

RESEARCH ARTICLE

Situation Analysis of Existing Facilities for Screening, Treatment and Prevention of Cervical Cancer in Hospitals/Primary health Centers of Delhi-NCR Region, India

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Abstract

Cervical cancer, the second most common malignancy all over the world, is associated with HPV infection. In a developing country like India, lack of early detection and treatment facilities is the main cause for its high burden. Therefore, through our study we e tried to present the current scenario of existing facilities for the detection and treatment of cervical cancer in hospitals and primary health centers (PHCs) of Delhi-NCR region. Data were collected from 312 healthcare facilities including public and private hospitals and PHCs of all nine districts from Delhi-NCR region. Healthcare providers including gynecologists, medical officers, women health care providers and paramedical staff were interviewed, using a questionnaire; the facilities for screening, diagnosing, and treating cervical cancer in each institution were recorded, using a previously designed checklist. Our study has shown that the basic facilities for the detection and treatment of cervical cancer are abhorrently lacking in Public hospitals and PHCs as compared to the Private hospitals in Delhi-NCR region. This study demonstrates that there is an urgent need for more investment in the diagnosis and treatment of cervical cancer facilities in public and rural healthcare facilities of Delhi-NCR region.

Keywords: Cervical cancer - hospitals - PHC - healthcare providers - Pap test - HPV-DNA test - delhi-NCR

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Introduction

Cervical cancer is the fourth most common cancer affecting women worldwide, after breast, colorectal, and lung cancers; with 528 000 new cases every year, it is most notable in the lower-resource countries . It is also the fourth most common cause of cancer death (266 000 deaths in 2012) in women worldwide. Almost 70% of the global burden falls in areas with lower levels of development and more than one fifth of all new cases are diagnosed in India (Globocon 2012). Of the nearly 500,000 new cases that occur annually, 83% are in the developing world, as are 85% of the 274,000 deaths associated with cervical cancer (Ferlay et al, 2010). The South Asian region harbors one fourth of the burden of cervical cancer. Despite the tremendous progress over the last ten years in prevention, diagnosis, and treatment, cervical neoplasias are still on the rise in developing countries.

Cervical cancer is the leading cancer among women in India (Asthana& Labani,2013). There are an estimated 132,000 new cases and about 80,000 deaths each year. There is a great diversity between urban and rural India when it comes to cervical cancer. Incidence of cervical cancer in urban India is decreasing because of more awareness in urban educated women (Dikshit et al., 2012).

The primary reasons for the high prevalence are attributed to lack of awareness of the risk factors of cervical cancer and lack of access to screening and healthcare facilities. Moreover, most cases are diagnosed at advanced stages when treatment is costly and cure rate is low. By 2025, the numbers of new cervical cancer cases and deaths in India are estimated to increase to 226,084 and 115,171, respectively (WHO/ICO Information Centre on HPV and Cervical Cancer, 2010). These statistics are dismaying for the simple reason that cancer cervix is treatable and preventable disease if detected at an early stage.

In the light of increasing number of cases of cervical cancer in India, the economic burden posed by the cost of secondary care of invasive cervical cancer is a serious concern, which is why opting for cost-effective prevention strategies comprising early screening and HPV vaccination assume importance. Today cervical cancer is an important public health problem in India as our country lacks an effective national control program for this disease. In contrast, for example, the introduction of effective population-based screening programs using the Papanicolaou (Pap) test to detect precancerous lesions has resulted in a significant reduction in the burden of cervical cancer in the developed world.

Therefore the present investigation has focused, at

different levels of assessment, the quantum of existing gaps that need to be addressed for bringing in place an appropriate control strategy. Through this multi-cross sectional study, 312 health centers (80 PHCs, 184 Private hospitals and 48 Govt. hospitals) of Delhi-NCR were surveyed for existing facilities for the detection and treatment of cervical cancer.

Materials and Methods

Present cross sectional study is based on the one year project sponsored by ICMR was conducted in Hospitals and PHCs of the State of Delhi and NCR region for assessing facilities available for screening and treatment of cervical cancer. This study was carried out in Delhi-NCR region of India, between August, 2012 to April, 2013. For each facility in participating health care facilities, data were collected from Public hospitals, Private Hospitals and Primary health care (PHC) centers selected by statistically sampling. Research survey was conducted in nine districts/ regions of Delhi-NCR covering 232 hospitals and 80 PHC's (Figure 1). The State of Delhi was divided into five geographic regions North, South, East, West and Central. The regions covered under NCR comprised Faridabad, Gurgaon, Ghaziabad, Gautam Budh Nagar.

