention Program²³ guidelines for patients with asthma and included (1) having a metered dose inhaler for corticosteroids (ICS) and using it regularly (≥ 5 d/wk), intermittently (1-3 d/wk), or not at all; (2) having a peak flow meter; (3) reporting knowing everything they should about recognizing triggers, managing flare-ups, or adjusting medications; (4) having had allergy treatment and/or evaluation; and (5) having ever discussed asthma triggers with health care providers. Previous studies have shown improved health outcomes related to use of inhaled corticosteroids,²⁴⁻²⁷ and patient education.²⁸⁻³²

PHYSICIAN SPECIALITY

Physician specialty was categorized as generalist, asthma-experienced generalist, or specialist (pulmonologist or allergist). The variable for the asthma-experienced generalist was constructed from 2 questions completed by physicians. The first question was "What is your specialty?" with response options of internal medicine; family practice; ear, nose, and throat; pulmonology; allergy; and other. The second question was "Are you an asthma specialist?" with response options of yes or no. If a physician responded that he or she is not an asthma specialist and that his or her specialty is internal medicine or family practice, then that respondent was grouped as generalist, the reference group in this study. If a physician responded that he or she is an asthma specialist with a specialty in internal medicine or family practice, then he or she was grouped

as an asthma-experienced generalist. Specialists included pulmonologists or allergists and were examined together and separately, compared with generalists.

ANALYSIS

The primary analysis examined the relationship of physician specialty to treatment indicators (assessed at year 1) and outcomes (reported at year 2). We hypothesized that patients treated by specialists would be more likely to report adherence to treatment indicators and would have better outcomes than patients cared for by generalists. We anticipated that in exploratory analyses, we would find similar levels of performance for pulmonary and allergy specialists.

The analysis included simple descriptive statistics and multivariable analyses. Frequency distributions and summary statistics were generated on the independent variables and dependent variables of interest. Univariate and bivariate analyses were performed to describe the data, including χ^2 and *t* tests, correlations, and the McNemar test. Mean values were computed for the effect of physician specialty on continuous outcome indicators.

Multivariable logistic regression analyses were performed on the relationships between physician specialty and the 9 outcome measures. In our first model, we controlled for demographics, asthma symptoms, presence of COPD, smoking and passive smoke exposure, and comorbid conditions that increase asthma symptoms.²³ To explore possible mechanisms for specialty-related differences, in a second model we further adjusted for quality of care indicators including possession of an ICS and peak flow meter, adequacy of information about asthma management, discussion of triggers, and allergy testing. A general linear model was used to analyze the relationships between selected outcomes and process of health care measures and physician specialty. All statistical computations were performed using commercially available software (SAS version 6.12; SAS Institute, Inc, Cary, NC).

Table 1. Patient Characteristics and Physician Specialty*

Characteristics	All Patients (N = 1954)	Treating Physician†			
		Generalist (n = 878)	Experienced Generalist (n = 204)	Pulmonologist (n = 292)	Allergist (n = 382)
Mean (SD) age, y	47.4 (13.7)	47.4 (13.9)	46.5 (12.0)	52.2 (13.7)‡	44.7 (12.9)§
Female	69.3	69.5	73.9	66.1	68.9
White	84.9	80.8	89.5‡	88.7‡	91.6§
College graduate	35.0	30.4	38.1	34.3	43.2§
COPD/emphysema	35.8	37.8	34.8	44.9	25.7§
Ever smoked cigarettes	48.9	50.8	54.4	48.4	40.5§
Mean (SD) asthma symptom score	2.6 (1.1)	2.7 (1.0)	2.6 (1.0)	2.8 (1.1)	2.4 (1.0)‡

*Denominators for percentages and means vary due to missing data. Unless otherwise indicated, data are given as percentage of patients. COPD indicates chronic obstructive pulmonary disease.

†Number of patients does not sum to 1954 because of incomplete physician data.

‡*P* < .01.

