

ORIGINAL PAPER

The burden of prevention: downstream consequences of Pap smear testing in the elderly

B E Sirovich, D J Gottlieb, E S Fisher

J Med Screen 2003;10:189–195

Context: Although cervical cancer is an unusual cause of death among women 65 and older, most elderly women in the US report continuing to undergo periodic Pap smear screening.

Objective: To describe the incidence of Pap smears and downstream testing among elderly women.

Setting: Claims-based analysis of female Medicare enrollees age 65 and older.

Methods: Using three years of Medicare Part B 5% Files (1995–1997), we differentiated between women undergoing screening Pap smears and those undergoing Pap smears for surveillance of previous abnormalities or Pap smear follow-up. We determined the proportion of elderly women undergoing Pap smear testing and rates of downstream testing and procedures after an initial Pap smear.

Results: Four million female Medicare beneficiaries over 65 years underwent Pap smear testing between 1995 and 1997, representing 25% of the eligible population. After adjusting for underbilling for Pap smears under Medicare, 43% of women over 65 are estimated to have undergone Pap smear testing during the 3-year period. The large majority (90%) of Pap smears were for screening, while 10% were done for surveillance or follow-up. For every 1000 women with a screening Pap smear, 39 had at least one downstream intervention within eight months of the initial Pap smear, including seven women who underwent colposcopy and two women who had other surgical procedures. Rates of downstream interventions were considerably higher for women undergoing Pap smear follow-up (302 per 1000 with at least one downstream intervention), and surveillance of previous abnormalities (209 per 1000 with a downstream intervention).

Conclusion: Cervical cancer screening is widespread among elderly American women, and follow-up testing is not uncommon, particularly among the ten percent of women who appear to be in a cycle of repeated testing. This substantial volume of testing occurs despite the rarity of cervical cancer deaths and unknown benefits of screening in this age group.

See end of article for authors' affiliation

Correspondence to:
Dr B Sirovich, VA
Outcomes Group (111B),
Department of Veterans
Affairs Medical Center,
White River Junction, VT
05009, USA;
brenda.sirovich@
dartmouth.edu

Accepted for publication
1 July 2003

Elderly women and their physicians face difficult decisions regarding whether or not to continue screening for cervical cancer. While all guidelines strongly recommend regular Pap smear screening for young and middle-aged women, no such unanimity exists for the elderly. Many US professional societies, including the American College of Obstetrics and Gynecology, offer no upper age limit, while the American Cancer Society recently joined the United States Preventive Services Task Force in recommending that older women (over age 65 or 70) stop screening if they have had previously normal exams.^{1–4} Outside the United States, screening women over 70 is extremely rare.⁵ These disparities reflect widespread uncertainty about the benefits of screening the elderly for cervical cancer. Most authorities do agree that any benefits, if they exist, are likely to be quite small.^{1,6}

The decision to continue screening, therefore, should depend on how women weigh a small and uncertain benefit against the downsides of screening. Easily recognizable downsides of Pap smear screening include patient inconvenience and discomfort,^{7,8} both likely to increase with age. The likelihood that an abnormal Pap smear will require further evaluation should also be considered. It is estimated that as many as 5% of Pap smears are read as abnormal, and are thus likely to lead to follow-up testing.⁹ Scant data are available, however, on the downstream consequences of Pap smear testing among elderly women. In fact, we were surprised to find that there are almost no population-based

data on rates of intervention following Pap smear testing for women of any age.

Despite uncertain benefits and lack of accurate information on the downsides of screening, Pap smear testing is common among elderly women. Survey data from 1998 suggest that almost two thirds of women over 65 are undergoing screening,¹⁰ and the numbers of older women being screened continue to increase.¹¹ Thus, quantification of the downsides of Pap smear screening in the elderly has become increasingly important. Using Medicare outpatient claims data files,¹² we sought to describe the downstream Pap smear screening experience among American women over age 65.

METHODS

Data

We used data from a 5% sample of the Part B Physician Supplier file of Medicare's National Claims History System (a publicly available database of all claims for 5% of Medicare enrollees, released annually by the Health Care Financing Administration, Baltimore, MD) to identify women who had undergone Pap smear testing during the three year period 1995–1997. In order to ensure complete availability of claims data for each woman, we excluded those who were ineligible for Medicare Part B (outpatient coverage), and those who enrolled in risk-contract managed care plans (HMO's).

Pap smear incidence

We estimated the proportion of elderly Medicare beneficiaries undergoing screening as follows. For the numerator, we used the number of women over 65 with any Pap smear interpretation procedure code during the three-year period 1 January 1995–31 December 1997. (See Appendices A–C for procedure [CPT] and diagnosis [ICD-9] codes used in the study.) We used a three year window because Pap smear screening every three years is endorsed by most US organizations and reimbursed under Medicare. We did not exclude Pap smears with an 'allowed charge'=US\$0.00, because of Medicare's narrow definition of a reimbursable Pap smear. (Restrictions limiting women to one screening Pap smear every three years, and requiring a diagnosis suggestive of genital abnormality for smears coded as non-screening). Because of this, approximately 25% of women with Pap smear codes had no CPT code with an 'allowed charge' >US\$0.00. For the denominator, we used the number of females who were Part B eligible, non-HMO enrolled Medicare beneficiaries over age 65 at the midpoint of the three year period (1 July 1996).