Statistical analysis

Statistical sampling of PHC's and Hospitals was done, using the formula applicable for survey research with normal approximation to hyper geometric. Sampling was done by using Formula: $n = Nz^2pq / (E^2(N-1) + z^2pq)$

n = Sample size of PHCs/ Hospitals to be covered

N = Total no. of PHCs/Hospitalson sample frame
 z = confidence level (1.96 at confidence interval of 95%)
 $= 1.96E (+/-error) = Standard error or sampling error$
 (i.e. coefficient of variance or relative error*population estimate (p))
 $= 0.06 * 0.8 = 0.048$ (Standard margin of error for surveys ranges from 5% to 10% and maximum at 20%)
 p = is the anticipated proportion of facilities with the attribute of interest (80 percent = 0.8)
 $q = 1 - p \dots (1 - 0.8 = 0.2)$

It is anticipated that each of the key estimates of the survey of small number of facilities will be in the range of about 50 to 100 percent. In that case, the largest sample size needed is when the percent with the given attribute is 80, and this is the sample size that should be used. Thus $p = 0.8$. For precision requirements, relative error (coefficient of variation) of 6% is taken. The sample size thus calculated at 95 percent level of confidence using above formula is 71 PHCs and 232 hospitals.

The overall percentage of government hospitals was less (12.8%; 48 govt. hospitals) in comparison to private hospitals (i.e. 87.2 %; 327 private hospitals) and unevenly distributed over different geographic areas of the State of Delhi and NCR region. As per judgmental sampling, all government hospitals were to be included from each stratum and the remaining would be private hospitals, matching with the number of hospitals from each stratum which is calculated by PPS sampling. All the data were analyzed by using SPSS 17 software.

Ethical considerations: The study protocol was approved by the Research Ethics Committee of World

Healthal Trust and was reviewed by the Project Review Committee of Indian Council of Medical Research, New Delhi. All the participant of the survey was explained about the Research Survey. Prior approval was taken from all the competent medical authorities for each district.

Results

A total of 312 healthcare facilities from Delhi-NCR region were surveyed during the course of this one-year project and the availability of basic infrastructure, staff and facilities for the screening and treatment of cervical cancer were assessed.

Availability of Staff

Looking at the available staff at the hospitals/PHCs that were surveyed, it was found that 96.1% hospitals had Gynecologists as compared to only 1.25% PHCs where Gynecologists were available. However, it was observed that both hospitals and PHCs have fairly good number of trained Paramedical staff. Further, 84.5% hospitals were found to have Women Healthcare Professionals whereas only 56.25% PHCs had Women Healthcare Professionals (Figure 2a). Overall only in 16% hospitals, oncologists were found.

According to Figure 2b, 97.3% facilities from Private sector were having gynecologists, while only 35.2% facilities from Govt. sector had any gynecologist. Location-wise, 40% facilities from Gurgaon were having oncologists, whereas only 10% facilities from Delhi were reported with oncologists (Figure 2c).

Basic facilities

Out of 232 hospitals most of them were found equipped with examination room, gloves and autoclaves, while these basic facilities were found to be significantly lacking in the 80 PHCs surveyed from Delhi-NCR region. Basic testing/cyto-pathology laboratory was found available in 82% of the hospitals whereas only 24% PHCs were found equipped with it (v 3a). A majority of hospitals from the Private sector were found with all basic infrastructural facilities in comparison with the Govt. hospitals. Similarly, 83% of Private hospitals were found equipped with basic testing/cyto-pathology laboratory whereas only 43% Govt. hospitals had such laboratory facility (Figure 3b).

Total number of facilities included in the survey

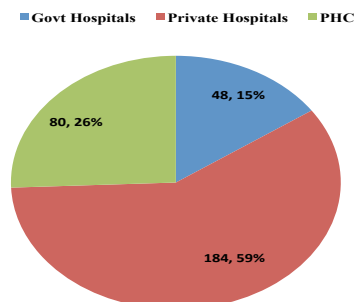


Figure 1. Distribution of Hospitals and PHC's included in the Survey

Faridabad was found to be reported with the lowest 65% of hospitals, having basic cytopathology labs (Figure 3c).

Facilities for detection and treatment of Cervical Cancer

The facilities for the detection and treatment for cervical cancer were grossly lacking in PHCs as compared to the hospitals. 92.7% hospitals were found to be equipped for conducting the Pap test, 50% were found having VIA test, while 48% hospitals had the HPV-DNA testing facility. For the treatment of pre-cancer cervical lesions, 60% hospitals were found to have the facility for doing tissue-biopsy and cryosurgery whereas facility for conducting LEEP was found only in 25% hospitals (Figure 4a). No PHC (out of 80 PHCs surveyed) was equipped with any of the screening or treatment facilities for cervical cancer as shown in Figure 4a.

