Teaching Case

Improving the clinical-care pathway of an Ayurvedic hospital: a teaching case for developing process improvement capabilities

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Abstract

Business Process Management (BPM) is a topic that has received immense attention in information systems research and practice. While its adoption has been increasing rapidly, many companies struggle to find BPM professionals with the appropriate skills, hence BPM education has been an area of increasing interest as well. One big challenge for BPM education is the lack of teaching resources. Appropriately written BPM teaching cases derived from real-life case scenarios has been recognised as a valuable means to address this gap. Yet, teaching cases that are rich in context dedicated to BPM are still scarce. This teaching case, specifically developed for business process improvement education purposes, is designed as a rich resource to address this gap. Teaching notes with an extensive set of multimedia ancillary material are also available to instructors upon request. This case study is based on a real-life patient-care process of a national Ayurvedic hospital in Sri Lanka. With its position as the leading national institute for Ayurvedic research and teaching, the hospital has the potential to make striding impacts with Ayurvedic innovations both nationally and globally. This narrative describes the current patient-care process in detail, challenging students to analyse the current process and derive justifiable high-impact creative/innovative recommendations that are feasible to the case's context and improve business processes at the hospital.
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Introduction

In any organisation the effectiveness of core business processes is critical to sustained delivery of services and agreeable customer outcomes. As supported by Hellström et al. (2010), this business imperative is justifiably of significant importance in the healthcare industry, especially when organisations are heavily impacted by operational and national constraints. On the basis of this resource-focussed context, Business Process Management (BPM) can provide a 'set of methods, techniques and software tools supporting the design, enactment, control and analysis of operational business processes in order to facilitate an optimised value creation' (Houy et al., 2010: 621). The healthcare industry in particular will benefit from this approach as Osterweil (2011: 187) acknowledges that 'carefully defined processes can be effective tools for guiding and coordinating the actions of healthcare professionals'. This imperative is also driven by

global healthcare challenges such as 'declining resources and increasing patient complexity with an increasing need for high-quality healthcare services' (Helfert, 2009: 937). In this teaching case, the healthcare provider in question (the Navinna Ayurvedic Hospital) is highly constrained in terms of physical, financial and human resources (HR). This necessitates the stringent and targeted application of process improvement methods that support the effective delivery of patient services aligned with the ethos of this organisation. Weerasinghe et al. (2014) view BPM as important for developing nations considering the impact process improvement can bring on these nations.

The rapidly developing nation of Sri Lanka is currently at a crossroads, embracing new Western medical practices while holding true to established, widely accepted and deeply cultural medical programs. The practice of Ayurveda is one such holistic approach to the management of patient well-being that has long been applied with much success. Now, with widespread acceptance both domestically and internationally, the demand for Ayurvedic healing is rapidly increasing.

This case study is based on the leading Ayurveda research institute and healthcare provider: Navinna Ayurvedic Hospital in Sri Lanka. It is a not-for-profit national institution, where, in addition to the provision of patient healthcare services, the hospital plays a vital role in the delivery of much-needed teaching and research programs to advance the quality of Ayurvedic healing and improve patient outcomes. These deliverables must be achieved under tight fiscal constraints from the government as well as increased scrutiny from the community in general, as funding for continued research and practice is always under threat. The fact that the hospital operates on a not-for-profit basis increases the obvious cost and revenue efficiencies they must strictly adhere to.

The appropriate use of 'real-world' teaching cases supports the current challenge of BPM education where there exists a gap in appropriate teaching resources that have been derived from real organisational scenarios. This teaching case (with a detailed supporting resource kit) has been designed to help address this known gap. On the basis of the provided narrative, students are tasked with creating innovative and effective process improvement ideas that support sustainable excellence in the provision of patient services.

BPM is considered as a suitable approach for consolidation and effective management of all patient-care functions to achieve operational efficiencies (Jain, 2009). The effectiveness of automation for patient-care processes has been questioned by the healthcare industry, and BPM has been acknowledged as an alternative for streamlining all healthcare processes. Furthermore, the access to healthcare services located in the urban areas by rural communities has been identified as a critical issue faced by many developing countries (Mitra et al, 2008). The positive results produced by introducing BPM in the public-sector healthcare establishments were reported by Ramani (2004). To advance the practices of the Navinna Ayurveda Hospital and ensure continued quality of healthcare, it is now critical to document and analyse the core business processes of this organisation and establish a set of metrics by which it can be managed. By improving the business operations of the hospital there will be a direct impact upon the national healthcare system, an opportunity to cater for international demand and, most importantly, improved patient outcomes that are sustainable.