§*P* < .001.

||*P* < .05.

and to have COPD (44.9% vs 37.8%; *P* = .03) than patients of generalists. Patients of allergists were also more likely to be white (91.6% vs 80.8%; *P* < .001), but were

younger (mean age, 44.7 vs 47.4 years; *P* < .001), had more education, and were less likely to have smoked (40.5% vs 50.8%; *P* < .001). They also had less severe asthma

Table 2. Treatment Indicators and Physician Specialty*

Characteristics	All Patients (N = 1954)	Treating Physician†			
		Generalist (n = 878)	Experienced Generalist (n = 204)	Pulmonologist (n = 292)	Allergist (n = 382)
Ever discuss triggers	80.8	74.4	75.0	82.2	94.8‡
Knows about flare-ups, medications, or triggers	76.3	69.6	73.1§	82.5‡	86.3‡
Allergy evaluation	75.7	65.5	69.9	80.5	97.4‡
Has ICS for asthma	72.1	66.3	77.2§	82.0‡	73.3
Has peak flow meter at home	48.4	41.9	51.7§	53.8§	54.2‡
Oral corticosteroid	20.8	18.7	11.0§	36.8‡	16.1
Excess use of β -agonist (>8 puffs per day)	12.8	12.5	16.1§	16.9	8.8

*Data are given as percentage of patients. Denominators vary due to missing data. ICS indicates metered-dose inhaler for corticosteroids.

†Number of patients does not sum to 1954 because of incomplete physician data.

‡ $P < .001$.

§ $P < .01$.

symptoms and were less likely to report having COPD (25.7% vs 37.8%; $P < .001$).

RELATIONSHIP OF PHYSICIAN SPECIALTY TO TREATMENT INDICATORS

Associations between physician specialty and patient-reported variables of process of care and knowledge about asthma are presented in **Table 2**. For treatment indicators, overall 80.8% had been told by medical personnel how to avoid triggers; 76.3% reported knowing how to manage asthma flare-ups, medications, or triggers; 75.7% had had an allergy evaluation; 72.1% had an ICS; and 48.4% had a peak flow meter at home. Treatment indicators varied by physician specialty. Patients of asthma-experienced generalists had several indications of greater consistency of care with National Asthma Education Program guidelines compared with patients of generalists, including more knowledge about flare-ups, medication use, and triggers and having an ICS and peak flow meter. Patients of pulmonologists or allergists had more knowledge about asthma management and were more likely to have a peak flow meter. In addition, patients of allergists were more likely to have discussed triggers and to have had an allergy evaluation, whereas patients of pulmonologists were more likely to have an ICS.

PHYSICIAN SPECIALTY AND PATIENT OUTCOMES

In multivariable logistic regression controlling for baseline patient characteristics, including demographics, asthma symptoms, and comorbid illness (model 1 in **Table 3**), there were significant differences by physician specialty in patient outcomes assessed 1 year later. Compared with patients of generalists, patients of asthma-experienced generalists were significantly less likely to cancel activities (odds ratio [OR], 0.55; 95% confidence interval [CI], 0.35-0.88) or miss work (OR, 0.58; 95% CI, 0.35-0.94) in the month before follow-up, or to have been hospitalized or to have visited an ED for asthma (OR, 0.53; 95% CI, 0.29-0.96). Patients of pulmonologists rated communication with their physicians and overall qual-

ity of care significantly higher than patients of generalists, but they were also more likely to be hospitalized or have ED visits (OR, 1.59; 95% CI, 1.08-2.35). Patients of allergists were significantly less likely than patients of generalists to cancel activities (OR, 0.57; 95% CI, 0.40-0.82) and to be hospitalized or have ED visits (OR, 0.63; 95% CI, 0.40-0.97). They rated physician communication and overall quality of care significantly higher, and showed significant improvements in asthma symptoms and physical health status.

To explore why outcomes might vary by physician specialty, we further adjusted for quality-of-care indicators, including use of ICS and peak flow meters, adequacy of information about self-management, discussion of triggers, and allergy testing. (model 2 in **Table 3**). We found similar associations to those seen in the previous 2 models, although some relationships were no longer statistically significant. Patients treated by pulmonologists, on average, had significantly improved symptom scores and rated overall quality of care as better (OR, 0.54; 95% CI, 0.33-0.87). Patients of allergists were less likely to cancel activities (OR, 0.51; 95% CI, 0.34-0.77), or have hospitalization or ED use (OR, 0.55; 95% CI, 0.33-0.90). Patients of allergists also had greater improvement in asthma symptom scores ($P = .07$) and physical health scores ($P < .001$) and rated overall quality of care higher (OR, 0.57; 95% CI, 0.36-0.88). Thus, differences in care, as reflected by the quality indicators, explained some but not all of the benefits associated with specialist care.

