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BUILDING AN AYURVEDA THERAPY DATA WAREHOUSE FOR CANCER TREATMENT

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ABSTRACT

This research paper presents architecture for health care data warehouse for cancer treatment which could be used by Ayurveda practitioners to support the healthcare process of the cancer patients. The line of treatment (data) of Ayurveda practitioners exist in multi sources with different formats make it necessary to have some techniques for data integration. Ayurveda practitioners need access to previous information so that they can decide the further line of treatment. Timely and accurate information (various test reports of the patient) is one of the most important factors to a health care organization. A health care data warehouse for cancer treatment is therefore necessary to integrate the different data sources into a central data repository and analysis this data. The objective of this paper is to show the contribution of a cancer data warehouse in solving cancer care management problems. The ability to research various conditions, evaluating medical procedures and protocols to define statistically optimal outcomes is an incredibly powerful tool to improve the efficiency and quality in an Ayurvedic cancer treatment.

KEYWORDS

ayurveda therapy, components of cancer health data, data warehouse architecture, health care data warehouse and cancer, flow of treatment.

1. INTRODUCTION

The healthcare industry is one of the world's largest, fastest-developing and most information rich industries. The growing need for integrated healthcare has led this industry to open towards adoption of extensive healthcare decision support systems. Information technology in health care is still a topical subject, has stimulated developments in physician order entry, decision support systems and shared patient records. Despite all the efforts, many health care organizations still have stand-alone information systems that do not communicate with each other. More importantly, clinical information systems (CIS) such as electronic patient records, are often designed to support hands-on care for individual patients, but are not well suited for analyses on an aggregated level, for example on group of patients with same disease.

Patients who present with cancer have three basic options for treatment. The first and the most conventional treatments utilize chemotherapy, surgery and radiation. Second are a wide range of alternative therapies like Ayurvedic treatment of cancer, and third is a combined approach. There are benefits and challenges regardless of which decision is made. Conventional treatments for cancer have varying success rates. For some cancers, when caught early, conventional therapies do have a high success rate. Success decreases as the cancer progresses.

Cancer usually spreads very fast and a patient can meet death in less than 6 months. Therefore, remedial measures need to be undertaken as soon as cancer is detected in the body. Various remedies available for cancer either try to put a check on the duplicating process of the mutant cells at genetic level or kill the entire collection of affected cells.

The process, whether done chemically or through radiation, always runs the risk of affecting the neighboring normal cells. Further, there are always significant side effects involved, which include hair loss, skin rashes, body pain, loss of body weight, weakness and debility, loss of appetite, diarrhea, bleeding and impotence. Presented paper studies the impact of Ayurveda treatment on cancer in following terms

- I. Success rate in specific type of cancer.
- II. Success rate in specific stage of cancer.
- III. Which treatment is applicable (suitable) depends on type & stage of cancer.

2. THE AYURVEDIC PERSPECTIVE

The word 'cancer' may be new to the 5,000 year old Indian system of medicine, Ayurveda, which relies on natural substances for healing. But ancient Ayurvedic classics are aware of the clinical features, resembling cancer, with the names such as *Apachi*, *Gulma*, *Granthi*, and *Arbuda*. The following are the names of select conditions mentioned in Ayurvedic classics that have relevance to cancer manifestations in modern medicine.

TABLE 1: MODERN MANIFESTATIONS OF CLINICAL FEATURES DESCRIBED IN AYURVEDIC TEXTS

Manifestations in Ayurveda	Manifestations in Modern Medicine
<i>Pandu</i>	Leukemia
<i>Apachi</i>	Hodgkin's Disease
<i>Stanarbuda/Agantuja Stanaroga</i>	Breast Cancer
<i>Raktagulma</i>	Tumors of Uterus / Ovary
<i>Rakta, Mamsaja, Medoja, Oshtha Roga</i>	Carcinoma of Lips
<i>Kachchapa, Raktarbuda, Mamsa Sanghata</i>	Carcinoma Palate
<i>Swarabhanga</i>	Tumors of Larynx
<i>Rakta pitta, Pandu</i>	Various Type of Leukemia

3. WHAT AYURVEDA CAN DO?

The excruciating experience of dying cancer patients can be ameliorated by making use of Ayurvedic principles. Ayurveda can be helpful in the management of cancer in many ways such as—prophylactic, palliative, curative and supportive. Ayurvedic medicines help to improve the quality of life of the patients as listed below:

Ayurvedic preparations can act as an adjuvant or a co-therapy along with chemotherapy or radiotherapy. It is also helpful in post-surgery care.

