

1: Cancer's Global Footprint | Interactive map of cancer

*Cervical cancer screening in developing countries: report of a WHO consultation. www.enganchecubano.com
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Explore this interactive map to learn about some cancers that disproportionately affect poorer countries. A study in *The Lancet Oncology* predicted that from 2008, cancer incidence will rise 75 percent globally and will double in the least developed countries. The illness is diagnosed most frequently in developed countries. Good nutrition in childhood and a relatively late age at which women begin childbearing are likely factors. The high rate of disease in wealthy nations may also reflect aggressive screening. A lack of early detection programs in these countries may play a role. Genetics may also be a factor; women of African descent tend to develop more aggressive tumors than women of European descent. A big reason is the Pap test, which can identify precancerous lesions. In low-income countries, testing is rare and the disease remains common and deadly. Vaccines against HPV, as well as low-cost tests that detect precancerous lesions, could dramatically lower death rates in countries where the disease still kills large numbers of women. In Asian countries such as Mongolia, the burden of disease is blamed on high rates of hepatitis B and C, as well as widespread alcohol use. In West Africa, a contributing factor is exposure to aflatoxins, carcinogenic compounds that can contaminate peanuts and other crops. In some high-risk countries, childhood immunization programs against hepatitis B have been implemented. Such a vaccination program in Taiwan, launched in 1971, appears to have reduced liver cancer rates among young adults. The lag time between when a person starts smoking and when cancer develops can be 30 years. High rates of lung cancer in countries such as the United States reflect high rates of smoking several decades ago. Experts predict sharp increases in lung cancer deaths in the developing world in the years ahead. The disease is diagnosed most frequently in high-income countries. One reason is aggressive screening with the prostate-specific antigen PSA test. Men of African descent are especially susceptible to the disease. In the United States, African American men are more than twice as likely to die from prostate cancer as white men. Incidence is especially high in East Asia, where diets rich in salty and pickled foods are a risk factor. Infection with the bacterium *H. pylori*. This decline may be due in part to the advent of refrigeration, which has reduced the use of salt as a food preservative. Japan, where stomach cancer is extremely common, conducts mass screenings to catch the disease early.

2: Cervical screening - Wikipedia

Cervical cancer is the third most common cancer worldwide, and 80% of cases occur in the developing world. It is the leading cause of death from cancer among women in developing countries, where it causes about , deaths each year. 1 Rates of the disease are highest in Central America, sub.