Background

According to Obeyesekere (1976), Ayurveda is considered more than a medicine as its base stems from religion and ritual. Before being introduced to Allopathy ('Allopathy' is a term used to refer to the broad category of medical practice that is commonly known as 'Western medicine'), it was Ayurveda that treated the ill of Sri Lanka. At present, a system of plural medicine exists in Sri Lanka where both Western biomedicine and Ayurveda are seen as equal alternate forms of medication. Predominantly, Ayurveda has been identified with wellness and around it have emerged many luxury Ayurvedic solutions for indulgence and pampering. This has succeeded in catering to a domestic market and has also opened avenues for international exposure in terms of Ayurvedic exports and as a means of attracting tourism. Although the practice is gaining popularity globally (and widely used by Sri Lankans), the need for identifying Ayurveda as a holistic medical alternative has been under pressure with Ayurvedic forms of treatment being critically tested on the patient outcomes it delivers.

Bandaranaike Memorial Ayurveda Research Institute (Ministry of Health and Indigenous Medicine, 2015a), based in Navinna, Sri Lanka (also known as the Navinna Ayurveda Hospital) was set up in 1962 as a national research institute for Ayurveda in Sri Lanka. The mission of the hospital is to be the national leader in Ayurvedic research; to be engaged in focussed and well-planned research and development in every aspect of Ayurveda; and to enhance and improve the contribution of Ayurvedic medicine to patient well-being. Apart from the research activities that it conducts, the institute provides services to both out-patients and also has separate wards to cater to patients who need in-house treatment. The hospital is an institution that belongs to the Ministry of Health and Indigenous Medicine of Sri Lanka and comes under the direct purview of the Department of Ayurveda (Ministry of Health and Indigenous Medicine, 2015b).

The hospital runs as a complete not-for-profit organisation. The funding for the hospital comes from the Department of Ayurveda (under the Ministry of Health and Indigenous Medicine). All doctors who practice at the Navinna Hospital have had intensive training at Sri Lankan universities where they have received specialised training in the practice of Ayurveda for at least 6 years. Further, the hospital is also the largest Ayurvedic teaching hospital in Sri Lanka. Other staff members such as the nurses, attendants (also known as health service assistants), pharmacists, research officers and lab assistants are also well-trained professionals in the field who have undergone special training on Ayurveda and are fully qualified in Ayurvedic aspects related to their job roles. A severe shortage of qualified staff who can competently conduct these activities has been an ongoing issue. The hospital currently has 135 personnel, which includes 31 doctors, 8 nurses, 1 sister who overlooks the nurses, 15 ward attendants and 5 kitchen staff among the other staff. Figure 1 provides an overview of the hospital's organisational structure in terms of staff designations at the strategic levels and the different divisions falling under them. The focus of this case is on the patient-care area, hence related roles specific to these tasks are listed further in Figure 1.

Recent organisational performance reviews have highlighted the need for proper formalisation, documentation and rapid review of the business processes undertaken at the hospital.
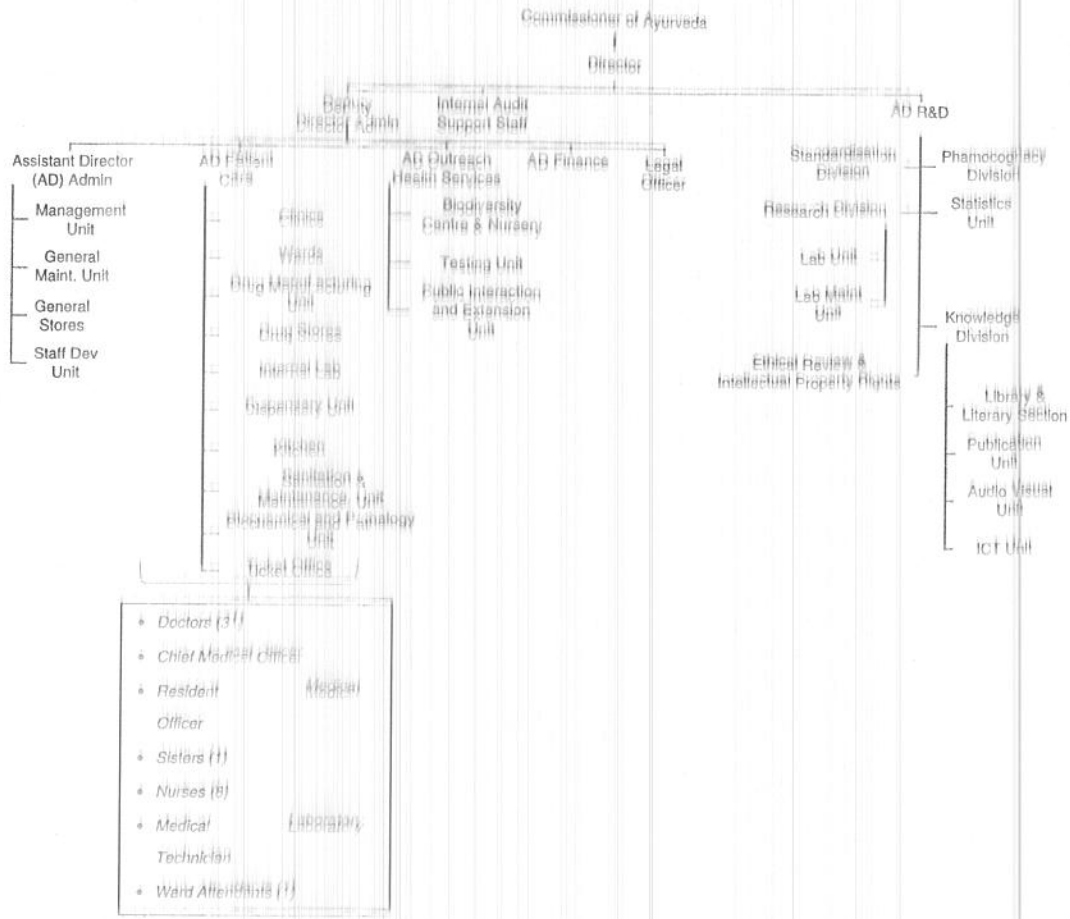
Figure 1 Organisational structure.