Because Pap smears are poorly reimbursed under Medicare (~US\$6 per test), we hypothesized substantial underbilling. In order to estimate the extent of underbilling, we analyzed prior claims on approximately 2000 women who underwent colposcopy in 1996, each of whom had almost certainly had a Pap smear during the preceding year. Only 59% had one or more Pap smear claims (or a previous colposcopy) during the 12 months prior to colposcopy, suggesting that approximately 41% of Medicare eligible women who have a Pap smear do not have an associated claim.

The downstream events study population

Our primary investigation focuses on downstream events during the eight months following a Pap smear. We therefore required that claims data was available for each woman for the full eight months following her Pap smear. We chose an eight month follow-up period presuming it would encompass most evaluations of abnormal Pap smears, while excluding a woman's next annual Pap smear. In order to determine the indication for each Pap smear, claims also had to be available for the full 12 months preceding a woman's Pap smear, which required that women were at least 66 years old on the day of the Pap smear (assuring one year of prior Medicare eligibility). The study population was therefore restricted to women 66 years and older with a Pap smear between 1 January 1996 and 30 April 1997, who had no gaps in Part B coverage during the 12 months prior to and eight months following the Pap smear.

We excluded women whose Pap smear may have been performed for symptoms rather than for screening. We therefore eliminated women with a diagnostic code (e.g. metrorrhagia) or a procedure code (e.g. endometrial biopsy) suggestive of post-menopausal vaginal bleeding during the three months prior to the Pap smear. (See Appendices A and B for listing of CPT and ICD-9 codes used to identify bleeding.) For each woman remaining (n=121,902), we defined the first Pap smear between 1 January 1996 and 30 April 1997 as the index Pap smear.

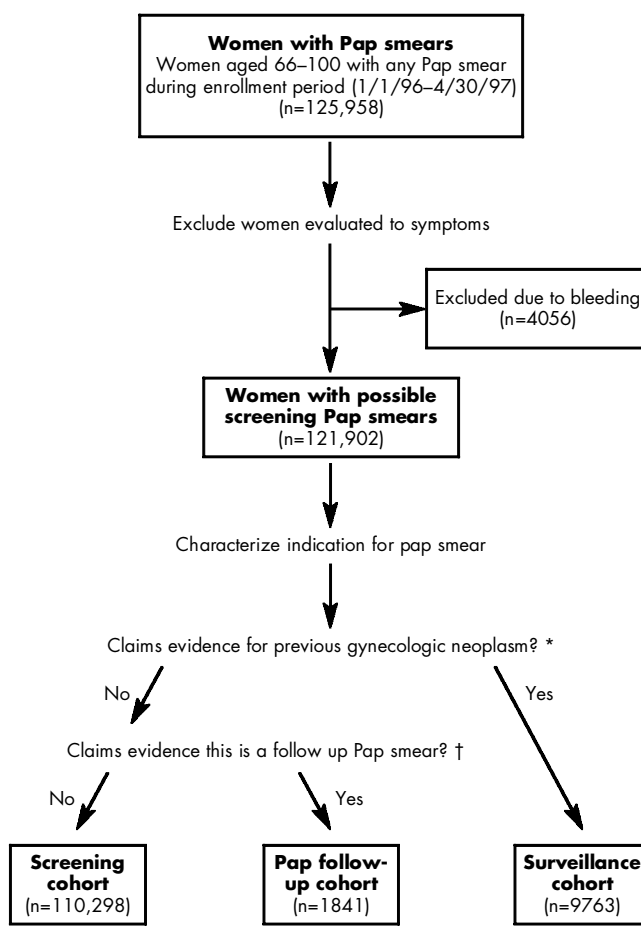
Determining Pap smear indication

Women undergoing Pap smear testing for surveillance of previous abnormalities or to follow up a prior abnormal Pap are likely to undergo downstream testing at higher rates than women undergoing screening Pap smears. We there-

fore used claims activity from the 12 months prior to the index Pap smear in order to divide the study population into three mutually exclusive cohorts based on Pap smear indication, as shown in Figure 1. The surveillance cohort included women whose Pap smear was likely to have been performed in surveillance of past cervical neoplasia – women who had a diagnosis (e.g. malignant neoplasm corpus uteri) or a procedure (e.g. cone biopsy) associated with a gynecologic neoplasm during the previous year. Of the remaining women, those who had a Pap smear code during the nine months prior to the index Pap smear constituted the Pap follow-up cohort. Women who did not meet the criteria for the Surveillance or Pap follow-up cohorts were assigned to the Screening cohort.