It was observed that 94% hospitals of the Private sector

had the facility for conducting the Pap test, whereas only 33% facilities from the Govt. sector were equipped with this facility. The screening facilities for detecting cervical cancer were more prominently available in health centers of Private sector in comparison with those of Govt. sector. For example, 53% Private hospitals were having the HPV-DNA test as compare to the 11% hospitals from the Govt. sector (Figure 4b).

All hospitals surveyed in Gautam Budh Nagar were having the Pap-test facility, whereas only 80% hospitals from Ghaziabad had this facility (Figure 4c). It was also noted that 55% hospitals from Delhi were having the HPV-DNA test facility, whereas only 27% hospitals from Ghaziabad had facility for conducting this test.

Reasons for lack of facilities

Out of 590 respondents, 261 were from the hospitals/

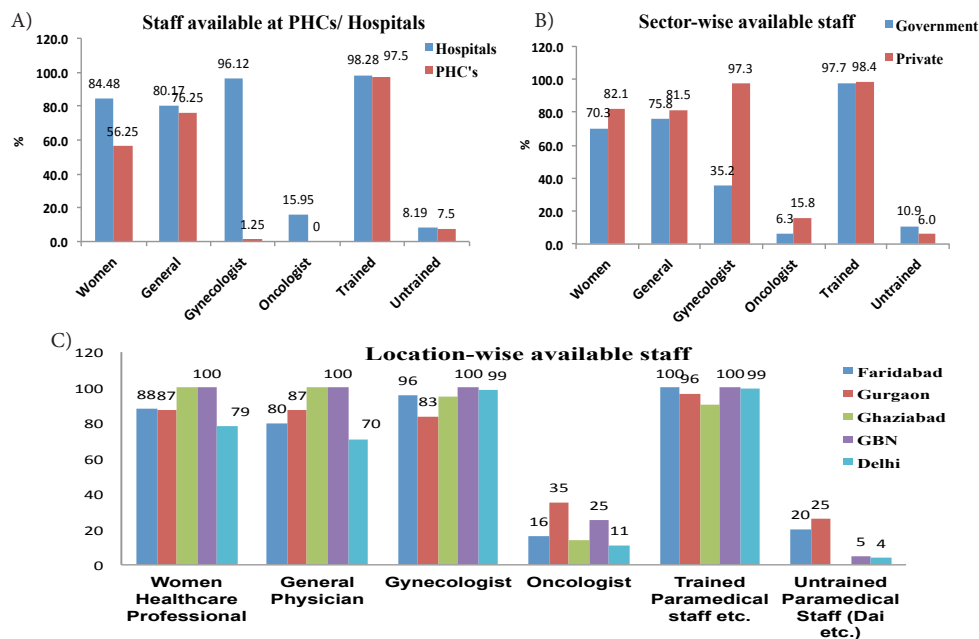


Figure 2. Total Staff Availability at the PHCs/Hospitals at Delhi-NCR(n=312). A) Total % of Staff Available at the PHCs/Hospitals; B) Sector-wise % of Staff Available at the PHC/Hospitals; C) Location-wise (%) of Staff Available at the PHCs/Hospitals at Delhi-NCR

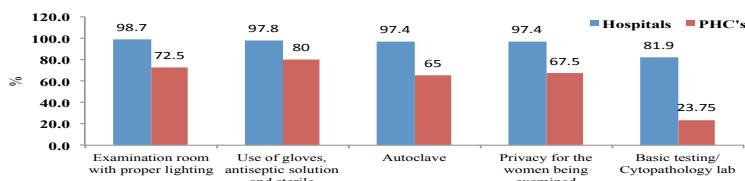


Fig 3a: Basic facilities available at PHCs/ Hospitals

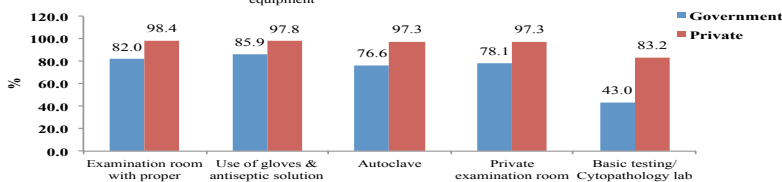


Fig 3b: Basic facilities available sector-wise at PHCs/ Hospitals

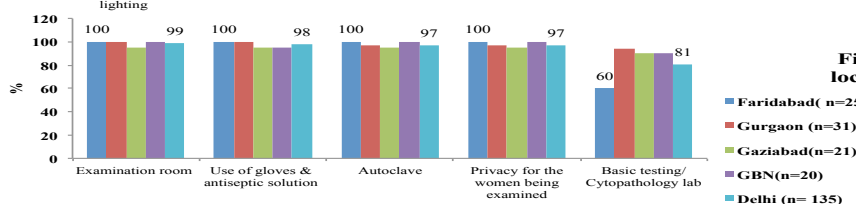


Fig 3c: Basic facilities available location-wise at PHCs/ Hospitals

Figure 3. Total Availability of Basic Facilities at the PHCs/Hospitals at Delhi-NCR(n=312)

