

ORIGINAL ARTICLE

DIAGNOSTIC DELAY IN ONCOLOGY: IS THERE A NEED FOR INCREASING CANCER AWARENESS AMONG PRIMARY CARE PHYSICIANS OF INDIA?

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ABSTRACT:

OBJECTIVE: To analyze the factors contributing to delay in diagnosis and initiation of cancer treatment, and evaluate the influence of such delay on treatment intent.

METHODS: All cancer patients referred to the Regional Cancer Centre at our institute through primary care physicians in December 2014 were included in this prospective audit. Details regarding date of first cancer related symptom noticed by the patient, date of first consultation with primary physician and date of first oncology consultation were collected. They were prospectively followed up and date of initiation of first cancer directed therapy and intent of treatment (curative/palliative) were recorded. Delay intervals on behalf of patient, primary care physician and treating oncologist were analyzed and correlated with treatment intent using multivariate analysis.

RESULTS: Median total delay before treatment initiation was 6 months. Maximum contribution to the delay was by the patient (median, 4 months). Median delay in referral by primary physicians was 3 weeks, but it ranged from less than a week to up to 5 years in some cases. Oncologists contributed to a median delay of 10 days. Shorter delays were observed for brain and lung cancers, while longest for head and neck cancers. Significant correlations were observed between patient delay and education status ($p=0.03$), physician delay and rural habitat ($p=0.02$), oncologist delay and cancer site ($p=0.01$). Overall delay was a significant factor determining the intent of treatment ($p=0.001$).

CONCLUSION: Overall delay has a significant impact on the intent of treatment eventually received by patients. Delays on behalf of patient and primary care physician have significant contribution to overall delay. Apart from educating the population regarding cancer symptoms, increasing awareness among primary care physicians regarding the need for early diagnosis and referral to tertiary centers might improve overall diagnostic delay.

Key words: diagnostic delay, oncology, developing countries, primary physicians, cancer awareness

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Introduction:

Advanced stage at diagnosis is considered as the most important prognostic factor associated with poorer outcomes for most of the malignancies [1]. Apart from amenability, tolerance of patients to radical therapies like surgery, chemotherapy or radiotherapy will be better when cancer is diagnosed at early stages. However, a large proportion of cancers in developing countries are diagnosed at an advanced stage [2].

Among the various factors contributing to this delay in diagnosis and initiation of cancer directed therapies, lack of cancer awareness among the general population leading to delay in approaching a physician, and limited availability of screening methods are frequently implicated [World Health Organization. Cancer control: knowledge into action: WHO guide for effective programmes. World Health Organization; 2006]. However, there are numerous weak links, like lack of awareness among primary care physicians, inadequate referral systems, limited availability of resources leading to delay in initiation of therapies etc., which might potentially affect the outcomes of these patients [3].

There are numerous studies in literature reporting variable results regarding delays in different cancer sites and their effects on overall outcomes [4-9]. However, heterogeneous data is available in terms of factors leading to such delays and strategies to overcome the hurdles [10-12]. Moreover, most of these studies were from developed countries, and their results cannot be extrapolated to developing countries with significant socioeconomic, demographic and cultural differences.

The purpose of our study is to analyze the factors contributing to delay in diagnosis

and initiation of treatment of cancer in developing countries, and to evaluate the influence of such delay on the intent of treatment eventually received by the patients – curative versus palliative.

Material and Methods:

All the cancer patients referred to the Regional Cancer Centre at our institute in December 2014 by primary care physicians were considered for this prospective questionnaire based study. Those patients who approached a tertiary care centre or an oncologist directly were excluded. Apart from the demographic data, details regarding the date of first cancer related symptom noticed by the patient, date of first consultation with a primary care physician and the date of first oncology consultation were collected. These patients were prospectively followed up and the date of initiation of first cancer directed therapy (surgery or radiotherapy or chemotherapy) and the intent of treatment (curative or palliative) were recorded.