The Navinna Ayurveda Hospital management has shared (see Figure 2) a high-level overview of the core processes conducted and have identified some significant issues and opportunities for improvement within their patient care processes. A detailed analysis of the end-to-end process, from when an individual enters the hospital as a 'patient' to the time the patient leaves the hospital, is discussed in the sections that follow. Improvements in this process will have a direct impact upon the thousands of Sri Lankans who reach out to Navinna hospital for Ayurvedic services to address their healthcare needs.

Detailed description of current scenario

For the Navinna Ayurveda Hospital management, it is not only *what* is being delivered to the client that is important but also *how* the service is being delivered. Coherent communication and patient safety are also aspects that the Navinna Ayurveda Hospital aims to achieve. One issue is patient waiting times, which negatively affects the hospital's reputation; elimination of these long waiting times is a key objective. Furthermore, patient errors are numerous, especially for those patients who see multiple doctors or who have multiple chronic diseases. This is partially influenced not only by the weaknesses of existing processes and information management, but also because of the nature of Ayurveda itself and its unique ways and methods of treatment. Reducing such errors

is paramount to ensure compliance with emerging National health standards, another key imperative.

The value chain of the hospital is depicted above in Figure 2. All organisational units represented here complement the activities of and are heavily interdependent on each other. The support activities have been identified to be crucial in the implementation of the primary activities. Both the primary and support activities are described in the sections that follow.

The patient-care chain directly and indirectly interacts with a large number of areas (hence many different stakeholder groups) within the hospital and therefore is a very complex process. There are three main variants (different types of patients) who seek services through the patient-care process. They are (1) patients of the outdoor patient department (hereinafter referred to as OPD), (2) patients who seek services at the different clinics held at the hospital and (3) patients who undergo in-house treatment within the hospital. The hospital has identified two types of patients within its care process: (1) the first-time patients who will always be directed to the OPD (where they may be recommended for further visits to the OPD, treatment at the clinics or in-house treatment) and (3) the repeat patients who can be either patients to the OPD or the clinics (this is further elaborated in the sections 'Patient registration', 'Outdoor patient department', 'Clinical care' and 'In-house treatment').
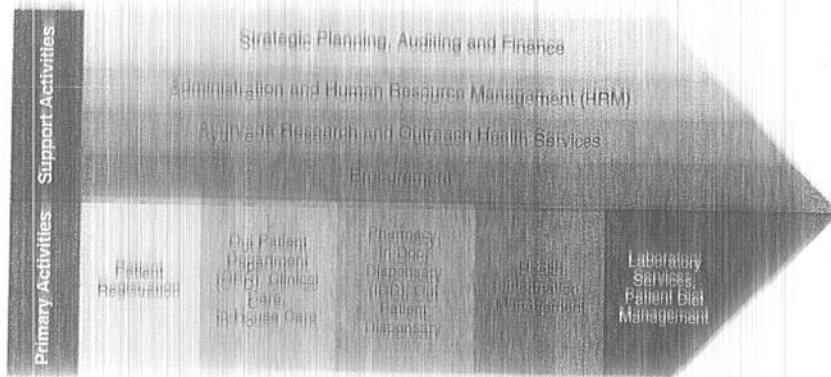
Figure 2 Overview of core process areas at the Navinna Hospital.

Patient registration

A patient's first point of interaction after entering the hospital is with the ticket issue counter (hereafter referred to as the 'ticket counter'). This is a very small counter with little physical space available to attend to the registration of all patients at the hospital. There are two different queues: one for the 'first-time' patients and another for repeat patients of the hospital. As no proper directions are given, the patients themselves have to identify the ticket counter, which is situated a distance away from the entrance to the hospital, and they must also identify the specific queues to which they belong.