Downstream events

For each woman, we recorded all CPT codes for Pap smears, colposcopies and surgical procedures performed within 240 days following the index Pap smear. (See Appendix A for CPT codes.) For all downstream procedures we report only whether a woman had any code for each separate procedure (e.g. colposcopy), and not whether a woman had undergone more than one.



* procedure code for colposcopy or other cervical procedure, or diagnostic code for gynecologic neoplasm in 12 months preceding index Pap smear; † procedure code for Pap smear within nine months preceding index Pap smear.

Figure 1 Women in the study population were assigned to one of three unique cohorts based on the indication for the index Pap smear. The indication was inferred based on diagnostic and procedural codes of claims from the 12 months preceding the index Pap smear.

Appendix A Current procedural terminology (CPT) codes used to identify the following procedures mentioned in the text.

Procedure	CPT codes	CPT code label
Pap smear	P3000	Screening Pap smear
	P3001	Screening Pap smear, requiring physician evaluation
	88150	Cytopathology, smears, by technician
	88151	Cytopathology, requiring interpretation by physician
	88155	Cytopathology, with definite hormonal evaluation
	88156	Cytopathology, the Bethesda System, by technician
	88157	Cytopathology, requiring interpretation by physician
Colposcopy	57452	Colposcopy (vaginocopy)
	57454	with biopsy of the cervix or endocervical curettage
	57460	with loop electrode excision procedure (LEEP)
	57500	Biopsy, single or multiple, or local excision of lesion
	57505	Endocervical curettage
Surgical Procedures	57510	Cauterization of cervix, electro or thermal
	57511	Cauterization of cervix, cryocautery, initial or repeat
	57513	Cauterization of cervix, laser surgery
	57520	Conization of cervix
	57522	Conization of cervix, loop electrode excision
	57530	Trachelectomy (cervicectomy), amputation of cervix
	57540	Excision of cervical stump, abdominal approach
	57545	with pelvic floor repair
	57550	Excision of cervical stump, vaginal approach
	57555	with anterior and/or posterior repair
	57556	with repair of enterocele
Procedures to evaluate bleeding	58100	Endometrial biopsy/biopsy
	58120	Dilation and curettage (D&C)
Hysterectomy	58150	Total abdominal hysterectomy (TAH)
	58152	with colpo-urethrocystopexy
	58200	TAH, with lymph node sampling
	58210	Radical abdominal hysterectomy
	58240	Pelvic exenteration for gynecologic malignancy
	58260	Vaginal hysterectomy
	58262	with removal of tube/ovary
	58263	with removal of tube/ovary, with enterocele repair
	58267	with colpo-urethrocystopexy
	58270	with repair of enterocele
	58275	Vaginal hysterectomy, with total/partial colectomy
58280	with repair of enterocele	
58285	Vaginal hysterectomy, radical	

Appendix B Diagnostic (ICD-9) codes used to identify the following diagnoses mentioned in the text.

Diagnostic category	ICD-9 codes	ICD-9 code label	
Past cervical neoplasia	V104.1	History of cervical malignancy	
	V104.2	History of uterus malignancy nec	
	179	Malignant neoplasm of uterus nos	
	180.0	Malignant neoplasm of endocervix	
	180.1	Malignant neoplasm of exocervix	
	180.8	Malignant neoplasm of cervix nec	
	180.9	Malignant neoplasm of cervix uteri nos	
	182.0	Malignant neoplasm of corpus uteri	
	184.0	Malignant neoplasm of vagina	
	219.0	Benign neoplasm of cervix uteri	
	233.1	Carcinoma in situ of cervix uteri	
	233.2	Carcinoma in situ of uterus nec	
	622.1	Dysplasia of cervix	
	623.0	Dysplasia of vagina	
	795.0	Abnormal Pap smear - cervix	
	795.1	Abnormal Pap smear - other site	
	Current bleeding	626	Disorder of menstruation
		626.1	Scanty menstruation
		626.2	Excessive menstruation
		626.4	Irregular menstruation
626.6		Metrorrhagia	
626.8		Menstrual disorder NEC	
626.9		Menstrual disorder NOS	
627.1		Postmenopausal bleeding	

single procedure rather than second Pap smears. Fewer than 5% of all second smears occurred between six and 15 days following the first smear. Thus, we recorded follow-up Pap smears starting at six days after the index smear, and required at least six days between subsequent smears in order to count as two separate downstream events.

Hysterectomy

We also recorded all procedure codes for hysterectomy among women in the three cohorts. Because the majority of hysterectomies are likely to be performed because of a gynecological condition unrelated to results of the Pap smear, we did not classify hysterectomies as downstream events. However, because women unconcerned with preserving fertility may be offered hysterectomy as an alternative to lesser surgical procedures (e.g. conisation) or frequent Pap follow-up, it is likely that some fraction of hysterectomies among elderly women who undergo Pap smear testing are actually a downstream consequence of abnormal Pap smears. We used diagnostic codes associated with each hysterectomy and the antecedent Pap smear to determine whether the procedure was likely a downstream consequence of the Pap smear, and thereby estimated the rate of downstream hysterectomies. (Appendix C describes the generation of low- and high-bound estimates).