The term ‘delay’ was used to quantify different time intervals. The interval between the onset of first symptom and the date of starting cancer directed therapy was calculated as ‘total delay’. It was further subdivided into ‘patient delay’ which indicates the time taken by the patient to consult a primary physician after the onset of first cancer related symptom; ‘physician delay’ which is the time taken by the primary care physician to diagnose and refer the case to an oncologist; and ‘oncologist delay’ which depicts the time taken by the oncologist for staging and initiation of cancer directed therapy after the diagnosis. All the time intervals were measured in weeks to cater for recall bias; however, the data is presented in months whenever possible, for easy comprehension.

Analysis was done using SPSS, version 22. A p-value of less than 0.05 was considered for statistical significance. Delay data was analyzed as mean, median and range. Multivariate analysis was used to signify the contribution of each component of delay in total delay; and to analyze the influence of various demographic and socioeconomic factors on various components of the delay. Since multiple cancer types with different natural histories have been included in this analysis, measurement of cancer related outcomes and their correlation with the delays was deemed inappropriate and beyond the scope of our study; however, as a secondary end point, intent of cancer directed therapy received by the patient (curative versus palliative) was correlated with various components of the delay using multivariate analysis.

Results:

Demographic profile of the 162 patients that were included in our study is presented in table 1. Median age of the patients was 52 years (Range, 3 – 85). About 35% of the patients in our study belonged to geriatric age group. Majority of the patients were male (59.3%). Approximately one third of the patients resided in rural areas. About 35% of the patients in our study were designated ‘below poverty line’, and received subsidized treatment from the institute. Only 53.7% are literate - with the ability to read, write and understand at least one language. Head and neck cancers were the most common, followed by gastrointestinal cancers. Among these, only 52.5% were eventually treated with curative intent; 32.1% of the patients received some form of palliative cancer directed therapy, while the remaining 15.4% were suitable only for best supportive care.

Table 2 shows different components of delay for the study population. Overall, the

Variables	N (Number)
Age (years)	
Median	52 (range, 11-85)
Less than 60 years	105 (64.8%)
60 years or more	57 (35.2%)
Male	96 (59.3%)
Female	66 (40.7%)
Income level	
Above Poverty Line	105 (64.8%)
Below Poverty Line	57 (35.2%)
Rural	53 (32.7%)
Urban	109 (67.3%)
Literate	87 (53.7%)
Illiterate	75 (46.3%)
<u>Cancer site</u>	
Head and neck	49 (30.2%)
Gastrointestinal	27 (16.7%)
Hepatobiliary	11 (6.8%)
Brain tumors	20 (12.3%)
Breast	18 (11.1%)
Gynecological	15 (9.3%)
Lung	10 (6.2%)
Sarcoma	5 (3.1%)
Hematological	4 (2.5%)
Genitourinary	3 (1.9%)
<u>Treatment intent</u>	
Curative	85 (52.5%)
Palliative	52 (32.1%)
Best supportive care	25 (15.4%)

Table 1: Demographic profile of the patients

median total delay was 6 months (Range: 0–121). Maximum median delay was on the patients’ behalf (4 months; Range 0 - 60). Median delay by the primary care physician was three weeks; however, it ranged from less than one week to more than 5 years in some cases. Median delay on behalf of the

Table 2: Delay (in months) for all cancers in the study

	Patient delay (Months)	Physician delay (Months)	Oncologist delay (Months)	Total delay (Months)
Median ± SD	4 ± 9.3	0 ± 7.09	0 ± 0.64	6 ± 15.03
Range	0 – 60	0 – 61	0 – 4	0 - 121

Table 3: Contribution of each component of delay to total delay

Type of delay	Number of patients with delay ≤ 1 month	Number of patients with delay > 1 month	Significance of contribution to total delay (p value)
Patient delay	22 (13.6 %)	140 (86.4 %)	0.00001
Physician delay	125 (77.2 %)	37 (22.8%)	0.03
Oncologist delay	153 (94.4 %)	9 (5.6 %)	0.34
Total delay	14 (8.6 %)	148 (91.4 %)	

oncologist was 10 days (1.5 weeks).