If it is a first-time patient, he/she will be given a prescription form by the ticket clerks at the ticket counter, to be filled in and handed to the Doctor by the patient. The form will require the patient to fill in details such as the name, address, age, gender and the occupation of the patient. At this point, a record starts for the patient at the ticket counter, and he/she will be issued with a registration number. The registration number comes with a numerator and a denominator. The denominator denotes the month (where an alphabetical index is used to represent the different months, where January is represented by A and February by B, etc.) in which the patient visited the hospital for the first time, and the numerator denotes the number that is assigned to the patient. Together with this registration number, the patient is also issued with a registration form that the patient should always bring along with him/her when he/she visits the hospital. This form also needs to be completed by the patient and requires (1) the registration number issued to the patient, (2) the name of the patient and (3) the date. The summary details on the prescription form are also entered by the staff in a separate manual log book that is maintained by the ticket counter. It captures the date, and the patients (including name, age, registration number and residential details) that were treated on that date. This is used for record-keeping purposes to know the exact number of patients who were treated within the day/week/month and so on. Upon registration, the patient is then directed to the OPD. Here a doctor will examine the patient and will record details of the diagnosis and the prescription for medicine on the prescription form that was issued to the patient at the ticket counter.

If the patient is a repeat patient (either of the OPD or of the clinics that are explained further in the sections 'Outdoor

patient department' and 'Clinical care', respectively), the patient's records should already be available with the ticket-issuing counter. Upon submission of the registration form (which the patient at the initial visit is given to carry with them on any occasion that they visit the hospital for medication), the ticket clerks will retrieve the records from the filing shelf where the records are maintained (see the section 'Record-keeping and health information management' for further details). The retrieved record is then handed over to the patient who is either directed or escorted to the waiting area near the consultation chamber.

It is clear that the ticket-issuing process is time consuming and, although the staff do try to be as efficient as possible, there are long queues especially during the peak hours. Often there is a lack of staff to handle the work load, at which times other hospital staff (from various designations) are called in for assistance. This *ad hoc* allocation of staff as need arises has created obvious issues from a HR perspective, as issues like establishing clear role accountability and training are frequently overlooked.

Outdoor patient department

Patients, who need medical or surgical care but are not in acute emergency, generally attend the OPD. A permanent cadre of Ayurvedic doctors performs general physician services for OPD patients. They may refer patients to specialist consultations at the clinics or for in-house care when they deem it necessary, and thus the OPD also acts as a filter for in-house admissions and specialist consultations at the clinics. On any given day, the OPD provides services to approximately 250 patients.

Patients who get their prescription forms at the ticket-issuing counter have to find their own way to the waiting area of the OPD, as the direction from the ticket counter is not clearly displayed. The waiting area sometimes lacks capacity to allow for seating facilities for all the patients of the OPD. The patients wait (for a duration that may vary from a minimum of 10 min to 90 min depending on the peak and off-peak hours) for their appointment. As patients are not informed or called for consultation, they have to be very attentive to work out when to walk in to see the doctor. Some consultation chambers are situated in a common hall and are attended by three or four doctors. The doctor takes historical patient

details from the prescription form (which the patient obtained from the ticket counter, in the case of repeat patients) and examines him/her. The doctor also informs the patient regarding his/her ailment, plan of treatment and prognosis and accordingly may prescribe drugs and/ or additional tests. The patient may also be given a date for revisits where deemed necessary. Where necessary, patients will be directed to the clinics if the patient requires specialised treatment for their ailments or for in-house admission. For each consultation of this nature, a doctor takes approximately 5–10 min.

Clinical care

Ayurvedic doctors specialising in various ailments such as cardiac disorders, eye problems, diabetes and so on can be consulted at the clinics. Clinics are held on Monday–Friday – 8.00 am–4.00 pm. There are 18 specialised areas of treatment, and normally three clinics are held for approximately a hundred patients on any given day. The patients have to be vigilant about the timetables of the clinics as they are not well-displayed, and there is no point of contact available to the patients to get information about the clinics. All clinics are dispersed around a generic area of the hospital that the patients must locate by themselves. Similar to the OPD consultations, the patients who receive their prescription form at the ticket counter find their way to the clinics (as it is not displayed) and wait for their turn to consult a doctor.

In-house treatment

The hospital has four separate wards – one each for (i) males, (ii) females, (iii) children and expectant women, and (iv) the clergy. Twenty five patients can be accommodated in each ward except the one for the clergy, which can accommodate only up to 10 patients at a time. On any given occasion, all the wards except for the ward for clergy are full and in total accommodate an average of 75 patients a day.