- Ayurvedic medicines help to minimize the side effects of these therapies.
- Ayurveda helps in reducing the therapeutic dose of the various drugs used as proved in some studies using cow urine.
- Ayurvedic preparations help to slow the progress of cancer in cases where chemotherapy, radiotherapy or surgery is contra-indicated, due to some reasons and patients have no other choice.
- The cell-protective activity of drugs prescribed in *rasayana* therapy helps to improve comfort and the quality of life of individuals with cancer.

According to Ayurveda the definition of any disease is dosh, dushya, sammurchana, janito vyadhi i.e. when tridosha (Vatha, Pitta and Kapha) single or in combination become pathological and when they intensely get mixed with one or more dushya i.e. one of the seven datu's (ras, rakta, mouse, med, asthi, majja, shukra) disease (vyadhi) occurs. One more very concise definition of disease is 'कुपितानाम हि दोषानाम शरीरे परि, धावताम यत्र संघा ख वैगुण्यात व्याधी ही तत्रोपजायते'

When tridosha become prakupit and there is khavaigunya (pathology in a system) i.e. viguna strotas and prakupit dosha unites then disease is formed, this is applicable to cancer also. In Ayurveda three types of major treatments are described

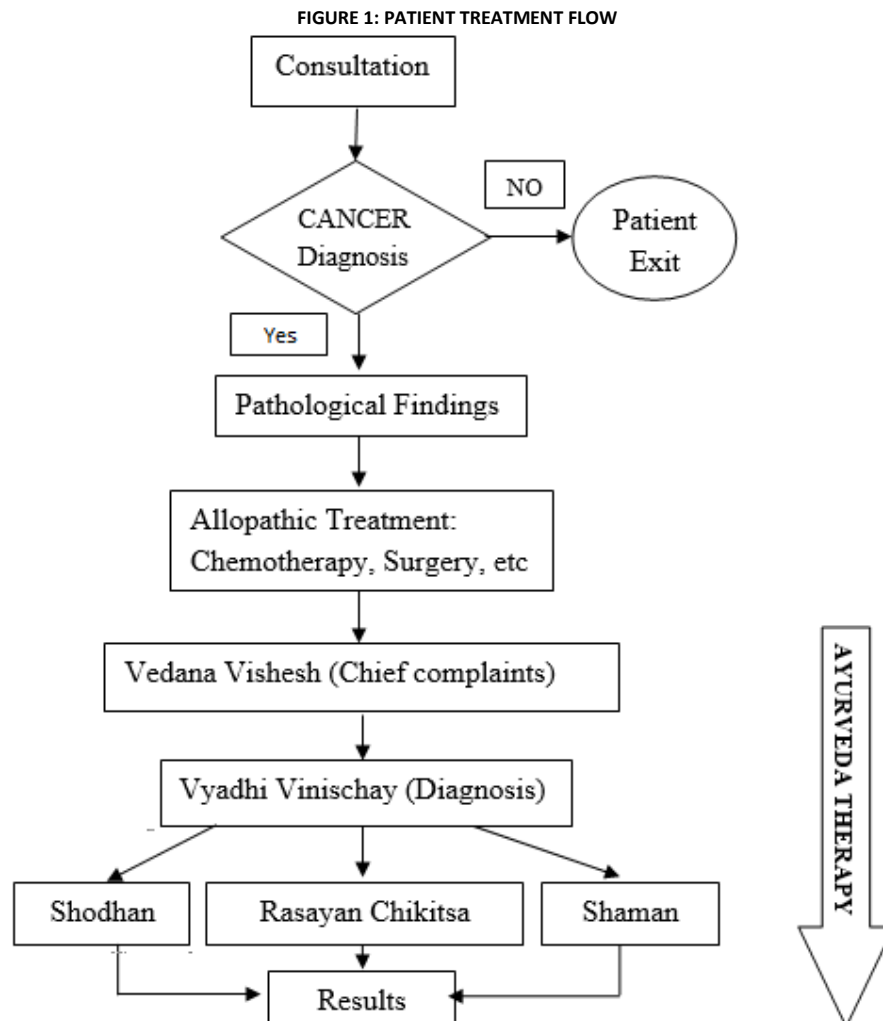
1. **Shaman:** It is a medicinal treatment which brings prakupit dosh to normal state and it also involves specific aahar (diet) and vihar (activity).
2. **Shodhan (i.e. Panchkarma):** This is procedural treatment which eradicates prakupit dosha from body and it involves five types of therapies (charak and sushrut) as illustrated in fig.2.
3. **Rasayana chikitsa:** It restores sapta datu and system to normal state.