COMMENT

With the growth of managed health care in the United States, concern has grown regarding measures to control costs. In particular, controls on access to inpatient care and specialty services have raised questions regarding the potential for adverse effects on patient health. The results of this study suggest that asthma care provided by specialists and experienced generalists was associated with better patient outcomes than was care provided by generalists. These results were consistent across a range of outcome measures that have relevance for pa-

Table 3. Multivariate Logistic and Linear Regressions for Physician Specialty and Patient Outcome Indicators*

Outcome Indicators	Overall	Experienced Generalist vs Generalist		Pulmonologist vs Generalist		Allergist vs Generalist		
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	
Frequency†								
Canceled activities in previous month due to asthma	32.2	0.55 (0.35-0.88)	0.60 (0.35-1.01)	0.98 (0.68-1.41)	0.67 (0.43-1.04)	0.57 (0.40-0.82)	0.51 (0.34-0.77)	
≥1 Hospitalization or emergency department visit in past year	18.6	0.53 (0.29-0.96)	0.62 (0.32-1.20)	1.59 (1.08-2.35)	0.94 (0.59-1.51)	0.63 (0.40-0.97)	0.55 (0.33-0.90)	
≥3 Asthma attacks per week in past month	17.2	0.90 (0.53-1.53)	0.77 (0.41-1.43)	1.09 (0.71-1.66)	0.89 (0.55-1.45)	0.75 (0.49-1.16)	0.76 (0.46-1.24)	
≥1 Workdays lost in past month due to health (employed persons only)	38.5	0.58 (0.35-0.94)	0.65 (0.38-1.12)	0.81 (0.51-1.27)	0.73 (0.44-1.23)	0.72 (0.50-1.04)	0.75 (0.49-1.15)	
Quality of communication with physician‡	74.0	1.0 (0.65-1.53)	1.07 (0.64-1.77)	0.56 (0.37-0.83)	0.81 (0.51-1.29)	0.52 (0.36-0.76)	0.66 (0.42-1.03)	
Quality of asthma care‡	73.7	0.87 (0.57-1.34)	0.87 (0.52-1.45)	0.42 (0.28-0.64)	0.54 (0.33-0.87)	0.54 (0.38-0.77)	0.57 (0.36-0.88)	
Scores§								
Asthma symptom score	2.6 (1-5)	-0.67 (.51)	-0.27 (.79)	-0.59 (.56)	-2.17 (.03)	-2.28 (.02)	-1.84 (.07)	
SF-36 physical health summary score¶	42.6 (9-69)	1.29 (.20)	1.43 (.15)	-1.38 (.17)	0.08 (.94)	2.84 (.005)	2.96 (<.001)	
SF-36 mental health summary score¶	49.1 (8-68)	-0.56 (.58)	-0.34 (.73)	1.48 (.14)	1.13 (.26)	1.42 (.16)	1.45 (.15)	

*N = 1954. Model 1 is adjusted for demographics (age, sex, race, education, asthma symptom score, chronic obstructive pulmonary disease, smoking history, passive smoker, asthma severity-related comorbidity, and interaction of age and smoking history). Model 2 is adjusted for demographics and treatment and quality-of-care indicators (steroid inhaler, peak flow meter, information about asthma management, allergy test, and ever discuss trigger). Boldface type indicates $P < .05$.

†Overall data are given as percentage of patients. Analyses are reported as odds ratio (95% confidence interval).

‡Rated as good, fair, or poor vs excellent or very good.

§Overall data are given as mean (range). Analyses are reported as mean difference (P value).

||Higher score denotes worse outcome.

¶SF-36 indicates 36-item Short-Form Health Survey of the Medical Outcomes Study.^{21,22} Higher score denotes better outcome.

tients, MCOs, employers, and other purchasers of health care.

In our study, patients treated by specialists were more likely to report having ICSs, peak flow meters, and adequate knowledge to manage their own condition. Patients of generalists who had substantial expertise in treating asthma also had higher rates for all of these process indicators. These patterns are consistent with treatment guidelines promulgated by the National Asthma Education Program.²³ With regard to outcomes, patients treated by a specialist or an asthma-experienced generalist had better outcomes during the ensuing year relative to patients treated by generalists, even when controlling for a variety of risk factors. The outcomes included a lower likelihood of canceled activities and workdays lost, fewer asthma symptoms, and better physical health as measured using the 36-item Short-Form Health Survey. The difference in workdays lost was equivalent to 0.6 days per month, or 7.2 days per year. Patients of specialists were most satisfied with the care they received.