Codes 88151 and 88157 indicate physician interpretation, rather than cytotechnologist interpretation; however not every physician interpretation code is preceded by a cytotechnologist code – therefore codes 88151 and 88157 were considered the same as the other codes with one exception: a 88151 or 88157 code appearing within 30 days following another Pap smear code was NOT counted as a separate and distinct Pap smear.

Analysis

We calculated the adjusted three-year Pap smear incidence by dividing the crude incidence by the estimated proportion of Pap smears actually billed (59%). We report rates of downstream testing as the number of downstream procedures per 1000 women undergoing Pap smear testing.

Counting follow-up procedures

In the case in which multiple Pap smear codes were present for one woman within several days of each other, we presumed that double-counting, double-billing or repeat billing for Pap smears not reimbursed may have taken place. In order to determine the window outside of which a second Pap smear code would be counted as a separate Pap smear, we evaluated a random sample of 200 sets of two or more Pap smear codes on one woman during a 180 day period. Based on information including Pap smear-associated ICD-9 codes, allowable charges, and providers, we found that Pap smear codes more than five days following another Pap smear CPT code were likely to represent separate Pap smear procedures. Of subsequent Pap smear codes within six months of a first Pap smear, 24% occurred within five days of the first smear and were presumed to be repeat bills for a

Appendix C Classification of hysterectomies as downstream events.

We used both narrow and broad criteria to attribute a hysterectomy to an antecedent Pap smear. This process generated a low- and high-bound estimate, respectively, of the rate of downstream hysterectomies after Pap smears. For both criteria, we first excluded all women for whom diagnostic codes (ICD-9 codes) associated with the hysterectomy specified neoplasm other than the cervix. This was done to avoid counting a hysterectomy done for uterine, ovarian, colon, or other malignancy as a downstream event following a Pap smear. Our narrow criterion for a downstream hysterectomy required that the primary diagnostic code associated with the hysterectomy identified a cervical abnormality*. Our broad criterion included any one of the following a) a hysterectomy that met our narrow criterion, b) a hysterectomy for which the secondary diagnostic code was a cervical abnormality, or c) a hysterectomy for which the antecedent Pap smear was done because of a cervical abnormality (as the primary diagnostic code).

* Any cervical abnormality includes the following ICD-9 codes:

Malig neo endocervix	180.0
Malig neo exocervix	180.1
Mal neo cervix NEC	180.8
Mal neo cervix uteri	180.9
Benign neo cervix uteri	219.0
Ca in situ cervix uteri	233.1
Cervicitis	616.0
Dysplasia of cervix	622.1
Mucous polyp of cervix	622.7
Noninflam dis cervix NEC	622.8
Noninflam dis cervix NOS	622.9
Abn Pap smear – cervix	795.0
Abn Pap smear – other	795.1

We calculated 95% confidence intervals (CI) using the exact binomial CI function for proportions in STATA Software (version 6.0, Stata Corporation, College Station, TX, 1999).

RESULTS

Pap smear incidence

Approximately four million female Medicare beneficiaries over 65 years old had at least one Medicare claim for a Pap smear during the three year period 1995–1997, representing 25% of the age-specific female population (See Table 1). Thirty three percent of women aged 66–75 years had Pap smear claims, as did 20% of those aged 76–85 years, and 9%

of women aged 86–100 years. When adjusted for under-billing, an estimated 43% of elderly women had at least one Pap smear during the three year period 1995–1997 (for women aged 66–75 years, 76–85 years, and 86–100 years, the proportions were 55%, 34%, and 14%, respectively).

Downstream events

Between 1 January 1996 and 30 April 1997, 121,902 women (in the Medicare 5% sample) had at least one Pap smear and were included in the ‘downstream events’ study population. Of these, 9763 (8%) women had undergone a procedure or had a diagnosis suggestive of gynecological neoplasia within the 12 months prior to the Pap smear and were assigned to the surveillance cohort. An additional 1841(2%) had undergone a Pap smear within the nine month period prior to the index Pap smear, and were included in the Pap follow-up cohort. The screening cohort consists of the remaining 110,298 women (90%).

Table 2 shows the rates of downstream testing among the three cohorts. Among women in the screening cohort, 39 per 1000 underwent at least one form of downstream testing during the eight months following the initial Pap smear – 35 had one or more follow-up Pap smears, seven underwent colposcopy, and two had a more invasive surgical procedure. Rates of downstream intervention were considerably higher for women in the other two (non-screening) cohorts. Among women in the Pap follow-up cohort, 302 per 1000 had at least one downstream intervention, including 288 with a subsequent Pap smear, 19 who underwent colposcopy, and six who had a surgical procedure. Among women in the surveillance cohort, 209 women per 1000 had one or more downstream interventions, including 171 with a subsequent Pap smear, 56 who underwent colposcopy and 16 who had a surgical procedure. Rates of subsequent Pap smears are likely to be considerably higher than these figures suggest (after adjusting for underbilling for Pap smears).

