Discussion

These results indicate that socioeconomic factors predominate as predictors of long-term care in the community. The way these factors operate is fairly clear. Relative youth implies better resources and coping skills. Males are more likely to have a surviving spouse. Better income allows for better housing and purchase of services, and children can be both care providers and income producers. In other recent longitudinal studies age, female gender, and living alone or absence of spouse have been shown to predict institutionalization.[8,9] Notably in the present study, when elders live with them, children appear to enhance the possibility of remaining in the community more than do living spouses or nonspecified "others."

Although, in this study, impairment and disability do not appear to predict whether community or institutional care will be used, it must be remembered that some part of nine years intervened between the measurement of dependent and independent variables. Observations closer to the decision-point might have shown that mental health impairment and functional disability were more difficult to care for at home than impairment of physical health alone, as suggested by the data in Table 1. □

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References

1. US General Accounting Office: The Well-Being of Older People in Cleveland, Ohio. HRD-77-70, Washington DC: US GAO, 1977.
2. Fillenbaum G: Multidimensional Functional Assessment of Older Adults: The Duke Older Americans Resources and Services Procedures. Hillsdale, NJ: Lawrence Erlbaum Associates, 1988.
3. Ford AB, Folmar SJ, Salmon RB, Medalie JH, Roy AW, Galazka SS: Health and function in the old and very old. J Am Geriatr Soc 1988; 36:187–197.
4. Pfeiffer E: A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients. J Am Geriatr Soc 1975; 23:433–441.
5. Kincannon JC: Prediction of the standard MMPI scale scores from 71 items: The minimult. J Consult Clin Psychol 1968; 32:319–325. (Modified by Pfeiffer—see reference 2.)
6. Feller BA: Americans Needing Help to Function at Home. National Center for Health Statistics, Advance Data from Vital and Health Statistics, No. 92, Department of Health and Human Services Publ. No. (PHS) 83-1250. Hyattsville, MD: National Center for Health Statistics, 1983.
7. Ford AB, Haug MR, Jones PK, Roy AW, Folmar SJ: Race-related differences among elderly urban residents: A cohort study, 1975–1984. J Gerontol Soc Sci 1990; 45: 5163–5171.
8. Branch LG, Jette AM: A prospective study of long-term care institutionalization among the aged. Am J Public Health 1982; 72:1373–1378.
9. Shapiro E, Tate RB: Predictors of long-term care facility use among the elderly. Can J Aging 1985; 4:11–19.

Recent Trends in the Incidence of Toxic Shock Syndrome in Northern California

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ABSTRACT

The incidence of toxic shock syndrome in women members of a large prepaid medical care program in Northern California was 1.5 cases per 100,000 in a period after removal of tampons containing polyacrylate rayon and reductions in tampon absorbency. This rate was lower, but not significantly lower, than the rate of 2.2 per 100,000 in the prior interval. It was higher, but not significantly higher, than the rate of 0.4 per 100,000 in the era before "superabsorbent" materials were introduced into tampons. The incidence in men has been stable at about 0.1 cases per 100,000 for the 15-year period from 1972 though 1987. (*Am J Public Health.* 1991;81:1209–1211)

Introduction

We previously reported the incidence of toxic shock syndrome (TSS) through 1985 in members of the Northern California Kaiser Permanente Medical Care Program ages 15–34 years.[1–3] Here, we present a final update on TSS in this population, presenting data for 1986 and 1987. The incidence of TSS in these latter two years is of particular interest, because polyacrylate rayon, a material included in tampons to increase their absorbency, was removed from tampons marketed in the United States in March 1985 and because there were further declines in the absorbency of tampons overall. Since high absorbency has been linked with an increase risk of TSS in tampon users,[4] one would expect the incidence of TSS to decline in women after reductions in the absorbency of tampons brought about, at least in part, by removal of polyacrylate rayon from tampons.

Methods

Our method of case ascertainment, in which medical records were reviewed to identify recognized and unrecognized cases of TSS, was described in detail in a

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TABLE 1—Incidence of Definite TSS in Females Ages 15–34 in Relation to Certain Milestones in Tampon Formulation and Marketing

Time Periods	Description	Number of Cases	Incidence[a] (95% Confidence Interval)
1. 1972–June 1977	Prior to introduction of superabsorbent materials	5	0.4 (0.1,1.0)
2. July 1977–April 1979	After superabsorbents introduced, but before Rely marketing in California	8	1.5 (0.6,2.9)
3. May 1979–September 1980	Rely and other superabsorbents in California	11	2.4 (1.2,4.2)
4. October 1980–March 1985	After Rely removal from the market but before removal of polyacrylate rayon	34	2.2 (1.5,3.0)
5. April 1985–December 1987	After removal of polyacrylate rayon products and reductions in absorbency	14	1.5 (0.8,2.6)