Despite being recommended by a doctor at the OPD or a clinic, not all patients are accommodated for in-house treatment because of lack of capacity. However, in case of capacity problems, special preference is given to patients who are first-time patients waiting to be admitted. Patients who have been admitted at the different wards on prior occasions will only be admitted if 3 months have elapsed after the last date of them being discharged from the ward. This is recognised as a general rule applied by the hospital to provide its services to the majority of the masses who seek in-house medication at the hospital.

To admit a patient to a ward, a referring doctor must first informally check the available ward capacity by consulting with the ward staff. The Chief Medical Officer (CMO) at the OPD is also kept informed about the ward occupancy details by the duty nurse on a daily basis.

The patient takes the prescribed admission document offered by the doctor to the Resident Medical Officer's (RMO) office. The RMO at this stage approves the patient admission. The RMO considers both patient details and the availability of space at the wards before approving admittance to the ward. Upon approval, the patient's details are provided by the patient or the patient's guardian to the staff (most probably a clerk) at the RMO's office who completes an in-house registration application for the patient. The application form includes details such as the name, age, gender, marital status and residential address of the patient and/or guardian. The patient and the guardian then leave for the ward with the in-house registration application and hands it over to the nurse in-charge of the ward at the particular point in time. The nurse will then record details of the patient in the log book maintained at the ward. As a general hospital rule, in-house patient admissions are only allowed from 8.00 am to 11.30 am and 2.00 pm to 3.30 pm.

Upon admission, the patient is given a special ward-patient ID number. This number is different from the number that the patient was initially registered with. A separate patient register is maintained in each ward by a nurse that includes details such as (1) the number of cases from the commencement of the year, (2) number of cases from the commencement of the month, (3) the name of the patient, (4) age of the patient, (5) gender of the patient, (6) marital status of the patient, (7) the religion and ethnicity of the patient, (8) date and time of admission to the hospital, (9) number of days the patient was ill before admission or the date on which he/she fell ill and (10) place at which he/she fell ill or was wounded. Upon discharge, the date and time at which the patient was discharged will also be noted in the register. Once a patient is admitted to a ward for in-house treatment, they will be subject to care and medication from the staff at the ward. As soon as the patient is admitted to a ward, the doctor-in-charge is informed who then examines the patient. If the doctor-in-charge is not available, another available doctor or the RMO will be informed to examine the patient.

The doctors, who are in-charge of the wards, will examine the patient and prescribe medicine and diets, and conduct various medical examinations (e.g., urine, blood pressure, heart, etc.) of the in-house patients on a daily basis. These will be recorded separately for each patient in the prescription forms (containing patient's name, details of prescribed medicines and dietary requirements) used for in-house patients. Apart from this, the patient's condition is also recorded on a daily basis by the doctor.

The average cost incurred by the hospital for an in-house patient's medicine amounts to Sri Lankan Rupees (LKR) 1500.00 (see Appendix for some further details related to costs described here and currency conversions). The treatments specified by the doctors will be provided by the nurses and the attendants at the wards. The wards also have very basic facilities of toilets, bathrooms and eating spaces for the patients. Certain equipment within the wards was donated by the patients and their caretakers. However, because of limited infrastructure, some of the equipment has not been used. The archaic design of the ward does not provide adequate privacy for patients. Female patients have to take additional steps on their own to ensure their privacy. The admission capacity can be increased by utilising the ample space available at the hospital (the hospital sits in an area of 18 acres of land with sufficient buildings already established and in good condition, which are not used in a very 'space-wise' manner). The inadequate furniture for visitors makes it difficult for them to manage their visits to the ward patients.

In-house patients are examined daily by the doctor-in-charge. They will decide on the patient's condition and make the decision whether the patient needs further in-house treatment or is ready to leave for home. If a patient is not fit to leave for home, they will continue to remain at the hospital on medication and under daily monitoring. The ward staff,

although few in number to attend to all the work relating to the in-house patients, try their utmost best to serve the patients well. If it is decided that the patient no longer needs treatment in-house, the patient will be set for discharge and will be informed of it. In most cases, patients are advised by the ward-in-charge doctor to continue with the prescribed medication at home. The patient will have to purchase the prescribed medicine externally if it is not available at the indoor dispensary (IDD).

On certain occasions, because of the unavailability of adequate space and inadequacy to handle a large number of patients, certain patients cannot be accommodated in the wards, and, therefore, they are required to visit the wards for treatment either on a daily basis or on specific days.

The records of the patients' medication history are kept at the ward in a separate summary patient register. This is maintained by the ward staff during a patient's stay.

Record-keeping and health information management

Record-keeping primarily happens at the ticket counter that has very small space availability. The records of the repeat patients to the OPD are physically maintained in different shelves at the counter. The shelves are labelled alphabetically to denote the month in which the patient initially visited the hospital (e.g., January – A, February – B, March – C) and the frequency of visits that patient has paid to the hospital (e.g., a patient who has visited once – 1, a patient who has visited twice – 2, etc.).