PHCs where screening and treatment facilities for cervical cancer were found to be lacking, and they reported to have the referral policy for recommending the patients to get screened or treated in other hospitals (Figure 5a). Out of these 261 respondents, 115 were from the Private sector (Figure 5b).

According to the majority of respondents from hospitals/PHCs where the screening and treatment facilities were found to be lacking, lack of existing policy on preventive oncology, lack of initiatives from the concerned authorities and lack of funds were found to be the major reasons for not having adequate facilities in their health centers (Table 1).

It was observed that only 12 respondents had applied for the funds for bringing facilities at their health centre (Figure 6).

According to 101 respondents, lack of awareness that cervical cancer is treatable in its early stages, lack of initiatives for preventive oncology, lack of funds and inappropriate utilization of funds were the major reasons for not having treatment facilities at their hospitals for the treatment of cervical precancerous lesions (Table 1).

Impact Analysis of lack of screening and treatment facility in Delhi-NCR region

During our survey of 312 health care facilities we

found that large number on an average 41,414 patients per month, visited different OPD and only 18.86% (7813 patients) from this population undergo for the test of cervical cancer detection. Out of these a significantly high number of patients 78.27% (6116 patients) are detected per month with abnormalities in cervix. This shows the

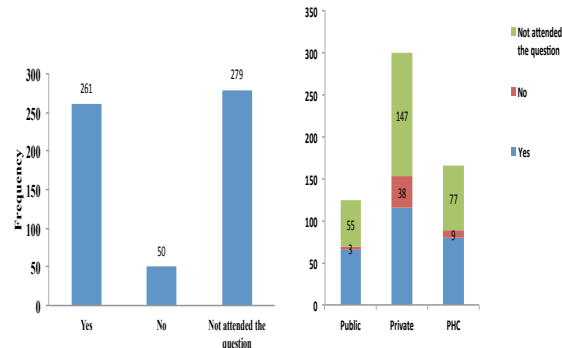


Figure 5. A) Frequency Of Respondents Following Referral Policies for Recommending Patients to get Screened or Treated for Cervical Cancer in Other Hospitals, B) Sector-Wise Frequency of Respondents Following Referral Policies for Recommending Patients to Get Screened or Treated for Cervical Cancer in Other Hospitals

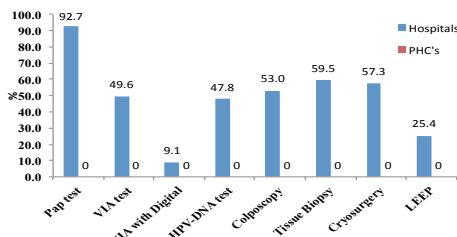


Fig 4a: Facilities available for screening and treatment of cervical cancer at PHCs/Hospitals

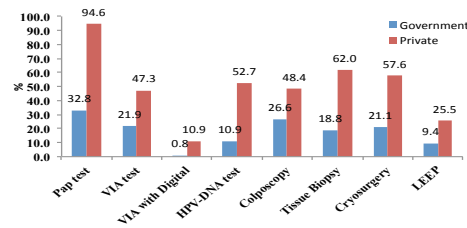


Fig 4b: sector-wise facilities available for screening and treatment of cervical cancer

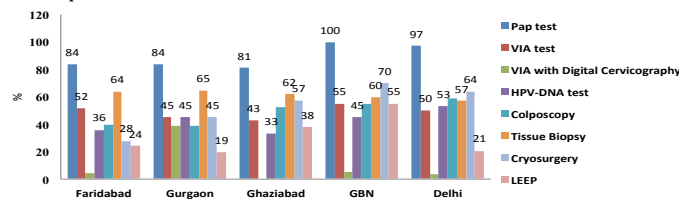


Fig 4c: Location- wise facilities available for screening and treatment of cervical cancer

Figure 4. Total Facilities Available for Screening and Treatment of Cervical Cancer at the PHCs/Hospitals at Delhi-NCR (n=312)

