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Screening For Cancer: How Useful Is It?

We have come to believe in cancer screening tests. And why shouldn't we? Who doesn't know someone who sings the praises of the mammogram, Pap smear, PSA test or colonoscopy that they believe saved their—or a loved one's—life? Who wants to harbour the regret that if only the cancer had been found early, things might be different today? But how do we know which screening tests really work? The purpose of screening is to ensure early diagnosis and treatment of chronic and incurable diseases, before irreparable damage has occurred.

In the 1950s, many doctors in the West began touting the chest X-ray as a screening method for early stage lung cancer. They profoundly criticized other doctors who suggested that a randomized trial was needed. The buzz surrounding the benefits of a chest X-ray became so strong that it proved difficult to enroll participants—they feared being assigned to a control group that wouldn't be screened. As a result, it took nearly two decades to complete the studies. But once they were done, the findings were indisputable: screening for early lung cancer with chest X-ray did not save lives.

The disappointing results illustrated an important phenomenon: screening can increase survival, but have no impact on mortality at all. That's because when a cancer screening test is introduced, they will be diagnosed earlier. Since survival is measured from the time the cancer is found, people who are screened will appear to live longer, even if the screening test doesn't delay their death. That's why, although the people who were screened with chest X-rays survived longer after their diagnoses, the death rates in both the screened and unscreened groups were essentially the same. It's a problem researchers refer to as *lead-time bias.*

Another difficulty in assessing the benefit of a screening test is that it is more likely to find slow-growing tumors than fast ones. And this problem, called *length-time bias*, can influence how effective the test appears to be. That's because, for some cancers at least, these slow-growing tumors can be more successfully treated than fast-growing ones.

Consider a woman who had her annual mammogram in January 2006. A tumor then begins to form in her breast in February. If the tumor is slow-growing, it could appear on a future screening test before it is big enough to be felt by hand. But if it's fast-growing, it's more likely that the woman will have symptoms that lead to diagnosis before her next annual mammogram. Now, multiply this woman many times over. Due to the test, more cancers will be found and cancer rates will rise. But most of those cancers will be the slow-growing, more easily treatable breast tumors, so five-year survival rates will go up too—making the screening test look pretty good. And it could be. Or it could be length-time bias, and merely the perception of a benefit where, in fact, there is none.

To explain why, the best example is the neuroblastoma, a cancer of the nerve cells that occurs in infants and children. In an attempt to reduce deaths from neuroblastoma, several countries began experimenting in the 1980s with a urine

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which took place between May 1989 and April 1994. More than 475,000 6-month-old children were screened, and 43 neuroblastomas were detected—which appeared to indicate that the test worked well. But then, the researchers compared Quebec's neuroblastoma rates with the rates "right next door in Ontario," where no screening was done. And they found, that the death rates from neuroblastoma in Quebec and Ontario were basically the same. But the incidence and cure rates were dramatically higher in Quebec.

Researchers refer to this problem as *over-diagnosis*. Due to the screening test, doctors in Quebec found more neuroblastomas than doctors in Ontario. But the investigators came to understand that many of those neuroblastomas never really needed to be found or treated. They learned that there are two types of neuroblastomas. There is the kind that will go away on its own as a kid gets older. Then there is the kind that kills people. The screening test found cancers that would eventually burn themselves out, but it could not detect the deadly ones when they were still in early enough stages for successful treatment. Not only did the test not save lives, but many children had surgeries they never needed.

In 1986, the U.S. Food and Drug Administration approved a blood test, the prostate-specific antigen (PSA) test, after it was found useful for monitoring whether prostate cancer was responding to treatment. Before long, doctors began to suggest that PSA screening might be used to detect new cancers, too. William Catalona, a surgeon and cancer researcher, has been at the forefront of that effort, and his research helped usher in the era of widespread, routine PSA testing. But not everyone is as convinced as Catalona. Some doctors wonder if PSA screening is causing more harm than benefit. As word spread about the test in the late 1980s and early 1990s, PSA-testing rates skyrocketed. So, too, did prostate cancer diagnoses. Between 1986 and 1992, the incidence of prostate cancer more than doubled. But the death rate hardly changed. Currently, neither the American Cancer Society nor the U.S. Preventive Services Task Force, two of the major players in establishing cancer screening guidelines in the world, believes there is conclusive evidence that screening can reduce prostate cancer mortality. The decisive findings will come from two large randomized trials that are expected to report results within the next two years.

Tests that work

Named after its inventor, George Papanicolaou, the Pap smear can detect early changes in cells in the cervix that could become cancerous. And when it comes to cancer screening tests, the Pap smear is still the champion. since the test has been responsible for up to a 90 percent reduction in mortality from cervical cancer. Well, that is the collective consensus. The Pap test was invented in the 1940s, before researchers widely recognized a need for randomized trials to rigorously evaluate screening tests. As a result, a definitive randomized trial has never been done. But looking back, as the test became more widely used, cervical cancer death rates dropped. We can also compare countries where it's widely used to ones where it's not and see the difference the test makes. To be sure, some could argue that the Pap smear got a pass when it came to quality studies. Yet the end result is that in this case, the doctors "guessed right."