The records of patients to the clinics are also maintained at the ticket counter separately from the records of the OPD patients. They are stored according to the different clinics run by the hospital. When a patient revisits the clinic, after the very first time, his/her records will be retrieved manually on a case by case basis by the staff at the ticket counter, for the patient to produce to the doctor that she/he will be seeing. All records of patients that exceed 3 months are physically archived in the ticket office. They are bundled according to the month and frequency system and stored away so they can be retrieved if the need arises.

All related detailed documents of any discharged in-house patient are maintained in a special archival system. As the hospital has no separate records room, these documents of patient history are maintained manually by the hospital's Diet Clerk in two separate cupboards stored according to the year of admittance and the ward in which the patient was treated. These records are kept for 5 years and rarely accessed unless needed for future reference.

Out-patient dispensary, IDD and pharmacy

There are three points of supply of medicine within the hospital, namely, the out-patient dispensary, the IDD (where medicine containers are not always labelled) and the pharmacy. Both the out-patient pharmacy and the IDD deal mostly with non-perishable medicine, whereas the pharmacy deals mostly with perishable medicine and only caters to the in-house patient requirements, making the prescribed Ayurvedic medications. The out-patient dispensary caters to the OPD patients. The IDD caters to the patients of the clinics as well as the in-house patients. The distinction between the out-patient dispensary and the IDD is not very clearly articulated to the patients who sometimes confuse themselves when obtaining

the medicine from the relevant dispensary. Patients form long queues at both dispensaries because of the severe lack of staff, and often staff from other areas in the hospital are called in to help out during peak hours.

The experienced and trained staff at the dispensary check the patients' prescriptions and issue the patients with the necessary medicine. They know the medicines by heart, and even though the medicine containers are not properly labelled, the staff are confident that there is very little room for mistakes in the issuing of medicine. The prescription forms of the patient will be kept with the dispensary and later (at the end of the day) returned to the ticket counter. Average cost of medicine for an OPD patient is between LKR150.00 and LKR400.00 for a clinical patient. If the required medicine is not available with the out-patient dispensary or the IDD, the patient or their caretakers will be informed to purchase the medicine externally. A separate register for the different categories of the issued medicine will be kept at the dispensary for reporting purposes. This record will track the amount of oil, tablets and other Ayurveda medicine that was issued for the day/week/month from the dispensary or pharmacy. Medicine needed for the dispensaries will be requested by the dispensary staff from the drug stores (the hospital's drug procurement and inventory management office, which is discussed in detail in the section 'Procurement') through a drug requisition form. This form includes details such as: (1) the date of issue; (2) the different types of medicine issued; (3) the quantities of medicine issued; and (4) the signature of the staff at the pharmacy who issued the medicine.

The doctors at the wards will prescribe the medicine to be issued to the patients each day during their ward rounds in the morning. According to such prescription, the staff at the ward will order medicine of a non-perishable nature from the IDD. Upon receipt of the order from the ward the dispensary will issue the medicine. They will keep record of the issued medicine and send the book on which the request was placed back to the ward. If the medicine is not available at the dispensary, staff at the dispensary will inform the ward staff of the unavailability who will then inform the caretakers of the patient to source the medicine externally. A separate register for the different categories of the issued medicine is kept at the IDD for reporting purposes. This register will record the amount of medicine in different forms that were issued by them.

Requests for the medicines of a perishable nature will be placed with the pharmacy. The ward staff will enter their requirement on a special book requesting the pharmacy for the medicine and send it across to the pharmacy upon which the pharmacy will prepare the necessary medicine. The pharmacy will keep record of the issued medicine and hand over the book to the wards. A separate register for the different wards and the issued medicine will be kept at the pharmacy for reporting purposes.

The pharmacy and its functions are run in a very old building within the hospital premises that is not built for this purpose and hence sometimes creates difficulties for the staff in the preparation of medicine. A doctor-in-charge at the pharmacy and staff supports the activities. However, there is certainly the need for more trained staff to work at the pharmacy. There is special purpose machinery that is used for the making of medicine, and some of this machinery is not operational.

Patient diet management

Patient diet management is a critical aspect of Ayurvedic treatment and therefore is given high importance. *Ayurvedic meals promote good health and well-being and are prepared according to the recommendations of the doctors.*

The food for the patients conforming to the dietary plans set by the Department of Ayurveda is decided by the doctor-in-charge of the ward. The staff is of the view that these plans are very old and at times outdated and are not suitable for the current context. A Diet Clerk, on a daily basis, takes a record of the food that needs to be prepared for the patients and makes a chart of the details that she receives from the wards. The Diet Clerk's responsibility thereafter is to convey the meal plan to the kitchen staff and ensure the patient is getting the meals at the scheduled time. Once the meal plan message is conveyed to the kitchen through a document (maintained by the Diet Clerk), the kitchen staff prepares the meals and delivers it to the appropriate wards. There are five kitchen staff including the Diet Clerk, cooks and helpers. The hospital incurs approximately LKR90 per patient on meals on any particular day.