Cervical cancer in developing countries Cervical cancer information Milena Alec, Pierre Vassilakos Cervical cancer is globally the third most common cancer, and the fourth cause of cancer-related mortality among women worldwide 1. Cervical cancer is also the fourth most lethal cancer in women worldwide , deaths and the third cause of cancer-related death in developing countries , deaths 3. It is therefore a matter of public health, as it affects women within the reproductive age groups. There is a high disparity for cervical cancer between higher and lower income regions. It is primarily due to the difficulty in implementing cytology-based screening programs. The most common screening test in developed countries is currently the Papanicolaou test or Pap smear. Unfortunately, it requires qualified pathologists to evaluate the results, thus rendering it difficult and expensive to implement in developing countries. Moreover, cytology even if done in optimal conditions is limited to its sensitivity. To be efficient, the test has to be repeated frequently, a prerequisite impracticable in low resource settings. Different health-care workers such as physicians, nurses, midwives and technicians can perform VIA. To begin with it requires minimal infrastructure. It is also simple and inexpensive. In the next place, if abnormal acetowhite lesions are observed, the patient can be treated immediately, obviating the need for histology. However, because VIA relies on subjective visual interpretation, its accuracy may vary widely. The large variability in the detection rate of the cancer and its precursors may be a major drawback in the implementation of this approach 5,6. Therefore, it is not only crucial to define suspicious lesions with consistent criteria but also to train the care providers to correctly implement these criteria. Only consistent training, quality control and experience will improve effectiveness and decrease the intra- and inter-observer variability of VIA. Nevertheless, such training sessions are difficult to organize regularly in developing countries. Progress in telecommunication, computer technology and high resolution video imaging devices, offers the possibility to deliver medical services to patients located in rural areas and areas with poor medical services. Nowadays, the digital camera incorporated in a cellular phone produces high resolution images, that can be magnified and used to perform an examination of the cervix. This could potentially improve the performance of VIA. The main objective of this site is to develop an e-Learning platform for VIA using smartphone images, in order to strengthen the screening capacity of cervical disease by health professionals, especially in countries with limited resources and treatment. Specific objectives include basic knowledge of: Human papillomavirus and cervical cancer Cervical cancer prevention Cervical cancer treatment Human papillomavirus and cervical cancer Human papillomavirus HPV are small, non-enveloped DNA viruses that cause most common viral infections of the reproductive tract. Different HPV types target different epithelia and at least forty types infect the human genital tract. Of these forty, twelve are frequently found in cervical cancers and are therefore considered as high-risk types. The other HR-HPV types are 33, 45, 31, 58, 52, 35, 59, 51, 56, 39 and 68 in descending order in the world-wide distribution, though there are geographical variations 8. It is substantial to emphasize that only a minority of women with persistent high-risk infections develop precancer. The rate at which precancer evolves to an invasive cancer is usually slow, measured in years, even decades. For this reason cancer incidence in young women is normally low. Most sexually active women and men will be infected at some point in their lives and some may be repeatedly infected. Approximately half of the carcinogenic HPV infections are resolved within six months of the exposure 9. Sexually inactive women rarely develop cervical cancer, whereas early sexual activity with multiple sexual partners increases the risk of developing cervical cancer. Persistence of infection is necessary for progression to cancer and as the probability of clearance decreases with time from exposure, the risk of invasion increases. For malignant transformation however, viral DNA integration into the host genome is almost always necessary. The critical molecules in viral replication are E6 and E7, which functionally inactivate the products of two important tumor suppressor genes, p53 and pRb, respectively. Both E6 and E7