Colonoscopy appears to be following the same path. This January, researchers in the US announced that cancer deaths dropped for the second year in a row, from 2003 to 2004, the most recent years for which published statistics exist. Colorectal cancer had the greatest decline, and many experts believe that the key reason was screening—and in particular, colonoscopy, which lets doctors find and remove polyps before they become cancerous. However, as a study published in December 2006 in the *New England Journal of Medicine* indicates, the value of a colonoscopy is heavily dependent upon not only the doctor's skill but how long he or she spends on the procedure. What's more, many people may not know that the definitive study of colonoscopy screening has not been done. Of all the colorectal cancer screening tests, the only one that a well-designed study has proved effective in decreasing mortality is the fecal occult blood test, a test for blood in stool, according to many gastroenterologists.

Mammography matters

The difficulty of ascertaining a test's true benefits is arguably most evident in the controversy that surrounds mammography screening. Eight randomized mammography trials were initiated in the 1960s and 1970s. If mammography had a huge benefit, these studies would have found it. Instead, we have disparate, conflicting findings that have left researchers debating the overall benefits of mammography for years.

Statistics indicate that mammography is doing what it was designed to do: find small tumors. But some of these tumors are so slow-growing they would have never gone on to cause harm. New tumor tests are being developed to help oncologists assess which women are in need of the most aggressive treatment, but the general consensus in the breast cancer field is that many women receive chemotherapy who probably don't need it. Some might say it's the price we need to pay for reducing breast cancer deaths. And that might be true if mammography had a dramatic impact, but that's not the case: mammography, which remains the best screening test for breast cancer, is only about one-third as effective in terms of reducing death rates as the Pap smear (though the total number of deaths from breast cancer is much higher than from cervical cancer). Mammography has also led to a dramatic increase in diagnoses of ductal carcinoma in situ (DCIS), a precancer that can go on to become cancer-but doesn't always– that are always treated with surgery, radiation and hormone therapy.

Source: Website of the American Association for Cancer Research (*www.aacr.org*)

Table 1: Vaccine-preventable Diseases & AFP

21st - 27th July 2007 (30th Week)

Disease	No. of Cases by Province								Number of cases during current week in 2007	Number of cases during same week in 2006	Total number of cases to date in 2007	Total number of cases to date in 2006	Difference between the number of cases to date between 2007 & 2006
	W	C	S	NE	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	00	01 MT=1	00	01 PU=1	01 AP=1	00	00	03	01	56	75	-25.3%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00.0%
Measles	01 CB=1	01 MA=1	00	00	00	00	00	01 KG=1	03	01	44	22	+100.0%
Tetanus	00	00	00	00	00	00	00	00	00	00	21	31	-32.3%
Whooping Cough	00	00	00	00	00	00	01 MO=1	00	01	00	25	60	-58.3%
Tuberculosis	107	01	00	37	21	27	00	01	194	106	5921	6021	-1.6%

Table 2: Diseases under Special Surveillance

21st - 27th July 2007 (30th Week)

Disease	No. of Cases by Province								Number of cases during current week in 2007	Number of cases during same week in 2006	Total number of cases to date in 2007	Total number of cases to date in 2006	Difference between the number of cases to date between 2007 & 2006
	W	C	S	NE	NW	NC	U	Sab					
DF/DHF*	63	04	04	03	38	09	04	22	147	173	2920	5679	-48.6%
Encephalitis	02 GM=1 KA=1	00	01 GL=1	01 MU=1	00	00	00	01 RP=1	05	03	132	84	+57.1%
Human Rabies	01 GM=1	00	02 HB=1 GL=1	00	02 KR=1 PU=1	00	00	00	05	02	40	41	-2.4%

Table 3: Newly Introduced Notifiable Diseases

21st - 27th July 2007 (30th Week)

Disease	No. of Cases by Province								Number of cases during current week in 2007	Total number of cases to date in 2007
	W	C	S	NE	NW	NC	U	Sab		
Chickenpox	11	01	04	02	07	01	03	10	39	2078
Meningitis	05 CB=5	00	03 MT=3	00	04 KR=1 PU=3	04 AP=4	03 BD=3	04 RP=1 KG=3	20	247
Mumps	14	04	06	02	06	04	02	09	47	938

*DF / DHF refers to Dengue Fever / Dengue Haemorrhagic Fever.
NA= Not Available.

Sources:

Weekly Return of Communicable Diseases:
Diphtheria, Measles, Tetanus, Whooping Cough, Human Rabies, Dengue Haemorrhagic Fever, Japanese Encephalitis, Chickenpox, Meningitis, Mumps.

Special Surveillance:
Acute Flaccid Paralysis.

National Control Program for Tuberculosis and Chest Diseases:
Tuberculosis.

Details by districts are given in Table 5.