Downstream events according to age

There were modest differences in rates of downstream testing according to age. Figure 2 displays, for the screening cohort only, the likelihood of downstream testing for each

Table 1 Estimated proportion of female Medicare enrollees getting a Pap smear during a three-year period, based on a 5% sample of Medicare fee-for-service enrollees

Age group	Number of women tested	Number of female Medicare enrollees	Observed proportion tested	Estimated* true proportion tested
66–75	2,752,520	8,305,498	33.1%	55.4%
76–85	1,149,040	5,630,130	20.4%	34.1%
86–100	157,560	2,043,852	8.7%	13.9%
All ages (66–100)	4,059,120	15,979,480	25.4%	42.5%

* adjusted for the estimated percentage of Pap smears billed for (59%). (See text.)

Table 2 Number of elderly women undergoing at least one downstream intervention within eight months of an initial Pap smear, according to Pap smear indication cohort

Downstream intervention	Screening cohort (n=110,298)		Pap follow-up cohort (n=1,841)		Surveillance cohort (n=9,763)	
	n*	per 1000†	n*	per 1000†	n*	per 1000†
Subsequent Pap smear(s)	3811	34.6	530	287.9	1673	171.4
Colposcopy	806	7.3	35	19.0	550	56.3
Surgical procedure‡	223	2.0	11	6.0	159	16.3
Any of the above	4350	39.4	555	301.5	2040	209.0

* number of women undergoing at least one intervention
 † number women with at least one intervention, per 1000 women in the cohort
 ‡ e.g. cryocauterisation, laser therapy, conisation.

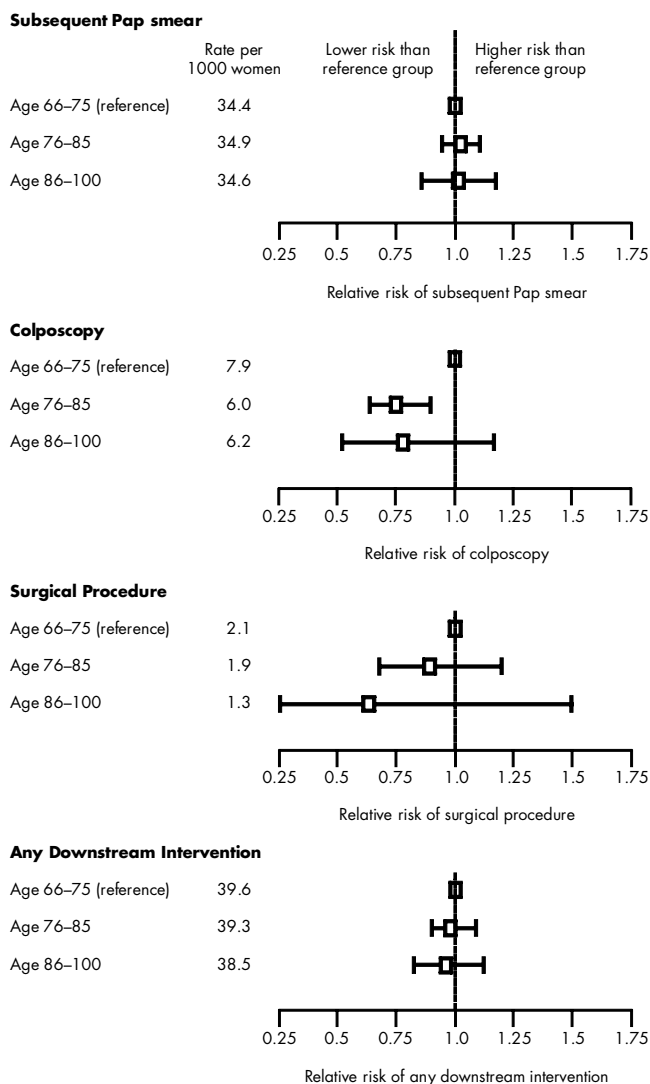


Figure 2 Absolute rate and relative risk of downstream events within the eight months following a screening Pap smear, according to age.

age group relative to those in the youngest age group, aged 66–75 (expressed as the relative risk of downstream testing). The rates of subsequent Pap smears were nearly identical (at approximately 35 per 1000) for women aged 66–75 years, 76–85 years and 86–100 years. Rates of colposcopy and other surgical procedures appeared to fall with increasing age. Compared with women in the youngest age group, women aged 76–85 years underwent 25% fewer colposcopies (relative risk [RR] 0.75; 95% CI 0.64–0.89), and 11% fewer surgical procedures (RR 0.89; 95% CI 0.52–1.18) during the eight months following a Pap smear. Women aged 86–100 years also had lower rates of colposcopy and surgical procedures, but the small numbers of women made these estimates unstable. Similar patterns were observed among women in the Pap follow-up and surveillance cohorts (data not shown).