This study is unusual in the opportunity it presented to explore differences in patient outcomes for 2 different asthma subspecialty groups, pulmonologists and allergists. As there may be differences in the training, experience, and approach to asthma care, we compared outcomes of patients treated by pulmonologists with those treated by allergists, and outcomes of both sets of patients with those of patients treated by generalists. Our results suggested that there are modest differences be-

tween the specialists that favor allergists. However, given the differences in patients seen by both specialties, our results should be considered preliminary and hypothesis generating rather than conclusive.

The performance of experienced generalists in this study is more noteworthy. Our results support the conclusion that many patients with asthma cared for by internists and family physicians would benefit from treatment by providers with more experience in treating asthma. However, it is premature to conclude that the sickest patients with asthma would do as well if treated by an experienced generalist as by a pulmonary or allergy specialist. Selection of a physician specialist is likely to depend on the severity of illness, the difficulty in managing the condition, patient preferences, and managed health care controls on access. Even after adjustment for symptom severity, there appears to be significant unmeasured risk for adverse outcomes. In addition, it is likely that patients' health status at baseline already reflected the quality of care being received. As a result, it seems likely that our results underestimate the differences in outcome attributable to specialty care.

Our study had several limitations. Although a disproportionate burden of asthma falls on disadvantaged minority urban populations,³³⁻³⁵ the sample in this study was composed of mostly white, well-educated adults insured through plans affiliated with prominent US companies. Thus, our findings are most generalizable to adults treated in managed health care settings. Also, as we over-

sampled patients who had been hospitalized or had had an ED visit in the 2 years before the study, asthma symptom scores were more severe in our study sample than for all adults with asthma. Measures of asthma symptoms and comorbidity were not sufficiently precise to adjust for all confounding effects of intrinsic disease severity, which limited our ability to demonstrate the benefit of treatment consistent with guidelines. In particular, we recognize the risks of confounding by indication when adjusting for treatments in studies of asthma. Adjustment for treatments likely accounts for their beneficial effects and the propensity to use treatments, the latter of which is driven in part by underlying disease severity or lack of asthma control. Thus, medications serve as indicators of intrinsic asthma symptom severity. Without ideal measures of intrinsic asthma symptoms (in this and any other observational study), we do not know whether accounting for use of treatments leads to underadjustment or overadjustment for symptoms. Improvements are needed in predictive modeling of the natural course of this chronic condition to allow investigators to assess the contributions of different treatments to patient outcomes over time.

For the practicing primary care physician, our study raises more questions than it answers. If there is a volume-outcome relationship for asthma,³⁶ the threshold for a minimum number of patients to provide ongoing care to achieve or maintain expertise may lie above the 20 or more patients reported by more than two thirds of generalists. At the time of referral, when is a single consultation, shared care, or assumption of care the best course of action? The important issue of comanagement was not addressed in this study. More research is needed to address these questions.

What are the implications for MCO managers? Evidence from this report and recently updated asthma guidelines³⁷ suggest that it may be more effective to assign the sickest patients to specialty care. Determining who is most likely to benefit from specialty care may require new strategies of patient matching. On the other hand, it is likely that some of the benefits of subspecialty care reside in structural aspects of the practices rather than in physicians themselves, such as staff who are knowledgeable about asthma. There may be other ways to realize the same level of results when using nonspecialist resources.

This study did not answer a pivotal question of what is different about the practice of subspecialists and asthma-experienced generalists that contributed to improved outcomes for their patients. The differential outcomes that we observed may have arisen from differences in training, experience, services provided, or unmeasured patient selection effects. We have examined selected aspects of asthma treatment, and these did not fully explain the differences in outcomes. To pursue goals of accountability and information that can support quality improvement, a range of next steps will be important. These steps include attaining a better understanding of the differences in care provided by subspecialists, experienced generalists, and generalists with limited asthma experience. We need a better understanding of the referral and care-seeking practices that lead patients with asthma of similar severity to be treated by physicians with different levels of training and experience. Translating the information

learned into new guidelines for training and practice should contribute toward a system that manages health care to ensure the best outcomes possible.

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