As seen in table 3, only 14 patients (8.6%) could be started on cancer directed treatment within 1 month of symptom onset. Delay on behalf of patients in approaching primary care physician was the most significant factor contributing to total delay (p = 0.00001). Only 22 patients (13.6%) reached a physician with their health complaints within 1 month of onset of their symptoms.

Another significant component of the total delay was due to the primary care physicians, in evaluation, diagnosis and referral to a trained oncologist (p = 0.03). Present study shows that primary care physician associated delay of more than one month was present in 22.8% of the patients.

However, contribution of the oncologist to total delay did not reach statistical significance, as compared to the other components, as 153 patients (94.4%) were worked up and started on cancer directed treatment within 1 month of referral to the oncologist.

Shortest total delay was seen among the patients with brain tumors (median 2.5

months), followed by patients with lung cancer (median 3.5 months). The longest total delay was found among patients with sarcomas (median 9 months) followed by head and neck cancers (median 7 months).

As seen in Table 4, age, gender and income had no significant correlation with the total delay or its components, on multivariate analysis. However, significant correlation was found between patients literacy status and delay on his account in reaching a primary physician (p = 0.03). Similarly rural patients were more likely to have physician associated delay in referral, compared to urban patients (p= 0.02). Also, correlation is found between the site of cancer and delay in start of treatment by the oncologist, with maximum delay for head and neck cancers followed by gastrointestinal cancers, and minimum delay for breast cancers and sarcomas (p = 0.01). As evident from the table, patients with longer delays were significantly more likely to receive non-curative treatments, compared to those with shorter delays (p = 0.001)

Table 4: Correlation between various factors and delay

Patient factors	Correlation with			
	Patient delay (p value)	Physician delay (p value)	Oncologist delay (p value)	total delay (p value)
Age	0.90	0.12	0.90	0.96
Sex	0.63	0.26	0.64	0.87
Income	0.19	0.44	0.90	0.08
Education	0.03	0.06	0.90	0.40
Rural or urban	0.31	0.02	0.44	0.73
Cancer site	0.07	0.44	0.01	0.33
Treatment intent	0.06	0.08	0.87	0.001

Discussion:

Most of the studies in literature reporting delays in diagnosis and initiation of treatment are site specific, and reflected the efficiency of health infrastructure of developed countries [4-12]. Our study, on the other hand, has a heterogeneous population including various sites of cancer, and hence more appropriate for analyzing the general awareness regarding cancer in the public as well as among the primary care physicians of developing countries, so that appropriate measures can be implemented to overcome those hurdles in a cost effective manner.

We found a median total delay of 6 months from onset of first symptom to the start of cancer directed treatment. Delay on behalf of the patient in approaching a physician accounts for most of the total delay, as can be expected from inadequate cancer screening and awareness programs in developing countries.

Interestingly, there was a significant contribution to the total delay on behalf of the primary care physicians. Similar results have been found by studies by Allgar et al [13] and Hansen et al [14] even in developed countries like UK and Denmark

respectively. This reflects an urgent need for increasing awareness regarding cancer and the importance of early diagnosis among the primary care physicians, especially in developing countries where resources for widespread screening programs to enhance early diagnosis are often limited.

Our study identified a significant correlation between total delay and intent of treatment received by the patient. Those with shorter delays were more likely to receive curative treatments, probably because of earlier stage at diagnosis. In a heterogeneous data with short follow up, this might be considered as a surrogate for favorable outcomes.

In our study, the shortest delay in start of treatment was seen for brain and lung malignancies, with median delay of 2.5 months and 3.5 months respectively. Gherasim et al reported positive association between shorter delay in diagnosis and favorable neurological outcomes for brain tumors [15]. Shorter delays for brain tumors are expected, since most patients manifest with severe headaches, vomiting or seizures that can rarely be missed or managed completely by a primary physician without diagnostic imaging. Moreover, surgery for most brain tumours is both diagnostic and therapeutic, thereby reducing the delay

between diagnosis and initiation of cancer directed treatment.