Hysterectomy

Among women in the screening cohort, 8.5 per 1000 screened underwent hysterectomy during the eight months following the index Pap smear. Rates of hysterectomy were higher among women in the surveillance (25.5 per 1000) and Pap follow-up cohorts (19.6 per 1000). Hysterectomy rates were similar for women aged 66–75 and 76–85 years,

and fell modestly among women age 86 and older. Based on the hysterectomy indication attached to the procedure claim, we estimated that between 4% and 5% of hysterectomies among the screening cohort were direct (downstream) consequences of Pap smear testing. This was true for between 13% and 32% of hysterectomies in the surveillance cohort and for no hysterectomies among women in the Pap follow-up cohort.

DISCUSSION

We found that Pap smear screening is common among elderly female Medicare beneficiaries: an estimated 43% of women over age 65 were screened during a three year period. Rates of subsequent testing among women undergoing Pap smear screening are not negligible – nearly 40 women per 1000 underwent further testing within eight months of the Pap smear – and were many times higher among women undergoing Pap smears for surveillance or Pap follow-up. Finally, rates of downstream interventions remained high even among the oldest women, although rates of invasive procedures declined modestly among those over age 85.

Our study has several limitations. Firstly, claims-based analysis is only as accurate as the claims themselves. It appears likely that, because of low reimbursement, Pap smear claims may substantially underestimate the frequency of Pap smear testing – only 59% of women had a Pap smear claim during the 12 months prior to colposcopy. We therefore report not only the proportion with a Pap smear claim, but also an adjusted estimate of the proportion that underwent testing, accounting for underbilling. (In the unlikely event that a significant number of women undergo colposcopy without having first had a Pap smear, our adjusted estimate of Pap smear incidence would be exaggerated.) Although we may have similarly understated rates of downstream Pap smears, it is less likely that we have substantially underestimated rates of more generously reimbursed downstream procedures such as colposcopy and cryosurgery, as prior work has demonstrated reasonable sensitivity and specificity of Medicare claims data, especially for procedures.^{13–15}

Secondly, our reliance on claims data required us to infer the indication for each Pap smear. The distinctly different pattern of downstream events for each of the three cohorts, however, provides reasonable face validity. If our assumptions introduce any systematic bias, it would be that because of underbilling for previous Pap smears, the screening cohort may include a very small number of women (1% of the cohort) actually undergoing Pap follow-up. Lastly, we also had to infer the causal connection between a Pap smear and the procedures we considered ‘downstream’ from that Pap smear. While causality cannot be definitively established without reviewing medical records, all procedures (except subsequent Pap smears) included as downstream events are rarely if ever performed in the absence of an antecedent abnormal Pap smear. The exception would be hysterectomy, which we have not categorized as a downstream consequence of screening, although our analysis of diagnostic codes suggests that this does occur.

Our results expand upon prior work examining Pap smear screening prevalence and consequences among elderly women. Our finding that 43% of elderly American women are screened during a three year period is substantially lower than previous estimates of between 64% and 87%.^{16–19} Several factors help to explain the discrepancy between our results and these survey-based estimates. In contrast to

Medicare data, survey data exclude women who are institutionalized, who have a low likelihood of screening, but include women enrolled in Medicare managed care plans, who are likely to be screened at higher rates than the general elderly population. In addition, self-reports of Pap smear history consistently overestimate actual screening.²⁰⁻²⁵ We suspect that the true proportion of elderly women screened lies somewhere between the survey- and claims-based estimates – i.e. between 43% and 64% of women over 65 are screened during any given three year period.

While little previous work has examined rates of downstream consequences of Pap smear testing, our estimates are consistent with what is known of the outcomes of screening. Overall, an estimated 2–3%, or 20–30 per 1000 Pap smears are abnormal among women over age 60.²⁶ In small studies in the USA²⁷⁻²⁹ and Great Britain,³⁰ similar proportions of elderly women – between 20 and 60 per 1000 – required further evaluation after a Pap smear. In the only previous population-based study of downstream interventions, 7.6 per 1000 Australian women age 65 and older undergoing a Pap smear required colposcopy³¹ – nearly identical to the proportion undergoing colposcopy among our Medicare Screening cohort. Similar population-based estimates are lacking for women undergoing surveillance of previous abnormalities, whose rates of downstream interventions we found to be substantially higher.

While recommendations supporting Pap smear screening are based on strong evidence from observational studies, these studies included few women over 65.^{32,33} Although cervical cancer mortality climbs after age 65, any benefit of screening is expected to decline markedly with age due to increases in competing causes of death and long delays in the realization of benefits of screening. Because the benefits of cervical cancer screening in the elderly are so uncertain, a realistic assessment of the potential harms is essential. Some of the downsides are obvious (discomfort and inconvenience) and apply to all screened women, but are difficult to measure. Others, however, can be measured. In addition to our quantification of the burden of downstream testing in the elderly, several small Pap smear outreach studies highlight the potential pitfalls of screening this population. Rates of refusal of follow-up were high, and not uncommonly, some participants went to hysterectomy only to find no malignancy detected, while others died of unrelated causes while undergoing evaluation.²⁷⁻²⁹

Medicare has provided reimbursement for Pap smear screening only since 1990, largely motivated by findings that up to 40% of elderly women in the United States had never had a Pap smear.³⁴⁻³⁷ Women never screened, who have the highest incidence of and mortality from cervical cancer and the lowest likelihood of future screening³⁸, benefit the most from screening.^{6,32,39} It is at these women that public health campaigns to lower cervical cancer incidence and mortality are aimed.⁴⁰ Little effort, however, has been made to ensure that women screened through Medicare are those who have never been previously screened, rather than those with a lifetime of previous normal Pap smears.