oncogenes induce proliferation, immortalization, and malignant transformation of the infected cells. Cervical cancer precursor lesions are histologically called cervical intraepithelial neoplasia (CIN), or dysplasia. CIN is ranked histologically according to the degree of dysplasia. The proportion of the thickness of the epithelium showing undifferentiated cells is used for grading CIN. The abnormal undifferentiated cells are confined to deeper layers, the lower third of the epithelium. Mitotic figures are rare. CIN2 is characterized by dysplastic cellular changes mostly restricted to the lower two-thirds of the epithelium, with more apparent nuclear abnormalities than in CIN1. Mitotic figures may be seen throughout the lower half of the epithelium. The majority of CIN2 regress. In CIN3, or carcinoma in situ, differentiation and stratification may be totally absent or only present in the superficial quarter of the epithelium with numerous mitotic figures. Nuclear abnormalities extend throughout the thickness of the epithelium. Many mitotic figures have abnormal forms. CIN3 is considered as the immediate precursor of invasive cancer and should always be treated due to the high risk of progression. A further categorization, the Bethesda system 12 is based on cytologic Pap test findings such as atypical squamous cells of undetermined significance (ASCUS), and a dichotomous division of cervical cancer precursors called Squamous Intraepithelial Lesions (SIL). The aim of the Bethesda System is to promote a more effective communication of cervical cytology results from the laboratory to the clinicians. Invasive cancer can come from either the squamous or the glandular cells. Most of the cervical cancers originate in the squamous component of the cervix. In the very early phase of invasion, cancer may not be associated with obvious signs and symptoms, and is therefore known as a preclinical invasive cancer. As the stromal invasion progresses, the disease becomes clinically obvious, showing several growth patterns which are visible on speculum examination. Early lesions may present as a rough, reddish, granular area that bleeds to the touch. More advanced cancers may present a proliferating, bulging, mushroom- or cauliflower-like growth with possible bleeding and foul-smelling discharges. Occasionally they may present a modest surface growth, resulting in a grossly enlarged and irregular cervix with a rough, granular surface. Cervical cancer prevention The well-defined premalignant phase and the fact that the cervix is easily accessible for sampling and treatment, makes cervical cancer particularly amenable for screening. During the last 50 years, large parts of the world were covered by screening programs based on Pap smear. Most of them have demonstrated a reduced cervical cancer incidence and mortality, undoubtedly due to these programs. Nevertheless there are considerable barriers in low- and middle income countries, to introduce the necessary infrastructure and quality control systems for screening facilities. Therefore, such programs have been difficult to establish in these countries that consequently greatly suffer from cervical cancer burden. Prophylactic HPV vaccines may eventually provide an optimal solution for prevention of cervical cancer in developing countries. Since most women are infected during their first intercourse, women should optimally be vaccinated before their sexual debut. As these vaccines do not treat preexisting HPV infections and precancerous conditions, screening will still be necessary for the generations of unvaccinated women. In addition, vaccinated cohorts continue to undergo regular cervical screening since the vaccines do not protect against all the oncogenic genotypes of the virus. Several screening alternatives have been proposed for areas with limited resources. The main advantages of this technique are that unlike conventional cytology, it is of low cost, easy to perform and does not need specialized laboratory. The results of the test are obtained almost immediately facilitating same-day screen and management. However VIA is controversial because of concerns over its reproducibility and accuracy. Another alternative may be HPV testing as primary screening test. The cost of HPV testing has considerably decreased and recent developments suggest that HPV testing might be performed in non-sophisticated laboratories with results available within a few hours. In addition HPV testing offers the advantage of being performed by the patient herself with results as reliable as those of sampling performed by a health care professional and, with a higher sensitivity than a cytology-based screening. Since HPV testing has a mediocre specificity and positive predictive value, a triage involving visual inspection of the cervix after application of acetic acid VIA for women testing HPV positive could be beneficial for further management. Estimates of worldwide burden of cancer in Sankaranarayanan R, Ferlay J. Worldwide burden of gynaecological cancer: Cancer incidence and mortality worldwide: ACCP; mai p. Pooled analysis of the accuracy of five cervical cancer screening tests assessed in eleven studies in Africa and India. A comparison

of four screening methods for cervical neoplasia in a developing country. Am J Obstet Gynecol. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. Worldwide prevalence and genotype distribution of cervical human papillomavirus DNA in women with normal cytology: Papillomavirus E6 and E7 proteins and their cellular targets. The Bethesda System: Edited by Aldo Campana,.

3: Cervical Cancer in Developing Countries - www.enganchecubano.com

In developing countries, cervical cancer remains a clinical problem of public health proportions. Eighty percent of the approximately , new cases of cervical cancer each year occur in such settings.