[a] per 100,000 women-years

prior publication.[1] Briefly, we used computer-stored information from records of discharges from Northern California Kaiser Permanente Medical Care Program facilities for the period 1972 through 1987 to identify men and women ages 15–34 years hospitalized with illnesses that might be confused with TSS, or, for later years, with diagnosed TSS. Records for qualifying hospitalizations were reviewed by a single trained medical record technician, who determined whether or not the illness met the case definition for TSS developed by the Centers for Disease Control (CDC), except that desquamation and orthostatic dizziness were not considered criteria because desquamation was not reliably recorded in the medical records and because orthostatic hypotension was not an official criterion for TSS when the study began. Records for all illnesses that might represent TSS were then reviewed independently by each of the co-authors, who classified them as definite TSS, probable TSS, or not TSS. Definite TSS cases were illnesses that met all the CDC criteria as TSS, except desquamation. Probable cases were illnesses that had rash, fever, and hypotension, but involved only two organ systems.

The denominators for the calculation of the incidence rates were person-years of membership in the Northern California Kaiser-Permanente Medical Care Program. Ninety-five percent confidence intervals were estimated based on the assumption that the incidence of TSS is distributed as a Poisson. Statistical tests of the hypotheses about rates of TSS were carried out based on the comparison of two Poisson variables.

Results

Table 1 shows the incidence of definite TSS in women in relation to certain milestones in tampon formation and marketing. The incidence of TSS was statistically significantly higher ($p = 0.0003$) after introduction of superabsorbent materials and Rely tampons into the California market (period 3) than in the period prior to these two changes in tampon for-

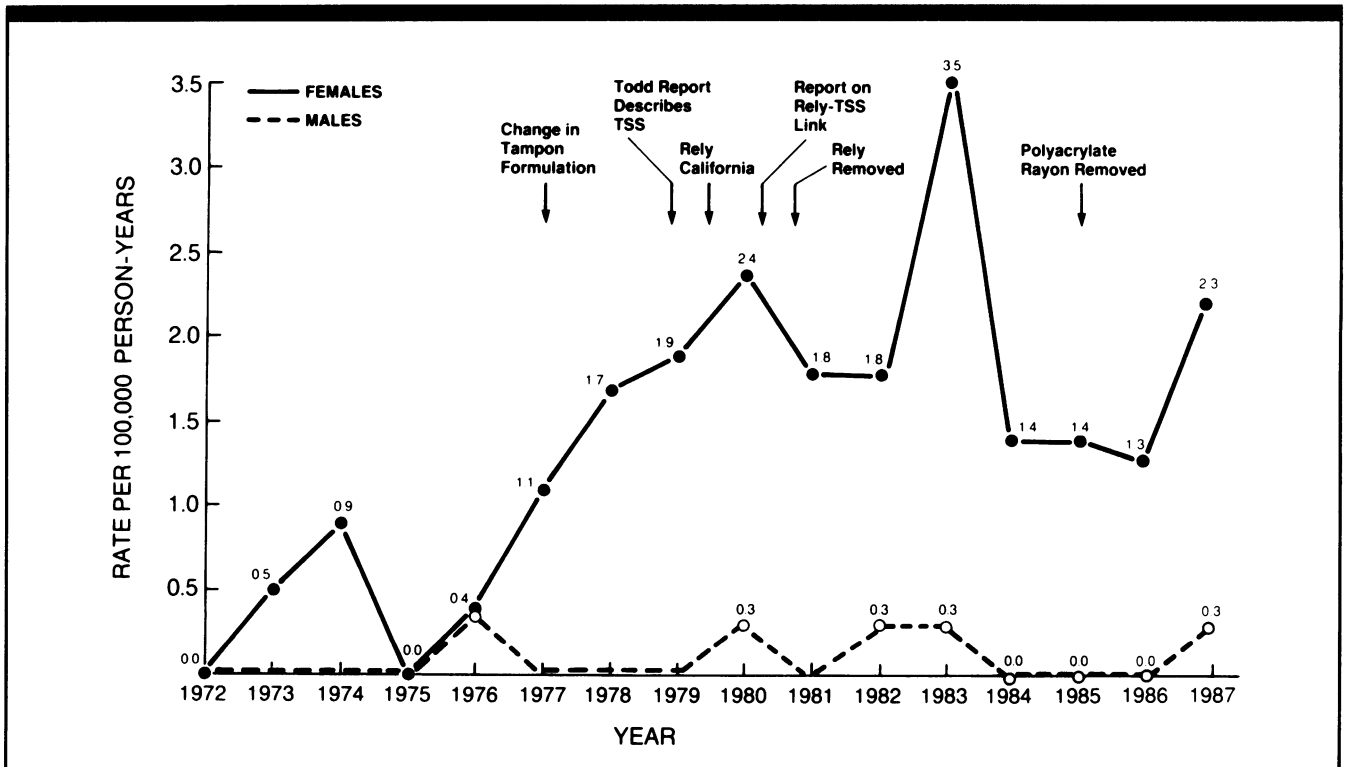

FIGURE 1—Incidence rate of definite TSS by year.

mulation and marketing (period 1). The incidence of definite TSS in women after removal of Rely and polyacrylate rayon from remaining tampons (period 5) was lower, but not significantly lower ($p = 0.13$) than in the prior two intervals (periods 3 and 4). The incidence rate after removal of polyacrylate (period 5) was also not statistically significantly higher ($p = 0.13$) than in the period prior to introduction of superabsorbent materials (period 1).