Our results show that Pap smear screening among the elderly, while by no means universal, is common. Other work has shown that rates of reported Pap smear screening are on the rise.¹¹ While many US professional societies have begun to recommend against screening elderly women – as has long been the practice in other industrialized nations – the drive toward increased screening as a component of quality improvement initiatives has largely been age-blind. It is not clear whether, at a time of increasing Medicare cost constraints, the promotion of higher rates of cervical cancer

screening represents the best use of resources nor whether continuing screening represents a well-informed choice for individual women. Certainly, promotion of screening in elderly women who have never been screened should remain an important goal. However, decisions regarding the continuation of screening in elderly women with a lifetime of normal Pap smears should acknowledge the low risk of development of cancer, the declining benefits of screening with increasing age, and the modest probability that Pap smear screening does not end after the Pap smear.

ACKNOWLEDGEMENTS

Dr Sirovich was supported by a Veterans Affairs Ambulatory Care Fellowship at the time of this research. The views expressed herein do not necessarily represent the views of the Department of Veterans Affairs or the United States Government.

.....

Authors' affiliation

Brenda E Sirovich, Staff physician, White River Junction VA Hospital, Vermont, USA and Assistant Professor of Medicine, Dartmouth Medical School, Hanover, New Hampshire, USA

Daniel J Gottlieb, Research Associate, Center for Evaluative Clinical Sciences, Dartmouth Medical School, Hanover, New Hampshire, USA

Elliott S Fisher, Co-Director, VA Outcomes Group, White River Junction VA Hospital, Vermont, USA and Professor of Medicine and Community and Family Medicine, Dartmouth Medical School, Hanover, New Hampshire, USA

REFERENCES

- 1 American College of Physicians. Guidelines: Screening for cervical cancer. In: Eddy DM, ed. *Common screening tests*. Philadelphia: American College of Physicians, 1991:413–14.
- 2 US Preventive Services Task Force. Screening for cervical cancer. In: *Guide to clinical preventive services*, 2nd ed. Baltimore: Williams & Wilkins, 1996:105–118.
- 3 Saslow D, Runowicz CD, Solomon D, et al. American Cancer Society Guideline for the Early Detection of Cervical Neoplasia and Cancer. *CA Cancer J Clin* 2002;**52**:342–362.
- 4 ACOG committee opinion. Recommendations on frequency of Pap test screening. Number 152 – March 1995. Committee on Gynecologic Practice. American College of Obstetricians and Gynecologists. *Int J Gynaecol Obstet* 1995;**49**:210–1.
- 5 Fahs MC, Plichta SB, Mandelblatt JS. Cost-effective policies for cervical cancer screening. An international review. *Pharmacoeconomics* 1996;**9**:211–230.
- 6 Fahs MC, Mandelblatt J, Schecter C, Muller C. Cost effectiveness of cervical cancer screening in the elderly. *Ann Intern Med* 1992;**117**:520–7.
- 7 Fylan F. Screening for cervical cancer: A review of women's attitudes, knowledge, and behaviour. *Br J Gen Pract* 1998;**48**:1509–14.
- 8 Price JH, Easton AN, Telljohann SK, Wallace PB. Perceptions of cervical cancer and Pap smear screening behavior by women's sexual orientation. *J Commun Health* 1996;**21**:89–105.
- 9 Davey DD, Naryshkin S, Nielsen ML, Kline TS. Atypical squamous cells of undetermined significance: Interlaboratory comparison and quality assurance monitors. *Diag Cytopath* 1994;**11**:390–6.
- 10 National Center for Chronic Disease Prevention and Health Promotion, Behavioral Surveillance Branch. *Behavioral Risk Factor Surveillance System, Survey data 1998* (CD-ROM, Series 1, No. 4). Atlanta: Centers for Disease Control and Prevention, 1998.
- 11 Blackman DK, Bennett EM, Miller DS. Trends in self-reported use of mammograms (1989–1997) and Papanicolaou tests (1991–1997) – Behavioral Risk Factor Surveillance System. *Morb Mortal Wkly Rep* 1999;**48**:1–25.
- 12 Mitchell JB, Bubolz T, Paul JE, et al. Using Medicare claims for outcomes research. *Med Care* 1994;**32**(7 Suppl):S38–51.
- 13 Fisher ES, Baron JA, Malenka DJ, et al. Overcoming potential pitfalls in the use of Medicare data for epidemiologic research. *Am J Public Health* 1990;**80**:1487–90.
- 14 Fisher ES, Whaley FS, Krushat WM, et al. The accuracy of Medicare's hospital claims data: Progress has been made, but problems remain. *Am J Public Health* 1992;**82**:243–8.
- 15 Baron JA, Yao GL, Barrett JA, Fisher ES. Internal validation of Medicare claims data. *Epidemiology* 1994;**5**:541–4.
- 16 Janes GR, Blackman DK, Bolen JC, et al. Surveillance for use of preventive health-care services by older adults, 1995–1997. *Morb Mortal Wkly Rep* 1999;**48**:51–88.
- 17 Mayer JA, Slymen DJ, Drew JA, et al. Breast and cervical cancer screening in older women: The San Diego Medicare Preventive Health Project. *Prev Med* 1992;**21**:395–404.