December 10, Abstract Developing countries suffer the highest burden of cervical cancers but have the lowest resources. Effective cervical cytology screening programme, along with a network of diagnostic and therapeutic colposcopy centres, like developed countries, is almost impossible to be reproduced in developing countries. Visual inspection methods [e. Screening by human papillomavirus HPV testing has high sensitivity A single lifetime HPV testing in a large unscreened population has been shown to significantly reduce cervical cancer incidence and mortality when compared to cervical cytology, VIA or no screening. HPV testing of self-collected vaginal specimens also helps to overcome religious and socio-cultural barriers towards pelvic examination amongst women in developing countries. One stop screen and treat facilities using VIA or rapid HPV testing, and cryotherapy, can overcome non-compliance to follow-up which is a major issue in developing countries. Cure rates of Incorporating telemedicine with cervicography of VIA or VILI or even telecolposcopy, has great potential in cervical cancer screening, especially in countries with vast geographical areas. Trends in cervical cancer screening in developing countries. To make the situation worse, the burden of poverty is further compounded by high burden of diseases in the less affluent countries. Cervical cancer in the less developed regions of the world has an estimated incidence of cases per year and death rate of cases per year as opposed to the more developed regions of the world whereby the incident and mortality rates are almost times lesser[4]. Age Standardise Incidence Rate for cervical cancer in developing countries range from 15 to 55 per people compared to less than 10 per people in the developed countries[5]. Many of these countries have limited facilities for cervical cancer screening and treatment such as surgery, chemotherapy or radiotherapy. Early detection and treatment will inevitably reduce the burden of the disease in these resource limited nations. Stage per stage, morbidity and mortality of cervical cancer is significantly reduced the earlier the treatment is instituted and thus the importance of early and effective screening. The aim of this review is to provide a comprehensive and in-depth overview of the trends in the methods of screening for cervical cancers in developing countries. George Papanicolaou[9 , 10] since the early 19th century and is commonly known nowadays as Pap Smear or less commonly, Papanicolaou Smear. Even though the effectiveness of cervical cytology has never been analysed in randomised controlled trials, sufficient evidence from observational studies has led to its widespread adoption as the main cervical cancer screening strategy across the world[11 - 14]. Liquid based cytology Apart from Pap Smear which is also referred to as the conventional method, liquid based cytology is another method of cervical cytology employing similar method of collecting cervical cells with a cervical brush which is then washed into a liquid fixative solution e. Additionally, these liquid based specimens can be utilised further for human papillomavirus HPV , gonorrhoea and chlamydia testing[19 , 20]. However, liquid based cytology solutions are patented and additional laboratory facilities are needed to process these samples. Altogether, they add a significant cost to cervical cytology screening programme and thus, liquid based cytology is neither a suitable alternative nor is there any established programme employing this technique among developing countries. Feasibility Traditionally, performing cervical cytology screening involves three visits when abnormality is detected , namely initial cervical smear, colposcopic diagnosis usually with biopsy and finally definitive treatment depending on the biopsy result[23]. At each step, there will also be communication of the test results to the patient. Thus, despite being available in developing countries, cervical cytology screening tend to be an expensive exercise and frequently impractical as it involves a relatively sophisticated infrastructure and system, skilled personnel colposcopists, cytotechnicians, cytopathologists etc. A cost-effectiveness analysis of different modalities of cervical screening in developing countries has shown that the most cost-effective strategies were the ones that required least visits, which have shortest linkage to treatment and relied less on laboratory facilities[25]. These criteria are not completely fulfilled by cervical cytology screening. Visual inspection methods described below which are widely advocated for cervical cancer screening in developing countries, have higher sensitivity rates but lower