Nurses attached to the relevant wards will cross check the meal with the prescriptions to ensure the correct meal is given to the patient. There are also specific dietary plans for the patients with different ailments (e.g., for diabetes patients) that are specified by the Department of Ayurveda with the collaboration of the Ministry of Health. The kitchen places orders for the needed ingredients to prepare meals with the registered suppliers of the hospital. The suppliers will deliver the ordered ingredients to the hospital. The payment for the suppliers is done by the Department of Ayurveda, and there are times when there is a lack of funds to support essential appropriate food requirements for the diverse patient needs, and thus compromised meals are occasionally provided to the patients.

Procurement

The Department of Ayurveda calls for quotations from medicine, raw material and food suppliers on an annual basis to supply to all Ayurvedic hospitals in Sri Lanka including the Navinna Hospital.

At the Navinna Hospital, there are two stores; the drugs store (which deals with all medicine storage and distribution), and the general store (which stores all other procured goods other than medicine). All shortages of medicinal requirements are requested from the drugs stores (referred to as the 'Stores' hereinafter). The stores play a vital role in making the medications available for the patients as and when required. The stores get requests for different kinds of medicine from the OPD, the IDD and the Pharmacy. On the basis of requests and the experience of the officer-in-charge of the stores (who has been doing the ordering for a long period of time), the monthly orders will be placed with the relevant suppliers. However, sometimes, there are delays in the supply of ordered goods from the stores to the two dispensaries and the pharmacy that creates a shortage of medicine to be issued to the patients. Although the staff at the stores is experienced, because of lack of training, they have limited professional expertise in managing the stores.

Normally, the requirements are provided to the stores through internal telephone calls. The pharmacy will request the amounts of different raw materials needed to prepare the medicine from the stores through a specified book entry (though notifying of it is done informally over the phone). At the time of issuing the medicine to the pharmacy, the staff of the pharmacy will arrive at the store complex and receive the goods in the presence of the store staff. The Store-in-charge officer will be present when issuing the goods. The Store-in-charge officer will note the details of the goods issued in the book sent by the pharmacy and keep a copy of these details for record purposes. The pharmacy will prepare the necessary perishable medicine for the patients in the wards and send the medicine to the stores. The stores will take a stock of it and send it across to the IDD for distribution within the wards.

One of the main suppliers to the hospital is the Ayurvedic Drugs Corporation. All suppliers will be paid through the Department of Ayurveda. The hospital will also call for quotations from suppliers for certain types of medicine. Records of orders placed, goods received as per orders made and goods issued to the different sections of the hospital are recorded in a separate registry. This enables the stores to determine the available stock of different medicines at any particular time and when to make orders in a timely manner.

Ayurvedic research

Research activity in the hospital is centred on clinical treatment and thus conducts well-planned research in every aspect of Ayurveda to enhance and improve the contribution of Ayurvedic medicine to the national healthcare services. Research focusses on five main areas, namely, cancer, cardiovascular diseases, chronic kidney diseases, diabetes and dengue. All doctors of the hospital are attached to at least one of the five areas of research. Undergraduate interns also conduct research in collaboration with the research unit of the hospital.

Laboratory services

The laboratory services within the hospital include two main sub-areas. One is the Botany division, which authenticates the raw material used in the production of drugs, and the other is the standardisation lab, which checks whether the medicine used in the hospital complies with the physical and chemical standards. These areas assist in quality assurance of the medicine produced and used at the hospital.

Strategic planning

The Commissioner of Ayurveda (based at the Department of Ayurveda) is the primary authority of the hospital as it is an institution that comes under the purview of the Department of Ayurveda. The operations of the hospital are headed by the Hospital Director. The hospital is given authority and has the autonomy to make decisions within the frameworks stipulated by the Department of Ayurveda. However, approval of the Commissioner is sought in all policy-related matters.

The Director of the hospital, two doctors in-charge of administration and the OPD section CMO have regular meetings and are involved in official strategy-related matters and short- and long-term planning. However, staff suggestions and participation is always sought by the Director when venturing out for new initiatives.

HR management and administration

The officers in-charge of the HR management and adminis-tration activities mainly deal with the attendance, leave, salary-related matters and the maintenance of personal files of employees. Table 1 depicts approximate monthly salaries of some employees of the hospital.

Auditing and finance

General auditing of the hospital is done by the Auditor General's department that is responsible for all audit-related activities in the public sector of Sri Lanka on an annual basis. Apart from this, the internal audit team from the Department of Ayurveda also conducts audits within the hospital.

