How successful are pap smears?

How successful are pap smears in detecting cervical and uterine cancers?

George Nicholas Papanicolaou established the Pap smear in the 18th century when he became intrigued by the guinea pigs vaginal smears as he was studying them. He quickly began to start his research on the female reproductive system, most specifically the different cytology slides he could obtain. His stake in the field was his book published in 1943, " Diagnosis of Uterine Cancer by Vaginal Smear." It covered topics like physiological changes of a menstrual cycle, the hormones incorporated, and vaginal smears that led to his classifications of disease and malignancies. This jump started thescreening for cervical cancerand can attest to a significant decline incases of cervical cancer. Later, he published another book specific to just distinguishing between healthy and diseased tissue throughout the entire body. These two publications were just two of the four he finished in his life on top of awards and honorary degrees. (Tan, 2015)

Papanicolaou was certainly ahuge help in the advancement of cytology reporting. Since then, we have beenable to learn and understand more about pap smears, cervical cancer and therole pap smears plays in diagnosing them. Although both cancers begin in thesame area, the uterus; we can differentiate them by their pathophysiology's. The question really stands, how successful are pap smears in detecting thesecancers? This can be argued on a few bases, but sticking to the facts we canfind out how successful they are, how they can be preventive, and what toexpect if a woman does find herself diagnosed. Several factors can be takeninto account such as the pathogenesis, level of disease, the manifestations,

precipitating factors, and several more. Uterine and Cervical cancers both comewith their own etiologies, epidemiology’s and prognosis.

There are a few differentways to screen for cervical cancer, and this will look directly into the Papsmear procedure. The Pap smear allows for a better look into the cells in thecervix, the opening of the uterus. The test is looking for cancerous andabnormal cells that could lead to cancerous outcomes. In the test anobstetrician- gynecologist will scrape away a portion of cervix cells. The useof a speculum helps the doctor keep the walls of the cervix open to have aclear view and retrieve a good sample. The specimen will then be tested in acontrolled laboratory setting where a technician will observe forabnormalities. An official cytology report will be sent to the doctor and thengiven back to the patient for further counsel if needed. Results will beabnormal or negative (normal). Several sources believe the Pap smear to be veryaccurate in the screening of cervical cancer. It also is a very preventivemeasure to take, as long as the patient is compliant with the doctor’sguidelines. By detecting cervical cancer early, treatment can begin to decreasethe risk of spreading and growth of the tumors. Pap smears have been estimatedto reduce cervical cancer rates and mortality by 80%. (Weber, 2017) Incomparison, up to 80% of women diagnosed with invasive cervical cancer have notreceived a pap smear in the past 5 years. (Stöppler)

CIN or, cervicalintraepithelial neoplasia is a precancerous condition of abnormal cell growthon the cervix. Intraepithelial means that the abnormal cells are growing on thesurface or the epithelial tissue of the cervix. Neoplasia is referring to thegrowth of new cells. Signs and symptoms can be obvious but can also resembleseveral conditions that females could

encounter. These symptoms can includeabnormal vaginal bleeding, bleeding after sexual intercourse, pelvic pain, discharge, and pain during sexual intercourse. (Stöppler) It is recommendedthat women start getting pap smears at the age or 21. This is most important ifyou are HIV positive or have a weakened immune system. (Weber, 2017) These screenings should continue from ages 21 to 29 with cytology aloneevery 3 years. From ages 30-65, women should continue cytology screening everythree years and add HPV testing. After 65 no screening is necessary as longpast screenings are normal and no high risk is present. (Boardman, 2018)

Over the years professionalshave found it difficult to all be on the same page about reporting. Some levelsof abnormal results can include atypia, mild, moderate, severe dysplasia, andcarcinoma in situ. The creation of the Bethesda System has given one reportingsystem for all health care professionals. In 1988 the National Cancer Instituteheld a conference for the creation of this system, it was then re-evaluated in2001. There are four major classifications that make it easier for thisuniversal system to work. “ ASC-US: This abbreviation stands for atypicalsquamous cells of undetermined significance. LSIL: This abbreviation stands forlow-grade squamous intraepithelial lesion. Under the old system ofclassification, this category was called CIN grade I. HSIL: This abbreviationstands for high-grade squamous intraepithelial lesion. Under the old system ofclassification, this category was called CIN grade II, CIN grade III, or CIS. ASC-H: This means atypical cells are present and HSIL cannot be excluded.”(Stöppler)

