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# When evidence says no: gynaecologists' reasons for (not) recommending ineffective ovarian cancer screening

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## INTRODUCTION

Most patients likely assume that physicians offer medical procedures backed by solid, scientific evidence that demonstrates their superiority—or at least non-inferiority—to alternative approaches.<sup>1</sup> Doing otherwise would waste healthcare resources urgently needed elsewhere in the system and also would jeopardise patient health and safety as well as undermine patients' trust in medicine<sup>2</sup> and care. In some instances, however, physicians' healthcare practices appear to act against scientific evidence.<sup>3–5</sup> For example, evidence from two large randomised controlled trials<sup>6 7</sup> on ovarian cancer screening's effectiveness showed that the screening has no mortality benefits—neither cancer-specific nor overall—in average-risk women but considerable harms, including false-positive surgeries in women without ovarian cancer. Consequently, the US Preventive Services Task Force and medical associations worldwide recommend against ovarian cancer screening.<sup>8</sup> Nevertheless, a considerable number of US gynaecologists persist in recommending the screening to average-risk women.<sup>9</sup> To understand why physicians continue using a practice called into question by scientific evidence, we investigated gynaecologists' reasons for or against recommending ovarian cancer screening, their assumptions about why other gynaecologists recommend it, and the association between their knowledge of basic concepts of cancer screening statistics<sup>10</sup> and recommendation behaviour.

## METHODS

We surveyed a national sample of US outpatient gynaecologists stratified by the distribution of gender and years in practice of gynaecologists in the American Medical Association (AMA) Masterfile (table 1). The survey (see online supplementary materials) was part of a larger project on gynaecologists' estimates and beliefs about ovarian cancer screening evidence. Detailed methods can be seen elsewhere.<sup>9</sup> For analysis, we classified respondents into 'screeners' (those who recommend the screening to average-risk women) and 'non-screeners' (those who do not) and compared response proportions using a  $\chi^2$  test. We performed logistic regression to investigate the associations between recommendation behaviour, knowledge of concepts of cancer screening statistics<sup>10</sup> (measured by four specific questions, see table 2) and demographics. Wilcoxon signed-rank test was applied for comparing gynaecologists' responses of their own reasons with their perceived reasons for their colleagues.

## RESULTS

Of 980 gynaecologists invited, 876 started the survey, 475 were excluded (inpatient care: 173, quota filled: 171, survey non-completion: 131) and 401 completed the survey (response rate, 63.1%; 401/(980–173–171)).

Screeners (n=231 (57.6%)) reported that their recommendations were most heavily influenced by patient expectations and fear of litigation, followed by their belief in the ability of screening to reduce disease-specific mortality and/

**Table 1** Distribution of demographic characteristics of the survey sample, compared with the AMA Masterfile for gender and years in practice

	Sample (N=401)	AMA Masterfile
	No. (%)	%*
Female	196 (48.9)	49
Age		
<30	1 (0.2)	
30–39	70 (17.5)	
40–49	101 (25.2)	
50–59	111 (27.7)	
≥60	118 (29.4)	
Years in practice		
<10	72 (18.0)	18.0
10–19	96 (23.9)	24.0
20–29	96 (23.9)	24.0
≥30	136 (33.9)	34.0
Divided clinical time		
Exclusively outpatient	48 (12.0)	
Mostly outpatient	353 (88.0)	
Clinical specialty		
Gynaecology/obstetrics	311 (77.6)	
Gynaecology	90 (22.4)	
Working status/practice type		
Actively working/mainly office-based	364 (90.8)	
Actively working/mainly hospital-based	37 (9.2)	

\*Percentages are rounded and may not total 100.

or incidence (table 2). In contrast, non-screeners' (n=170 (42.4%)) recommendations were mainly influenced by current guidelines and concerns about the harms of screening (eg, overdiagnosis)—aspects that played minor roles for screeners (p<0.001). Screeners further assumed that a larger proportion of colleagues recommend the screening than did non-screeners (Mean 42.2% (SD 25.5) vs 13.6% (13.1), p<0.001) and for similar reasons, with one exception: screeners believed their colleagues were more often influenced by financial interests than they themselves were (14.3% vs 3.5%, p<0.001). Screeners nevertheless thought financial interests to be the least likely reason for their colleagues to recommend the screening, whereas non-screeners considered financial interests to be the most relevant reason for colleagues to recommend it (14.3% vs 43.5%, p<0.001).

In univariate analysis, gynaecologists' knowledge of concepts of cancer screening statistics was significantly associated with all listed reasons for recommending the screening (p<0.001) except fear of litigation and conflicts of interest. In adjusted multivariate analysis—accounting for fear of litigation and conflicts of interest, both already known

to negatively influence physicians' evidence-based advice<sup>11 12</sup>—we found that gynaecologists' recommendations were independently associated with their knowledge of cancer screening statistics and fear of litigation, but not with conflicts of interests. With knowledge of cancer screening statistics being the strongest predictor, the odds of a gynaecologist both answering 75% or more of the statistical concept questions correctly and being a non-screener was nearly four times higher than that of a gynaecologist answering 50% or less of questions correctly (OR 3.58, 95% CI 2.28 to 5.65; p≤0.001) (regression table; see online supplementary materials).