4. FLOW OF CANCER TREATMENT

In this phase the patient is submitted to a series of examinations of pathological anatomy, clinical pathology, radiology, among others, to detect the localization and evolution of the illness.

After these examinations, if the localization, stage and diagnosis of the cancer identified. Only then treatment of cancer that corresponds, predominantly, to a surgery, applications of radiotherapy and chemotherapy initiate as shown in figure 2.

Figure1 also depicts that if the patient is taking Ayurvedic treatment as an alternative therapy along with the cycle of chemotherapy or any allopathic treatment suggested by oncologist.

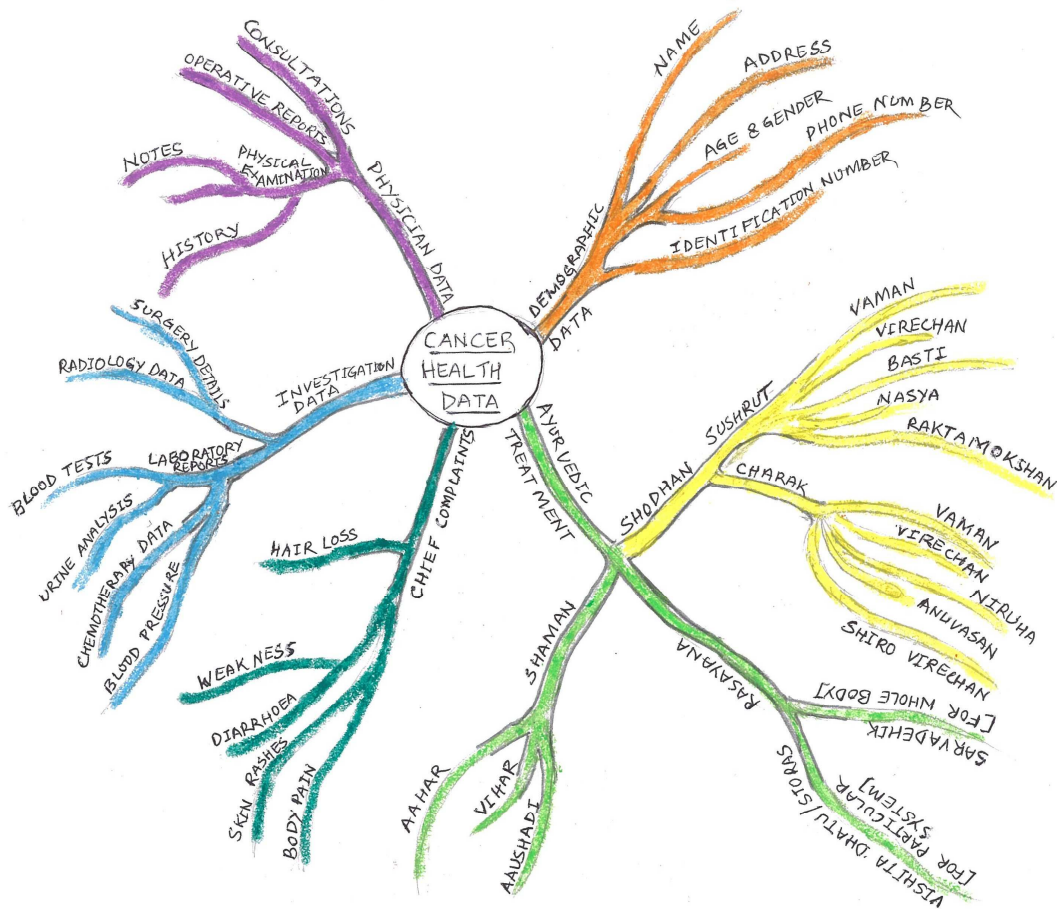


5. BUILDING CANCER DATA WAREHOUSE

Ayurvedic healthcare processes of cancer patient involve a series of patient visits for treatment or a series of outcomes. The modeling of outcomes associated with these types of healthcare processes is different from and not as well understood as the modeling of standard industry environments. The process of cancer patient in healthcare can be thought of as a value circle as illustrated in figure 2 the center of this circle are data related to patient various treatment.

The treatment is measured or generated by all the processes around the circle shown in Figure 2. This is quite different from typical processes in other industries, which usually follow a linear chain model in which a product moves through a series of steps from raw material to finished goods or from customer order to delivery.