CIN cases are most alwayscaused by infection with oncogenic types of HPV or, Human Papillomavirus. There are 12 known types of high risk HPV, which

are the most prevalentassociations with cervical cancer. Cervical cancer results from a genitalinfection with HPV, a known human carcinogen. Because most HPV infections aretransient or, passing in and out of existence in a patient, it causes onlytemporary changes in cervical cells. (National Cancer Institute, 2014) About 90% of HPV infections clear on their own within months to yearswith no sequelae. (Boardman, 2108) This makes it difficult to catch the HPVinfection and in turn cervical cancer. Too frequent of screenings might beproblematic for several reasons. One being that treating these abnormalitiesthinking it was HPV but that went away anyways would cause unnecessary stresson the patient. Also, putting strain on the cervix several times in any periodof time can weaken the tissue and could ultimately affect the woman's fertility. Interestingly enough, it can take up to 20 years for a persistent infectionwith a high risk HPV to become cancerous. (National Cancer Institute, 2014) Lowrisk HPV infections rarely or almost never cause cervical cancer. (Boardman, 2018) However if lesions are found and not treated, they are more than likelyto turn into cervical cancer. (National Cancer Institute, 2014)

There are different levelsof cervical cancer that decipher the progression on epithelial tissue. CINgrade 1 is low grade neoplasia involves around one-third of the thickness ofthe epithelium. CIN 2 refers to the abnormal changes in about one to two-thirdsof the layer. CIN 3 is the most severe affecting over two-thirds of theepithelium. 5% of HPV infected patients will acquire CIN grade 2 or 3 lesionswith three years of infection. Only 20% of CIN 3 lesions progress to invasivecervical cancer within 5 years. Only 40% of CIN 3 lesions progress to invasivecervical cancer within 30 years.

Genetics can also play a role in a woman’s development of cervical cancer; genetic connection holds fewer than only 1% of cervical cancers. “ Women who have an affected first degree biological relative have a two fold relative risk of developing a cervical tumor compared with women who have a nonbiologic first degree relative with a cervical tumor.” Some specific genetic factors have been shown to be in association. The tumor necrosis factor is involved with cell apoptosis and a high incidence of cervical cancer. Polymorphisms, another gene dealing with apoptosis, have been linked to the increased rate of HPV and in turn, cervical cancer.

Cervical cancer is the leading cause of cancer related morbidity in developing countries, but is very uncommon in the United States. “ Since 2004 rates have decreased by 2. 1% per year in women younger than 50 years and by 3. 1 per year in women 50 years of age and older. ACS reports 12, 170 new cases of cervical cancer would be diagnosed in 2012.” Age related demographics from 2004-2006 were highest among women from 50-79. But cervical cancer is possible to be present in any sexually active woman. In terms of race, cervical cancer rates per 100, 000 women in the US from 2005-2009 are across the board: Hispanic 11. 8, African American 9. 8, American Indian/ Alaska Native 8. 1, White 8. 0 and Asian/ Pacific Islander 7. 2. Internationally, 500, 000 women are diagnosed every year.

Prognosis for cervicalcancer is very good, especially when caught early. 5 year survival rates: Stage1 greater than 90%, Stage 2 60-80%, Stage 3 approximately 50%, and stage 4 lessthan 30%. Treatment for this type of cancer is usually dependent on age, fertility or pregnancy plans. One procedure, LEEP, the loop electrosurgicalexcision procedure carries an

electrical current through a wire to remove abnormaltissue. Cryotherapy freezes the abnormal tissue. Laser therapy uses a beam oflight to remove or even destroy the cells. Conization can also be used with aknife and laser. (Boardman, 2018) In severe cases removal of the uterus, hysterectomyis sometimes necessary. Radiation, chemotherapy and surgery can sometimes beperformed in other extreme cases.

However like any screeningtest there is always a risk of inaccuracy in false negatives and falsepositives. (National Cancer Institute, 2014) In some cases a pap smear can befaulty and must be reported in an official capacity. Some examples of thiscould be “ drying artifact’ or “ excessive blood.” The person reading the smearcould feel these are factors that affect the reading. Inflammation can also bea problem in a Pap smear reading. Inflammation can be from infection orirritation. (Stöppler)

Uterine cancer is defined asthe any invasive neoplasm of the uterine corpus and is the most common pelvicgynecological malignancy in the United States. Uterine cancer can also belabeled endometrial cancer. The most common type of uterine cancer specificallyis endometrioid adenocarcinomas. (Chiang, 2017) It is believed to have twoforms; type 1 or estrogen dependent and type 2, which is estrogen independent.(Holman 2012)

Uterine cancer can start insmall areas or “ a diffuse multifocal pattern.” Health care professionals canusually diagnose this type of cancer by the spreading pattern of the tumor. Usually the tumor will grow from the original location. This can tell thedoctor how far along the cancer is. Later tumor growth is seen throughmyometrial invasion and movement towards the

cervix. The cancer itself can takefour different routes to spread outside the uterus. Direct or local extendsbeyond the uterus. Lymphatic, referring to exposure to the pelvic, para-aortic, and sometimes the lymph nodes. Hematologic goes further reaching the lungs, liver, and bone metastatically. Lastly, “ peritoneal/ transtubular spreadresults in intraperitoneal implants.