## DISCUSSION

Gynaecologists who recommend ovarian cancer screening—which is neither justified by evidence nor supported by medical associations—followed some of the same reasoning (eg, fear of litigation) that has been observed in other clinical settings.<sup>13</sup> Our study uncovers an additional mechanism behind this potentially harmful behaviour: misconceiving basic concepts of cancer screening statistics. Physicians who wrongly believe that detecting more cancers or a higher proportion of early-stage cancers proves that screening saves lives are more likely to overvalue screening's benefits and undervalue its harms, and they are also more likely to struggle to accept contradicting evidence and to adequately address patients' medically undue wishes or unwarranted fears. Believing that most colleagues act and think the same may further undermine essential progress towards practising evidence-based care.

The fact that our survey has been done with US gynaecologists may have influenced our results, and generalisability might thus be limited. Particularly the problem of malpractice litigation is a phenomenon mainly reported for the US healthcare system, with gynaecologists belonging to one of the disciplines most susceptible to it.<sup>14</sup> With respect to knowledge of concepts of cancer screening statistics, however, previous studies in populations from various countries found that a considerable number of physicians are misled by relative as opposed to absolute risk formats,<sup>15–19</sup> have difficulty calculating the positive predictive value of tests<sup>20–23</sup> or perceive cancer screening statistics as challenging.<sup>10 24</sup> This suggests that the issue is not restricted to our survey population but is instead universal.

Our survey therefore calls on the medical community to improve how medical statistics is taught and learnt in medical schools and continuing medical education. A critical number of statistically literate physicians will not resolve all healthcare problems,

**Table 2** US gynaecologists' reasons for or against recommending ovarian cancer screening, their assumptions about why other gynaecologists recommend it, and their knowledge of concepts of cancer screening statistics

	Number of gynaecologists providing the respective response (%)		
	Screeners n=231	Non-screener n=170	P value*
<b>Which of the following reasons influence your decision to recommend/not recommend ovarian cancer screening to average-risk women?</b>			
Reduced ovarian cancer mortality due to the screening	106 (45.9)	41 (24.1)	<0.001
Reduced ovarian cancer incidence due to the screening	79 (34.2)	23 (13.5)	<0.001
Concerns about the screening's harms (eg, false alarms, overdiagnosis)	48 (20.8)	157 (92.4)	<0.001
Fear of litigation if no screening is done and cancer develops later on	155 (67.1)	78 (45.9)	<0.001
Screening is financially lucrative	8 (3.5)	9 (5.3)	0.454
Current guideline recommendations of accredited medical associations	41 (17.7)	149 (87.6)	<0.001
Expectation of patients to offer everything in the fight against cancer	163 (70.6)	13 (7.6)	<0.001
<b>In your opinion, which of the following reasons contribute to your colleagues recommending ovarian cancer screening to average-risk women?</b>			
Reduced ovarian cancer mortality due to the screening	107 (46.3)	30 (17.6)	<0.001
Reduced ovarian cancer incidence due to the screening	59 (25.5)	26 (15.3)	0.059
Concerns about the screening's harms (eg, false alarms, overdiagnosis)	39 (16.9)	7 (4.6)	<0.001
Fear of litigation if no screening is done and cancer develops later on	121 (52.4)	94 (61.4)	0.093
Screening is financially lucrative	33 (14.3)	74 (43.5)	<0.001
Current guideline recommendations of accredited medical associations	44 (19.0)	12 (7.2)	0.003
Expectation of patients to offer everything in the fight against cancer	167 (72.3)	72 (42.4)	<0.001
<b>Knowledge of concepts of cancer screening statistics: which of the following proves that a cancer screening test saves lives from cancer death?</b>			
Increased 5-year survival rate in the screened group (incorrect)†	169 (73.2)	106 (62.4)	0.023
Increased incidence of cancer in screened group (incorrect)‡	111 (48.1)	33 (19.4)	<0.001
Detection of more early-stage cancers in the screened group (incorrect)§	152 (65.8)	73 (42.9)	<0.001
Reduced mortality rate in the screened group (correct)¶	184 (79.7)	137 (80.6)	0.900

\*P values are derived from  $\chi^2$  analysis.

†5-year survival in the screening group always increases because detection by screening (rather than later detection by symptoms) advances the time of diagnosis, known as lead time. Thus, the 5-year survival rate with screening can be better regardless of whether or not the screening test actually saves lives.

‡A screening test is only effective if the additional number of detected cancer cases translates into prevented cancer deaths. Simply detecting more cases of cancer cases in the screening group as compared with the non-screening group without a reduction in cancer mortality suggests the occurrence of overdiagnosis and overtreatment.

§Detecting more early-stage cancer cases in the screening group as compared with the non-screening group is also no proof that the cancer screening works if there is no equivalent reduction in cancer mortality. If finding more cancers earlier and therefore starting treatment earlier is indeed effective, then cancer mortality should also be reduced in the screening group.

¶Reduced mortality within the screening group in a randomised trial is the only valid evidence that lives are saved due to the screening. The reason for this is the way in which mortality rates are calculated. Whereas the calculation of survival rates is based only on those people diagnosed with cancer, the calculation of mortality rates is based on all people in the study arms, which makes the statistic robust against biases such as lead time bias.

but will promote greater patient safety and more evidence-based care.

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