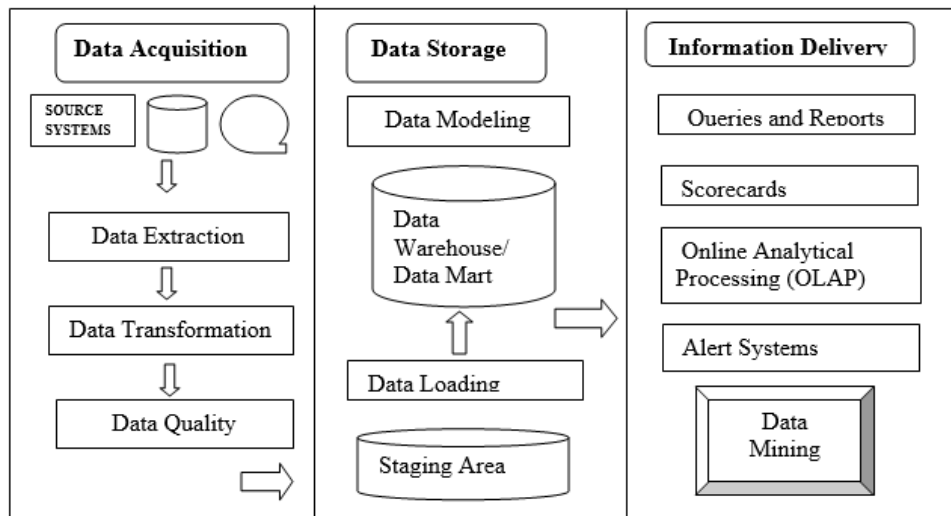
FIGURE 2: COMPONENT OF CANCER HEALTH DATA



6. ARCHITECTURE DESIGN OF DATA WAREHOUSE

Figure 3 illustrates the overall architecture of the propose healthcare data warehouse specific to Cancer. Data is imported from several sources as mention in Figure 2 and transformed within a staging area before it is integrated and stored in the production data warehouse for further analysis.

FIGURE 3: DATA WAREHOUSE ARCHITECTURE



Source: Data Warehousing – Fundamentals for IT Professional by Paulraj Pooniah Page 185

In general, all data warehouse systems have the following architecture:

DATA ACQUISITION**SOURCE SYSTEM**

This represents the different data sources that feed data into the data warehouse. The data source can be of any format -- plain text file, relational database, other types of database, Excel file, etc., can all act as a data source as shown in Figure 1 and 2.

DATA EXTRACTION LAYER

Data gets pulled from the data source into the data warehouse system. There is likely some minimal data cleansing, but there is unlikely any major data transformation.

DATA TRANSFORMATION

Transform extracted data into appropriate formats. Provide default value as specified.

DATA QUALITY

Assist in locating and correcting data errors. Help resolve data inconsistencies in load images.

DATA STORAGE**Data Modeling**

Enable developers to create and maintain data models for the source systems and the data warehouse target databases.

Data Loading

Load transformed and consolidated data in the form of load images into the data warehouse repository.

Staging Area

This is where data sits prior to being scrubbed and transformed into a data warehouse / data mart. Having one common area makes it easier for subsequent data processing / integration.

INFORMATION DELIVERY**Queries and Reports**

Allow user to produce canned, graphic-intensive, sophisticated reports. It helps users to formulate and run queries.

Scorecards

It provides comparison of current performance against target and past performance. Focus on clarity and ease of use.

Alert System

It provides alerts from the data warehouse database to support strategic decision.

OLAP Layer

This is where OLAP cube is built from the data warehouse which is used further as a basis for various kinds of analysis

7. CONCLUSION

The Ayurvedic healthcare industry is one of the oldest, fastest-developing and information-rich industries for take advantage from this information we have proposed this cancer data warehouse to integrate between the operational database and medical files and therefore the analysis on data makes easy. Then we can analyses the cancer disease, the cost of treatment for this disease, Death rate in specific type of cancer and the impact of a specific Ayurvedic treatment that helps

I. In eliminating toxins through Panchkarma

II. Restoring healthy digestive power function and

III. Rejuvenation through Rasayana

Building data warehouse encounter a several challenges such as the following:

1. Data integration plays the most critical role in a data warehouse Building.
2. Data should be extracted from physical medical files, such as patient medical records, blood tests, urine test results, x-ray results, CT scan results etc., or retrieved directly from the operational medical system.

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