Table 1. Reasons for Lack of Adequate ‘Screening’ Facilities

A. Reasons for not having adequate ‘screening’ facilities in hospital/PHC/clinic for detecting cervical lesions		Frequency	%
1	Lack of an existing policy on preventive oncology	14	2.4
2	Lack of initiative by concerned authorities to include a policy on preventive oncology	8	1.4
3	Lack of funds to initiate preventive services to screen and diagnose women having cervical lesions	23	3.9
4	All 1, 2 & 3	123	20.8
5	Any other	24	3.6
6	Not attended the Question	398	67.1
B. Reasons for not having adequate ‘treatment’ facilities in hospital/ PHC for treating women having cervical pre-cancerous lesion			
1	Lack of awareness that cervical cancer in its early stage is fully treatable	17	2.9
2	Lack of initiative by concerned authorities to include a policy on preventive oncology	26	4.4
3	Lack of funds to initiate preventive services to treat cases of cervical cancer	29	4.9
4	Inappropriate utilization of funds	4	0.7
5	All 1, 2, 3 & 4	101	17.1
6	Any other	20	3.4
7	Not Attended the Question	389	66

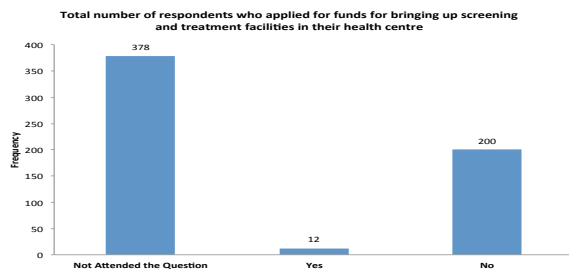


Figure 6. Frequency of Respondents who Applied for Funds for having Adequate Screening & Treatment Facilities for Cervical Cancer in Their Health Centre

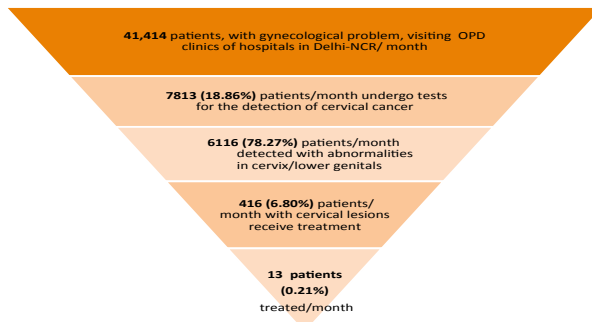


Figure 7. Impact Analysis Due to the Lack of Screening and Treatment Facilities in Delhi-NCR

prevalence rate of patients having detectable abnormalities in cervix. To make matters worse, out of these 6116 patients detected with abnormalities in cervix/lower genitals, only 6.80% that is 416 patients with cervical lesions are found to receive treatment per month in the surveyed hospitals located in Delhi-NCR. The present survey has also revealed that from among these patients who have received treatment, only 13 patients per month (0.21%) are successfully treated (Figure 7).

Discussion

Despite being a preventable disease, cervical cancer claims the lives of almost half a million women worldwide each year. India bears one-fifth of the global burden of the disease, with approximately 130,000 new cases a year. In an effort to assess the need and potential for improving the quality of cervical cancer prevention and treatment facilities in India, a strategic assessment was conducted in Hospitals/PHCs of Delhi-NCR region through the present study.

Present study is the first report so far reported complete lack of screening and treatment facilities in the Hospitals and PHCs from Delhi-NCR region, are responsible for the burden of cervical cancer which is clearly noticeable from our findings. This survey has brought to light the grim fact that nearly 41,414 patients, having some gynecological problem, visit the different OPD clinics of hospitals located in Delhi-NCR per month. Out of these, only 18.86% that is 7813 patients per month undergo any tests for the detection of cervical cancer and. The present survey has also revealed that from among the patients who have received treatment, only 13 patients per month (0.21%) are successfully treated (Figure 7).

Since early detection predicts better prognosis, the

most effective way of preventing and controlling cervical cancer is regular screening and early diagnosis, followed by prompt treatment ((Ghotbi and Anai, 2012; Coscun et al., 2013; Thippeveeranna et al., 2013). In our study, a total of 312 healthcare facilities from Delhi-NCR region were surveyed during the one-year period and the availability of basic infrastructure, staff and facilities for the screening and treatment of cervical cancer were assessed. Although an acute shortage of Gynecologists is notably reported in PHCs, both hospitals and PHCs have a fairly good number of trained Paramedical staff. Further, 84.5% hospitals were found to have Women Healthcare Professionals whereas only 56.25% PHCs were equipped with them. Overall, only in 16% hospitals, oncologists were found. As compared to Private hospitals, Govt. hospitals were found to have very few Gynecologists. Location-wise, 40% facilities from Gurgaon were having oncologists, whereas only 10% facilities from Delhi were reported with oncologists. So far no study has been reported in the literature regarding the available staff at hospitals and PHCs from India. This study has demonstrated that there is an urgent need of recruitment of trained staff at PHCs and Govt. hospitals for the early and timely detection, as well as for the treatment of cervical cancer. Numerous studies have pointed out an important role of health care students, nurses and midwives in the cervical cancer prevention (Ljiljana et al., 2014)