Hansen et al reported a median delay of 108 days in lung cancers, which accords with our study [14]. Easy availability and frequent utilization of radiological imaging may account for minimized physician related delays and early referral, thereby making delayed consultation of physician by patients the primary cause for overall delay and a potential target for intervention.

Head and neck cancers, which account for majority of cases in developing countries, had the longest delay in our study (median, 7 months). Multiple studies have reported inferior outcomes in head and neck cancers with longer delay intervals [16-18]. A significant component of this delay was on patients' behalf (median, 6 months). Low socioeconomic status and illiteracy leading to lack of awareness among the population is probably the most common reason for this delay. Furthermore, non specificity of most of the early symptoms of head and neck cancer might have resulted in negligence, leading to delayed consultation with physicians even in educated cohorts.

Delay on behalf of the primary physicians in diagnosis and referral ranged up to 8 months in some cases of head and neck cancer. Inability to recognize premalignant and early malignant lesions or lack of awareness regarding importance of early referral to tertiary centers for initiation of cancer directed therapies might be a significant factor leading to delay by primary care physicians. Time for staging evaluation and endoscopic assessment further contributes to the delay by the oncologists in the already overburdened tertiary care centers. Additional delay in treatment initiation is caused by the limited availability of surgical and radiation facilities in tertiary care

centers, which are the prime modalities of treatment for head and neck cancers.

Analysis of demographic factors and their association with various components of delay provides interesting insights that help identifying potential areas of intervention by policy makers. Literate patients were more likely to have an early consultation with a primary physician according to our study, consistent with the analysis by Montella et al [19]. Physician related delay was longer for rural patients compared to urban population, reflecting availability of better diagnostic facilities and proximity of tertiary care and specialist services.

Similar to the study by Burgess et al [20], there was no significant difference in delay in geriatric patients in our study, though some studies [13, 19] have observed association between longer delays and old age. These variations across different studies could only be explained by differences in the prevailing cultural and social factors indigenous to the regions of those studies. Marital status had no significant correlation with any component of delay in our study, in accordance with the study by Ramirez et al [10]. Unlike some western studies [10, 20] which reported no significant effect of low socioeconomic status on overall delay, a significant association was found in our study; however, this was limited only to breast, colorectal and gynecological primaries.

The weakest link in this diagnostic chain is the population at risk. Socio-economic constraints of developing countries often present a hurdle for early diagnosis of cancer by secondary preventive strategies like screening. In such scenarios, increasing awareness regarding risk factors and cancer related symptoms among the people might be an effective complimentary strategy to

decrease diagnostic delays of common cancers.

Though seldom studied, lack of awareness among the primary physicians regarding importance of early diagnosis and referral, should be addressed at a grass root level, by adequately incorporating basics of oncology into the undergraduate medical educational curriculum as well as updating the physicians on advances in screening and diagnosis of cancer in general, with particular attention to the commonest cancers of the developing countries.

Delay in initiation of treatment at tertiary centers can further be improved by optimal utilization of available resources using standard protocols and implementing triage whenever required. Nevertheless, importance of development of basic infrastructure at peripheral level and enhancement of tertiary care centers by policy makers cannot be overemphasized.

Being a prospective audit limited by the number of suitable cases that were registered in a month's duration, this study provides insight into the general trends in the community surrounding the area of study. Need for further analyses at multiple centers all over the country for appropriate planning and policy making cannot be overemphasized.

Conclusion:

Overall delay in initiation of cancer directed therapy has a significant impact on the intent of the treatment eventually received by patients. Patient delay and physician delay have significant contribution to the overall delay. Apart from educating the population at risk regarding cancer related risk factors and symptoms, increasing awareness among the primary care physicians regarding the

need for early diagnosis and referral to tertiary centers might improve the overall diagnostic delay. We believe such sustained increase in the awareness among primary care physicians could only be achieved by increasing oncology teaching hours in undergraduate curriculum, and mandating targeted continuing medical education sessions for primary care physicians – potential strategies possible only through appropriate policy making.

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