Provinces: W=Western, C=Central, S=Southern, NE=North & East, NC=North Central, NW=North Western, U=Uva, Sab=Sabaragamuwa.

DPDHS Divisions: CB=Colombo, GM=Gampaha, KL=Kalutara, KD=Kandy, ML=Matale, NE=Nuwara Eliya, GL=Galle, HB=Hambantota, MT=Matara, JF=Jaffna, KN=Killinochchi, MN=Mannar, VA=Vavuniya, MU=Mullaitivu, BT=Batticaloa, AM=Ampara, TR=Trincomalee, KM=Kalmunai, KR=Kurunegala, PU=Puttalam, AP=Anuradhapura, PO=Polonnaruwa, BD=Badulla, MO=Moneragala, RP=Ratnapura, KG=Kegalle.

Table 4: Laboratory Surveillance of Dengue Fever

21st - 27th July 2007 (30th Week)

Samples	Number tested	Number positive *	Serotypes				
			D_1	D_2	D_3	D_4	Negative
Number for current week	12	03	00	03	00	00	00
Total number to date in 2007	359	33	01	16	09	00	06

Source: Genetech Molecular Diagnostics & School of Gene Technology, Colombo. * Not all positives are subjected to serotyping.

Table 5: Selected notifiable diseases reported by Medical Officers of Health
21st - 27th July 2007 (30th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptos-pirosis		Typhus Fever		Viral Hepatitis		Returns Re-ceived Timely**
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	45	788	12	243	00	07	01	41	01	59	02	78	01	02	07	84	**92**
Gampaha	05	312	02	239	01	18	00	45	00	35	05	148	00	11	03	85	**71**
Kalutara	13	199	04	328	01	02	00	35	00	22	01	72	00	01	00	43	**100**
Kandy	03	262	04	179	00	03	02	41	00	07	03	49	02	49	32	1554	**77**
Matale	01	66	02	124	00	06	01	12	00	09	01	33	00	05	00	91	**67**
Nuwara Eliya	00	30	00	182	00	02	03	90	00	366	00	08	00	28	10	358	**100**
Galle	00	57	09	100	01	09	00	12	29	33	00	34	01	19	00	14	**75**
Hambantota	00	34	03	72	00	05	00	18	00	15	00	33	01	34	02	13	**91**
Matara	04	98	07	198	00	08	00	25	01	12	00	116	02	138	02	24	**81**
Jaffna	00	28	00	95	00	02	00	322	00	05	00	00	00	81	00	16	**00**
Kilinochchi	00	01	00	00	00	00	01	04	00	00	00	00	00	02	00	02	**50**
Mannar	00	07	00	14	00	00	01	57	00	00	00	01	00	00	00	07	**75**
Vavuniya	00	12	01	33	00	04	00	11	00	40	00	02	00	00	01	06	**100**
Mullaitivu	00	00	04	15	01	08	01	16	00	01	00	00	00	00	00	04	**100**
Batticaloa	03	65	08	419	00	08	00	14	00	10	00	00	00	22	29	633	**73**
Ampara	00	03	00	65	00	00	00	03	00	00	00	00	00	00	00	17	**14**
Trincomalee	00	50	00	161	00	03	01	19	00	23	00	07	00	10	02	86	**56**
Kurunegala	34	317	08	291	00	03	02	48	00	19	01	20	02	32	00	39	**89**
Puttalam	04	81	05	83	00	10	00	52	00	03	00	15	00	04	00	63	**78**
Anuradhapura	07	113	00	61	00	08	00	17	00	14	00	18	00	18	00	33	**68**
Polonnaruwa	02	43	02	59	00	02	01	08	00	04	00	19	00	00	03	19	**100**
Badulla	04	27	09	394	00	02	01	65	00	08	00	34	01	102	15	193	**87**
Monaragala	00	16	14	238	00	02	03	38	00	10	00	36	04	44	02	25	**100**
Ratnapura	19	171	06	371	01	12	02	45	00	08	00	37	02	16	04	61	**81**
Kegalle	03	137	03	186	00	07	00	33	00	04	02	68	00	17	04	118	**73**
Kalmunai	00	03	02	110	00	01	00	07	04	04	00	00	00	02	01	92	**85**
SRI LANKA	**147**	**2920**	**109**	**4260**	**02**	**126**	**18**	**1078**	**35**	**703**	**15**	**928**	**16**	**637**	**117**	**3680**	**79**

Source: Weekly Returns of Communicable Diseases (WRCD).
***Dengue Fever / DHF** refers to Dengue Fever / Dengue Haemorrhagic Fever.
****Timely** refers to returns received on or before 4 August 2007. Total number of reporting units = 290. Number of reporting units data provided for the current week: 228.
A = Cases reported during the current week. **B** = Cumulative cases for the year.

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Comments and contributions for publication in the WER Sri Lanka are welcome. However, the editor reserves the right to accept or reject items for publication. All correspondence should be mailed to The Editor, WER Sri Lanka, Epidemiological Unit, P.O. Box 1567, Colombo or sent by E-mail to chepid@sltnet.lk.

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