specificity compared to Pap Smear[27]. However there is no published data to support this perception. A pilot study amongst field health workers non-specialists trained to perform cervicospoty however reports that it is easier to detect the colour patterns produced by iodine staining rather than acetic acid[30] Figure 1. VIA is often interchangeably used with the term cervicospoty even though in the strictest sense, cervicospoty simply means visualizing the cervix with the naked eye after applying a staining solution and should be applicable to VILI as well[32 , 33]. DVI with a special chemiluminescent light and using magnification is called speculospoty[35]. A large trial involving more than patients in South Africa showed no added benefit in using this technique and the usage of the special light increases its cost[36]. The term VIA will be used in this paper in keeping with its more popular usage. Abnormal epithelium usually have higher content of precipitated nuclear protein due to hyperchromasia which prevents the reflection of the underlying pink stroma with rich blood vessels and thus appears white[39]. An attractive feature of cervical screening by VIA is the short duration of time needed to train non-physician field health workers, ranging from 7 to 21 d which is very useful in resource limited developing countries especially if it has vast geographical areas with large population[30 , 41]. However, a large trial involving 34 women undergoing VIA in India by non-physician field health workers reported issues of declining rates of cervical abnormality detection, implying progressive drop in skills and the need for yearly re-training[42 , 43]. Frequently, cervical cancer screening facilities in developing countries face the issue of concurrent sexually transmitted diseases amongst the women being screened. A study amongst women in South Africa has also shown that the efficacy of VIA is not affected by co-existing Neisseria gonorrhoeae, Trichomonas vaginalis or Chlamydia trachomatis infection of the genital tract but the presence of HIV infection significantly decreased its specificity[44]. Due to the wider availability of affordable anti-retroviral therapy, more women with HIV are living longer and cervical cancer screening strategies need to be tailored accordingly[45 - 47]. Various other problems are present in visual inspection of the cervix strategies. Squamo-columnar junction where pre-cancerous lesions commonly occur, tend to migrate inward into the endocervical canal with increasing age. Contrary to cytology where shed cells from deep inside the endocervical canal may be picked up; direct visualization can be increasingly difficult in older women in order to obtain adequate view of the transformation zone. Training non-physician health workers to use the endocervical forceps can become more technical even though it is not impossible. Real world performance may differ from the promising figures of controlled research settings. VIAM Low level magnification However, these trials have shown that low level magnification did not give any added benefit to VIA. A meta-analysis of 3 studies involving over 18 patients has shown that VIA has a pooled sensitivity and specificity of VIAM on the other hand, showed a sensitivity of There are no reported trials of magnification techniques using VILI. It was first introduced by Adolph Staffl in [54]. It has been evaluated both as a primary screening tool and as an addition to other screening methods. A large trial involving women in Costa Rica showed that cervicography has an overall sensitivity of Cervicography was particularly not recommended for postmenopausal women in this study as it only had a sensitivity of Despite its high sensitivity being offset by reduced specificity, HPV testing has been repeatedly trialled as a primary screening tool both in developing and developed countries especially since an Italian study showed an overall reduction of cervical cancer incidence through HPV screening[58]. Single lifetime HPV screening A large trial involving women was performed in India, to compare HPV testing using HC2 as a single lifetime screening strategy vs cervical cytology, VIA or standard care which is the control group i. The HPV testing group has shown a significantly reduced incidence of cervical cancer and cervical cancer mortality rate compared to cervical cytology and VIA[43]. Cumulative data over 8 years revealed that compared to the control group, hazard ratio for the incidence of cervical cancer was 1. Hazard ratio for death due to cervical cancer was 0. It is yet to be marketed commercially. HPV test and self-sampling HPV testing also paves the way for analysing self-collected specimen from the vagina by the women using various methods such as tampon, swab, cytobrush, vaginal lavage or custom made device[64]. No good evidence is available to compare between self-sampling methods. Cultural, religious and even socio-economic barriers among women which are particularly prevalent in developing countries may hinder participation in cervical cancer screening programmes which traditionally requires speculum aided collection of cervical specimen. This was studied in