Information on menstrual status at the onset of symptoms was retrievable from the medical records of all 12 definite TSS cases in women in 1986 and 1987 (Figure 1). Eight of these cases (67 percent) were menstrual (95% CI = 49, 85). This percentage is the same as it was in prior years in this population.[2]

The incidence of TSS in men has been stable at about 0.1 cases per 100,000 throughout the 15-year period covered by this surveillance project.

Discussion

The incidence of TSS began increasing in about 1977 in temporal relation to changes in tampon formulation that made them more absorbent. The rarity of TSS in this population limits the ability to draw firm conclusions about the incidence of TSS in relation to the removal of Rely tampons from the market, the subsequent removal of polyacrylate rayon, and the reductions in the absorbency of tampons that occurred simultaneously. The data are suggestive of a decline in incidence in relation to removal of polyacrylate rayon and accompanying reductions in absorbency. However, these changes in tampon formulation have clearly not eliminated TSS in women.

It is reasonable to conclude TSS is very rare in men. It also appears that in this population the percentage of menstrual cases is stable at about two-thirds of all cases in women. The incidence in both men and women in this population is very low, and TSS is not an important public health problem at this time. □

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References

1. Petitti DB, Reingold A, Chin J: The incidence of toxic shock syndrome in Northern California, 1972 through 1983. JAMA 1986; 255:368–372.
2. Petitti DB, Reingold A: Tampon characteristics and menstrual toxic shock syndrome. JAMA 1988; 259:686–687.
3. Petitti DB, Reingold A: Update through 1985 on the incidence of toxic shock syndrome in members of a prepaid health plan. Rev Infect Dis 1989; 11(Suppl):22–26.
4. Berkley, SF, Hightower AW, Broome CV, Reingold AL: The relationship of tampon characteristics to menstrual toxic shock syndrome. JAMA 1987; 258:917–920.

Hospital Charges in Five Washington Counties Jump Average of Nearly 37%

Hospital charges in the state of Washington's five largest counties increased by an average of nearly 37% between 1987 and 1989, according to a report by the Washington State Department of Health.

The report, "Inflation Measures in Hospital Charges," covers 15 separate categories, from coronary bypass surgery to Caesarean delivery, at hospitals in King, Pierce, Snohomish, Thurston, and Spokane Counties.

"Hospital charges climbed at a significant rate over that 3-year period," said State Health Secretary Kristine M. Gebbie. "This report confirms that the issues surrounding the inflation of hospital charges are complex and that the upper range of these inflation measures are well above the consumer price index or even average increases in medical charges."

Increases in charges over the 3-year period range from 9.9% for treating alcohol and drug dependency to 67.7% for newborn children with major medical problems. Annual inflation figures for those same categories of treatment were 4.1% and 32.8%, respectively, with a median annual inflation rate of 10.5% covering all 15 categories.

The overall average increase for the 15 categories of services was 36.6% over the 3-year period.

The amount of inflation varied by category of service and the county. For example, average charges for cardiac bypass surgery in King County jumped from about $17,500 in 1987 to just over $22,200 in 1989, whereas in Pierce County the charges for similar procedures increased from just under $23,000 to more than $30,000. In Spokane County, similar bypass surgery jumped from about $18,800 to about $21,500.

For this type of bypass surgery, the overall average charge increased from $19,038 to $23,482, or about 23.3%. Annually, this meant the inflation rate for this procedure was 10.7%. The greatest total increase over the 3-year period was 30.8% in Pierce County, and the smallest gain was in Spokane County with 14.6% over 3 years.

Another category, care for newborn children without significant problems, represents the greatest single area of competition between hospitals, according to the state agency's report.

The average charge for newborn care within the five counties increased from $478 for the first half of 1987 to $555 for the second half of 1989, or about 16%. This level of increase did not occur in all counties. Snohomish and Spokane counties posted 20.8% and 28.5%, respectively.

Two measures of inflation are used extensively throughout the report: total change in the average charge from the first half of 1987 through the last half of 1989; and the average annual rate for 1988 and 1989. The report also measures the average level of inflation in charges covering all patients and all categories.

In addition to bypass surgery and Caesarean section deliveries, the 15 categories of service include chemotherapy, reattaching major joints or limbs, and psychiatric care, including the treatment of schizophrenia and manic depression.

Anyone who wants a copy of the report may contact the State Department of Health, Office of Hospital Data Systems, Mail Stop FJ-21, Olympia, WA, 98504, or phone 206/753-1990 during regular business hours.