- 18 Ruchlin HS. Prevalence and correlates of breast and cervical cancer screening among older women. *Obstet & Gynecol* 1997;**90**:16-21.
- 19 Sirovich BE, Welch HG. The frequency of Pap smear screening in the United States. *J Gen Intern Med* [in press].
- 20 Bowman JA, Redman S, Dickinson JA, et al. The accuracy of Pap smear utilization self-report: A methodological consideration in cervical screening research. *Health Serv Res* 1991;**26**:97-107.
- 21 Bowman JA, Sanson-Fisher R, Redman S. The accuracy of self-reported pap smear utilisation. *Soc Sci Med* 1997;**44**:969-76.
- 22 McGovern PG, Lurie N, Margolis KL, Slater JS. Accuracy of self-report of mammography and Pap smear in a low-income urban population. *Am J Prev Med* 1998;**14**:201-8.
- 23 McKenna MT, Speers M, Malin K, Warnecke R. Agreement between patient self-reports and medical records for Pap smear histories. *Am J Prev Med* 1992;**8**:287-91.
- 24 Suarez L, Goldman DA, Weiss NS. Validity of Pap smear and mammogram self-reports in a low-income Hispanic population. *Am J Prev Med* 1995;**11**:94-98.
- 25 Whitman S, Lacey L, Ansell D, et al. Do chart reviews and interviews provide the same information about breast and cervical cancer screening? *Int J Epidemiol* 1993;**22**:393-7.
- 26 Rolnick SR, LaFerla JJ, Wehrle D, et al. Pap smear screening in a health maintenance organization: 1986-1990. *Prev Med* 1996;**25**:156-161.
- 27 Mandelblatt J, Gopaul I, Wistreich M. Gynecological care of elderly women: Another look at Pap smear testing. *JAMA* 1986;**256**:367-71.
- 28 Mandelblatt J, Traxler M, Lakin P, et al. Breast and cervical cancer screening of poor, elderly, black women: Clinical results and implications. *Am J Prev Med* 1993;**9**:133-8.
- 29 Weintraub NT, Violi E, Freedman ML. Cervical cancer screening in women aged 65 and over. *J Am Geriatr Soc* 1987;**35**:870-5.
- 30 Raffle AE, Alden B, Mackenzie EFD. Detection rates for abnormal cervical smears: What are we screening for? *Lancet* 1995;**345**:1469-73.
- 31 Kavanagh AM, Santow G, Mitchell H. Consequences of current patterns of Pap smear and colposcopy use. *J Med Screen* 1996;**3**:29-34.
- 32 Power EP. Pap smears, elderly women, and Medicare. *Cancer Invest* 1993;**11**:164-8.
- 33 Hakama M, Miller AB, Day NE, eds. *Screening for cancer of the uterine cervix: from the IARC Working Group on Cervical Cancer*. Lyon: International Agency for Research on Cancer, 1986.
- 34 Celentano DD, Shapiro S, Weisman CS. Cancer preventive screening behavior among elderly women. *Prev Med* 1982;**11**:454-63.
- 35 Mandelblatt J, Schecter C, Fahs M, Muller C. Clinical implications of screening for cervical cancer under Medicare: The natural history of cervical cancer in the elderly: What do we know? What do we need to know? *Am J Obstet Gynecol* 1991;**164**:644-51.
- 36 Weinrich S, Coker A, Weinrich M, et al. Predictors of Pap smear screening in socioeconomically disadvantaged elderly women. *J Am Geriatr Soc* 1995;**43**:267-70.
- 37 Gluck ME, Wagner JL, Duffy BM. *The use of preventive services by the elderly. Preventive Health Services under Medicare series, Paper 2*. Washington DC: Office of Technology Assessment, 1989.
- 38 Fletcher A. Screening for cancer of the cervix in elderly women. *Lancet* 1990;**335**:97-99.
- 39 Sherlaw-Johnson C, Gallivan S, Jenkins D. Withdrawing low risk women from cervical screening programmes: mathematical modeling study. *BMJ* 1999;**318**:356-61.
- 40 Lawson HW, Henson R, Bobo JK, Kaeser MK. Implementing recommendations for the early detection of breast and cervical cancer among low-income women. *Morb Mortal Wkly Rep* 2000;**49**:36-55.