Similar to our study, Chirenje et al 2001 has reported that surgical facilities to operate on women with cervical cancer in South African countries were available in 46% of the provincial hospitals, of which 21% had a Gynecologist to perform the surgery. Thus, the majority of women with invasive cervical cancer were referred to tertiary hospitals, resulting in huge transport costs to the patient. They also reported that the number of onco-surgeons, radiotherapists and physicians in the tertiary hospitals were inadequate. There is also a need for investment so that a cytology technician or histo-pathologist should be available in all facilities. For any cervical cancer screening program to be effective, every hospital must have a resident pathologist and gynecologist to avoid costly referrals to tertiary hospitals.

We have reported that out of 232 hospitals most of them were found equipped with examination room, gloves and autoclaves, while these basic facilities were found to be significantly lacking in the 80 PHCs surveyed from Delhi-NCR region. Basic testing/cyto-pathology laboratory was found available in 82% of the hospitals whereas only 24% PHCs were found equipped with it. A majority of hospitals from the Private sector were found with all basic infrastructural facilities in comparison with the Govt. hospitals. Similarly, 83% of Private hospitals were found to be equipped with basic testing/cyto-pathology laboratory whereas only 43% Govt. hospitals had such laboratory facility.

The global evidence demonstrates that the key to reducing cervical cancer morbidity and mortality is early detection coupled with timely treatment of cervical pre-cancerous lesions. Cervical Cancer usually develops very slowly. It starts as a precancerous condition called dysplasia/intraepithelial neoplasia. This precancerous

lesion can be detected by Pap smear and is 100% treatable. With improved technology it is usually detected at a very early stage (Rajesh Dikshit et al., 2012). Cervical cytology, often referred to as the Pap smear test, is perhaps the most well known of available screening methods. However, other screening techniques such as visual inspection methods and HPV-DNA testing have also demonstrated potential for early detection in many settings. These technologies are currently being assessed by the Alliance for Cervical Cancer Prevention (ACCP) for their use in developing countries. As critical as detection is, the need for women with positive results to receive adequate and timely treatment for dysplasia, is paramount. Even in low resource settings, treatment can be offered using low morbidity outpatient procedures such as cryotherapy or Loop Electrosurgical Excision Procedure (LEEP) (ACCP, 2004).

According to the study of Sherris et al, 2009, Pap test screening programs are effective in high-income countries (HIC), but health systems in developing countries are ill-equipped to effectively provide Pap screening to all women, as they are hindered by the challenges of reaching target populations, carrying out appropriate testing and follow-up of women who need treatment. Today, highly effective alternative low-cost screening approaches and early treatment technologies are available, which are appropriate for low- and middle-income countries (LMIC). These tools and approaches resolve many obstacles that prevented Pap-based screening programs from being effective in these countries. VIA, VILI and HPV-DNA testing offer new options for screening. These can be immediately followed by cryotherapy, a highly effective and low-cost approach for early treatment. These tools allow for combined screening and treatment, known as the screen-and-treat approach that can be performed at the same sitting (Denny et al., 2005). Hence, there is a need to design an effective screening and treatment strategy that targets high-risk women once or twice in their lifetime, using a highly sensitive test, with emphasis on high coverage (>80%) of the targeted population (Sankaranarayanan et al., 2001).

Evidence shows that the sensitivity for VIA and VILI screening are comparable to that of cytology method. When physicians and mid-level workers were properly trained and supervised, VIA showed a sensitivity from 41% to 79% (Almonte et al., 2007; Sankaranarayanan et al., 2005a), and VILI presented a sensitivity from 57% to 98% (Sankaranarayanan et al., 2005b). A recent large study in India reported about a 50% reduction in cervical cancer incidence and mortality following a programme strategy based on a single round of HPV testing. However, no similar benefit was seen with strategies based on a single round of VIA or Pap screening (Sankaranarayanan et al., 2009). In the present study, we have reported that 53% Private hospitals, surveyed in Delhi-NCR region, were having the facility for HPV-DNA test as compared to just 11% hospitals with this facility in the Govt. sector.