Staging of Uterine cancer, like most cancers, will depend on the amount of growth and spreading of thetumors. Clinical stage 1, which is the most common for patients, is strict tothe uterus. Stage 2 involves a large amount of the cervix. Stage 3 “ vaginal extension, adnexal mass, and/or suspicious retroperitoneal lymphadenopathy.” Stage 4accesses the bowel and bladder and some other metastases around the body.

Although pap smears areprominent for cervical cancer findings, it is not as helpful in uterine cancer. According to my findings, there are actually no screening regimens forasymptomatic women. The only screening mentioned is a transvaginal ultrasound, which “ determines the thickness in postmenopausal women.” In the suspicion ofabnormalities, biopsies can be taken. Uterine cancer usually includes bothsurgery and radiotherapy. Other treatments follow a hormone regimen. Otherforms can use estrogen replacement therapy and Tamoxifen, which is usually usedfor breast cancer but can be used on endometrium tissue as well. (Holman 2012)Because of the early representation of the cancer, treatment is usuallysuccessful and most do not progress past stage 1. Recurrences can happen andusually do within 3 years of the original diagnoses, which occurs in half ofpatients. (Holman 2012)(Uterine Cancer)

Symptoms of uterine cancercan range from genital discharge, pain, weight loss, and change in bladder orbowel movements. However, postmenopausal bleeding is said to diagnose up to 90%of endometrial cancers. Another clinical finding would be glandular cells froma pap smear on a postmenopausal woman. Some risk factors are obesity, nulliparity, and late menopause. Diabetes and hypertension are also conditionsthat. Less than 5% of this cancer is actually diagnosed when the woman isasymptomatic can increase the risk of uterine cancer. (Uterine Cancer) Most ofthe patients diagnosed with uterine cancer are obese, which can affect estrogenlevels. (Holman 2012)

Over 50, 000 cases of uterinecancer are diagnosed each year, leading up to 10, 000 deaths per year. In womenalone, it leads to 4% of deaths related to cancer. 70-75% of cases arediagnosed at stage 1. In 2009, the survival rate for uterine cancer was 83. 1%.(Chiang, 2017) A large majority of the population diagnosed are postmenopausaland ages 50-65, average age of 61. White women have the largest risk of uterinecancer in the United States compared to African American, Asian and Hispanicwomen. However, African American women have a larger rate of death. Interestingly, those women living in Asia or Africa have a much smaller rate ofuterine cancer than Asian and African American women in the United States. Smoking actually has been shown to decrease your chance of endometrial cancer. The use of contraceptive pills has also been said to be a protective measurefor women. (Holman 2012)

In conclusion, Pap Smearscan be resourceful ways of detecting cervical cancer but not at large uterinecancers. Pap smears are a great screening

method for obstetrician-gynecologists and their patients to catch and prevent cervical cancer. Bydetecting cervical cancer early, prognosis is very good and very likely in mostcases. These quick diagnoses from pap smears and other sources has madecervical cancer a very uncommon cancer related death for women in the UnitedStates. Unfortunately for developing countries, lack of medical resources andresearch has made discovering cervical cancer difficult and fatal. With theBethesda System doctors from all over can classify cervical cancer the sameway. Pap smears are very accurate, but like any screening procedure there isalways the risk of false negatives or false positives.

Although Pap smears haven’tbeen shown totally reliable to detect uterine cancer, there are several othermethods to find uterine cancer. The most obvious can be the presence of postmenopausalbleeding in women, which diagnoses most of the cases. Transvaginal ultra soundcan be used to determine the state of the woman’s uterine tissue. These and afew others have been said to be more reliable than Pap smears. Counterpart toruling out Pap smear findings, one source does tell that if glandular cells arepresent than it might be uterine cancer. Like cervical cancer, uterine canceris most always found in early stages or stage 1 to be exact. This earlydetection makes it only 4% of cancer related deaths in women.

In doing my research it wasclear to me that Pap smears are in fact helpful in detecting cervical cancerbut not as much in uterine cancer. I only found one source that mentionedfindings from a Pap smear for uterine cancer. This was entirely interesting tome because they are in very similar areas of the woman’s reproductive system. In doing more research, it makes sense that a

pap smear rarely diagnosesuterine cancer because it starts inside the uterus. The cervix being much lowerand away from the uterus makes it easier to obtain cells and much morereliable. Finding cervical cancer can be much more direct and easily obtained. Getting to the uterus safely is much more difficult.

In further research I believe it would be interesting to look further into minimally invasive ways to detect uterine cancer. Another topic is using the any findings from a Pap smear in detecting cervical cancer to relate to prevention of uterine cancer. Lastly, the result of cervical and uterine cancer on future pregnancy or on currently pregnant women.

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