a randomised controlled trial comparing conventional cervical cytology and cytobrush for self-sampling among Mexican women[65]. It also showed that HPV analysis of self-sampled cervical specimen displayed higher sensitivity, lower specificity and lower positive predictive value compared to cervical cytology for detecting CIN2 or worse[65]. The preferred treatment method in this strategy is cryotherapy as it has been shown to have lower and milder complication rates, requires less skill than electrical excision, can be performed by trained non-physician health worker and is cheaper than laser ablation[68 - 70]. A study in India where women underwent VIA and cryotherapy, cure rates of Utilisation of digital cameras linked to the internet via laptop or even multimedia messaging system MMS via mobile phones, especially modern smartphones, will enable non-physician health workers in remote areas to capture cervical images and transmit them to experts in centralised secondary or tertiary centres for further opinion. Limitations of this approach are loss of stereoscopic view and depth perception as the images are 2 dimensional, potential distortions of the images due to factors such as technique, lighting and camera battery which in turn can cause wrong diagnosis and decisions and cost of infrastructure, maintenance and repair that can be forbidding in certain countries[72]. The successes of developed countries to inhibit cervical cancer rates to very low levels by high intensity cervical cancer screening programmes could not be emulated in low and middle income countries. Primary prevention of cervical cancer with HPV vaccine is still beyond reach for many poorer countries. In the continuum, the importance of secondary prevention by utilising the most cost-effective cervical cancer screening strategy could not be over emphasized. There is no one technique which will meet the needs of all developing countries and each health authority would need to work in collaboration with the local medical fraternity to determine the best option. CA Cancer J Clin. Cancer Incidence and Mortality Worldwide: International Agency for Research on Cancer; Cancer Incidence in Five Continents. Trends in mortality from cervical cancer in the Nordic countries: Effect of screening on incidence of and mortality from cancer of cervix in England: Cervical cancer trends in the United States: J Womens Health Larchmt. The diagnostic value of vaginal smears in carcinoma of the uterus. Arch Pathol Lab Med. Cancer of the Uterus: The Vaginal Smear in Its Diagnosis. Effectiveness of cervical cancer screening over cervical cancer mortality among Japanese women. Jpn J Clin Oncol. Decline in cervical cancer incidence and mortality in New South Wales in relation to control activities Australia. Screening for squamous cervical cancer: Does screening by "Pap" smears help prevent cervical cancer A case-control study. The cell smear method of diagnosing cancer. Collection devices for obtaining cervical cytology samples. Cochrane Database Syst Rev. ThinPrep R Package Insert. Vaginal speculum lubrication and its effects on cervical cytology and microbiology. A comparison of liquid-based cytology with conventional cytology in cervical cancer screening. J Natl Compr Canc Netw. Indian J Med Res.

4: Trends in cervical cancer screening in developing countries

Cervical cancer is the most common malignancy amongst females in developing countries, mainly due to a lack of precursor screening. This absence of screening is the result of inherent.

Recommendations[edit] Different countries have different cervical screening recommendations. In Europe, most countries suggest or offer screening between the ages of 25 to 30. This is by Pap smear, and regardless of sexual history. The greatest impact on cervical cancer reduction appears to result from screening women aged 30 to 39 years, so resources may be directed to that age group. Pap test In the conventional Pap smear, the physician collecting the cells smears them on a microscope slide and applies a fixative. In general, the slide is sent to a laboratory for evaluation. Studies of the accuracy of conventional cytology report: The media are primarily ethanol -based for Sure-Path and methanol for ThinPrep. Once placed into the vial, the sample is processed at the laboratory into a cell thin-layer, stained, and examined by light microscopy. The liquid sample has the advantage of being suitable for high-risk HPV testing and may reduce unsatisfactory specimens from 4. Studies of the accuracy of liquid based monolayer cytology report: Those that have a prolonged infection with a high-risk type [22] e. This means that if initial screening test shows borderline results or low-grade abnormal cells, a further test for HPV is made on the sample. If this shows HPV is present, the patient is called for a further examination, but if no HPV is present the patient resumes the usual screening schedule as if no abnormalities had been found. A worthwhile screening test requires a balance between the sensitivity and specificity to ensure that those having a disease are correctly identified as having it and those without the disease are not identified as having it. HPV testing appears as sensitive as immediate colposcopy while reducing the number of colposcopies needed. Women that had even a single Pap smear in their history had a lower incidence of cancer. For patients at similar risk to those in this study Click here to adjust these results for patients at higher or lower risk of CIN One promising prospect in HPV testing is possibility to self-sampling. HPV testing on a self-sample can today be suggested as an additional strategy to reach women not participating in the regular screening programme and in future as a possible screening strategy.

5: Cervical Cancer screening in the developing countries | ICPI

Cervical-cancer screening strategies that involve the use of conventional cytology and require multiple visits have been impractical in developing countries. We used computer-based models to.

6: Cervical cancer in developing countries - Cervical cancer information

Cervical cancer is also the fourth most lethal cancer in women worldwide (, deaths) and the third cause of cancer-related death in developing countries (, deaths) (3). It is therefore a matter of public health, as it affects women within the reproductive age groups.

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