In our study we also reported that the facilities for screening and treatment for cervical cancer were grossly lacking in PHCs as compared to the hospitals in Delhi-NCR region. 92.7% hospitals were found to be

equipped for conducting the Pap test, 50% were found having VIA test, while 48% hospitals had the HPV-DNA testing facility. For the treatment of pre-cancer cervical lesions, 60% hospitals were found to have the facility for doing tissue-biopsy and cryosurgery whereas facility for conducting LEEP was found only in 25% hospitals. It was observed that 94% hospitals of the Private sector had the facility for conducting the Pap test, whereas only 33% facilities from the Govt. sector were equipped with this facility. The screening facilities for detecting cervical cancer were more prominently available in health centers of Private sector in comparison with those of Govt. sector. All hospitals surveyed in Gautam Budh Nagar were having the Pap-test facility, whereas only 80% hospitals from Ghaziabad had this facility. It was also noted that 55% hospitals from Delhi were having the HPV-DNA test facility, whereas only 27% hospitals from Ghaziabad had facility for conducting this test.

Similar to our findings, a study by Dabash et al, 2005 has reported that there was lack of routine screening offered to asymptomatic women in healthcare facilities, with the exception of a few private providers and military hospitals from three district of Uttar Pradesh: Lucknow, Agra and Saharanpur. In the Public sector, Pap test were mostly limited to the tertiary care level on an outpatient basis, and usually only offered to women with symptoms of reproductive tract infections or advanced cervical cancer. Moreover, equipment and services for diagnosis and treatment of precancerous lesions, including colposcopy and cryotherapy were readily available in military sector facilities and a few private facilities, yet rarely available or functioning at public tertiary health centers. Some centers had cryotherapy equipment but were only using it to treat 'cervical erosion'. Health personnel at these centers were not aware that it could be used to treat cervical pre-cancer. Thus, in the Public sector and in many Private facilities, invasive inpatient procedures such as hysterectomy were the first line of treatment and management of women with pre-cancer, even for mild dysplasia.

In our study, out of 590 respondents, 261 were from the hospitals/PHCs where screening and treatment facilities for cervical cancer were found to be lacking, and they reported to have the referral policy for recommending the patients to get screened or treated in other hospitals. According to the majority of respondents from hospitals/PHCs where the screening and treatment facilities were found to be lacking, lack of existing policy on preventive oncology, lack of initiatives from the concerned authorities and lack of funds were found to be the major reasons for not having adequate facilities in their health centers. According to 101 respondents, lack of awareness that cervical cancer is treatable in its early stages, lack of initiatives for preventive oncology, lack of funds and inappropriate utilization of funds were the major reasons for not having treatment facilities at their hospitals for the treatment of cervical precancerous lesions.

On the other hand, a study by Dabash et al, 2005 has reported that most gynecologists in Public and Private Facilities felt competent in taking cervical samples for Pap test but said that they generally referred clients to pathology laboratories for the pathologists, residents or

technicians to take the cervical sample. Some reported doing so for their own convenience while others believed that laboratory personnel were better suited to take smears. Observations and provider interviews suggested that at least some of the cervical samples collected were of poor quality due to noted gaps in provider practices, such as using cotton swabs to collect samples or improper collection of the cervical smear. Mid-level and nursing staff rarely knew the difference between cervical pre-cancer and cancer or about stage-appropriate treatments. Additionally, few Public sector providers had been trained or had access to Colposcopes for cervical cancer diagnosis. Access to and knowledge of the value of simple and effective pre-cancer treatments such as Cryotherapy and LEEP were also limited among providers in the Public sector, but considerably better among Private and Military sector providers and Public sector Oncologists and Radiotherapists.

Conclusion: As till date no therapeutic HPV vaccines are available, secondary prevention in the form of screening and treatment of early precancerous lesions continues to be the most effective way to reduce the incidence of cervical cancer. Findings of the strategic assessment of the present study reveal the need for policies and interventions to expand women's access to cervical screening and treatment facilities. In his regard, India is not different from other low resource settings, where programs are lacking or failing due to inadequate legislative and regulatory frameworks. The present has clearly shown that there is an acute shortage of Gynecologists in PHCs, while both hospitals and PHCs have fairly good number of trained Paramedical staff. There is an urgent need of recruitment of trained staff at PHCs and Govt. hospitals for the early detection, as well as for the treatment of cervical cancer. The facilities for both screening and treatment of cervical cancer were found to be significantly lacking in the 80 PHCs as compared to hospitals surveyed in Delhi-NCR region. Every woman has the right to cervical screening at least once in her lifetime and the most optimal age for screening to achieve the greatest public health impact is between 30 and 40 years. Cytology-based screening programs using Pap-smears have been shown to be effective in developed countries but it is difficult to sustain high quality cytology programs in developing countries. Therefore, in situations where healthcare resources are scarce, resources should be directed towards alternative cost-effective strategies that are more affordable and for which quality can be assured.

This survey also brings to light that the lack of a functional policy on preventive oncology, lack of initiatives from the concerned authorities, lack of awareness that cervical cancer is fully treatable in its early stages and lack of funds are the major reasons for not having adequate screening and treating facilities in Govt. and rural health centers.

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References

- Alliance for Cervical Cancer Prevention (ACCP) (2004): Planning and Implementing Cervical Cancer Prevention and Control Programs: A Manual for Managers Seattle: ACCP.
- Almonte M, Ferreccio C, Winkler JL, et al (2007). Cervical screening by visual inspection, HPV testing, liquid-based and conventional cytology in Amazonian Peru. *Int J Cancer*, **121**, 796-802.
- Asthana S, Satyanarayana L (2013). Factors associated with attitudes of rural women toward cervical cancer screening. *India J Commun Med*, **38**, 246-8.
- Chirenje ZM, Rusakaniko S, Kirumbi L, et al (2001). Situation analysis for cervical cancer diagnosis and treatment in East, central and Southern African countries. *Bull WHO*, **79**, 127-32.
- Coskun S, Can H, Turan S (2013). Knowledge about cervical cancer risk factors and pap smear testing behavior among female primary health care workers: a study from south Turkey. *Asian Pac J Cancer Prev*, **14**, 6389-92.
- Dabash R, Vajpayee J, Jacob M, Dzuba I, et al (2005). A strategic assessment of cervical cancer prevention and treatment services in 3 districts of Uttar Pradesh, India. *Reprod Health*, **2**, 11.
- Denny L, Kuhn L, De SM, et al (2005). Screen-and-treat approaches for cervical cancer prevention in low-resource settings: a randomized controlled trial. *JAMA*, **294**, 2173-81.
- DN, Shet AS, Gelband H, Jha P; Million Death Study Collaborators (2012). Cancer mortality in India: a nationally representative survey. *Lancet*, **379**, 1807-16.
- Ferlay JBF, Pisani P, Parkin D (2010). Cancer incidence, mortality and prevalence worldwide. Lyon, France7.
- Ghotbi N, Anai A (2012). Assessment of the knowledge and attitude of female students towards cervical cancer prevention at an international university in Japan. *Asian Pac J Cancer Prev*, **13**, 897-900.
- GLOBOCAN (2012). Cancer Incidence and Mortality Worldwide: IARC Cancer Base No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer.
- Antic LG, Djikanovic BS, Antic DZ, Aleksopoulos HG, Trajkovic GZ. (2014). Differences in the level of knowledge on cervical cancer among health care students, midwives and patients in Serbia. *Asian Pac J Cancer Prev*, **15**, 3011-5.
- Sankaranarayanan R, Ferlay J (2006). Worldwide burden of gynaecological cancer: the size of the problem. *Best Pract Res Clin Obstet Gynaecol*, **20**, 207-25.
- Sankaranarayanan R, Budukh AM, Rajkumar R (2001). Effective screening programmes for cervical cancer in low- and middle-income developing countries. *Bull WHO*, **79**, 954-62.
- Sankaranarayanan R, Gaffikin L, Jacob M, et al (2005). A critical assessment of screening methods for cervical neoplasia. *Int J Gynaecol Obstet*, **89**, 4-12.
- Sankaranarayanan R, Nene BM, Dinshaw KA, et al (2005). A cluster randomized controlled trial of visual, cytology and human papillomavirus screening for cancer of the cervix in rural India. *Int J Cancer*, **116**, 617-623.
- Sankaranarayanan R, Nene BM, Shastri SS, et al (2009). HPV screening for cervical cancer in rural India. *N Engl J Med*,

Shanta V, Krishnamurthi S, Gajalakshmi CK, Swaminathan R, Ravichandran K (2009). Epidemiology of cancer of the cervix: global and national perspective, *J Indian Med Assoc*, **98**, 49-52.

Sherris J, Wittet S, Kleine A, et al (2009) Evidence-based, alternative cervical cancer screening approaches in low-resource settings. *Int Perspect Sex Reprod Health*, **35**, 147-54.

Thippeveeranna C, Mohan SS, Singh LR, Singh NN (2013). Knowledge, attitude and practice of the pap smear as a screening procedure among nurses in a tertiary hospital in north eastern India. *Asian Pac J Cancer Prev*, **14**, 849-52.

WHO (2010). Human papillomavirus and related cancers. summary report update. India. WHO/ICO HPV Information Center.