The funds received from the treasury for research activities are handled by the project offices of the research and develop-ment division that are established to administer the five different research areas (discussed in the section 'Challenges and tasks'). The management unit overlooks the funds allocated for the other expenses of the hospital. There are administrative officers at the project offices and the manage-ment unit who look into the finance-related activities under the purview of the Director of the hospital. The expenses that the general office deals with are depicted in summary in Table 2.

Table 1 Monthly Staff Salaries

Salary grade[a]	Expenditures (LKR)
Doctors	
• Special grade	82,113
• Senior medical officer	72,074
• Junior medical officer	47,192
Administration staff	
• Administrative officer	48,904
• Development officer	34,316
• Research assistant	36,745
• Senior management assistant	43,392
• Junior management assistant	32,638
• Driver	38,480
• Senior nurse	66,573
• Junior nurse	47,544
Minor staff	
• Ward attendant	36,384
• Labour – Senior	31,695
• Labour – Junior	30,739

[a]Employees within a certain function (e.g., ticket counter, dispen-saries) may fall into different salary grades based on their seniority.

Table 2 Annual Expenditures

Item	Expenditure (in Sri Lankan Rupees – LKR)[a]
Annual total expenditure on medicine	36,063,284
Annual total cost on administration activities	13,440,580

[a]See Appendix for further financial details and currency conversion information.

Challenges and tasks

Your team is requested to conduct a comprehensive process analysis and improvement project for the patient-care process described above. The main challenges are expected to centre around: development of a detailed understanding of the current (as-is) process; definition of a (graphical) process model describing the process; identification of key perfor-mance indicators, benchmarks and other performance metrics; conducting quantitative and qualitative analyses of the as-is process performance; and proposal of opportunities and recommendation for process improvements for the short term (to be implemented in the next 3–6 months) and long term (to be implemented in 12–18 months). It is important to provide quantified and qualified benefits of the suggested improvement ideas, with a high-level implementation strategy and plan.

Furthermore, the hospital administration is aware of the potential of IT solutions (such as EHR – Electronic patient Health Records) and how they have become the 'norm' in the healthcare service domain. However, with less than 5% of the hospital staff having had any formal training in IT, hospital executives have been concerned of the challenges of even considering any automated solutions. They are fully aware of the need to first better understand the underlying processes and evaluate the stakeholders 'readiness for technology' before any such recommendations are considered, and seek your valued input for this as well.

A set of tasks (that will relate to the trainings you receive from the course) are recommended (see below) to help you address the challenges laid in front of you.

1. Describe what this case is about.

   1.1. What are the main goals of this process?
   1.2. What are the main phases of the described process? – Derive a value chain depicting these.
   1.3. Who are the key stakeholders in this process?
   1.4. What roles do these different stakeholders play in the process?
   1.5. What areas/aspects of the process are not clear for you – derive a detailed set of questions that you seek to ask at the client-side interview.
   1.6. What insights can you obtain about BPM in the healthcare sector?

      1.6.1. For what goals and purposes is BPM applied in the healthcare sector?
      1.6.2. What are some of the common issues with BPM in the healthcare sector?
      1.6.3. Can you find some useful cases that would be relevant to the context of this case study (i.e., cases from the developing context/cases about better patient information management, etc.)?

2. Create a SIPOC diagram and an IGEO diagram to capture the context of this process.

   2.1. What are the advantages and disadvantages of these two approaches?
   2.2. For each area in the process chain, identify the main activities and the involved stakeholders.

3. Model the current (as-is) scenario for this process, using BPMN.

3.1. Derive a high-level value chain that describes this process, using correct modelling notations.

3.2. What modelling tool and technique will you use to model this process? Justify your selection.

3.3. Document the modelling guidelines your team will use for this modelling effort.

3.4. Apply the guidelines and derive a complete 'as-is' process model for this process.

3.5. Reflect how easy or difficult it was to abide by the guidelines you had created – describe your response with some samples from your work.

4. Provide a preliminary analysis of the process.

   4.1. Derive a SWOT analysis about this process.

      4.1.1. What are the strengths and weaknesses of doing a SWOT analysis on the process?

   4.2. What are the current constraints of the process?

   4.3. Derive a stakeholder objective matrix for this process.

      4.3.1. How are the objectives of the different stakeholders similar or different?

      4.3.2. How can this effect the process improvement initiative?

   4.4. What aspects of the process can you do a Pareto analysis on?

   4.5. What other techniques can you use here to enhance your preliminary understanding of the process?

   4.6. Provide a summary document that articulates your preliminary understanding of the process.

5. What are some of the issues of this process?

   5.1. Maintain an issues register for this process.

   5.2. How might you prioritise these issues?

   5.3. Conduct a root cause analysis (making the relevant assumptions as deemed relevant) to three of the top priority issues identified by your team.

6. Provide a detailed analysis of the process's current performance.

   6.1. What techniques might you use here to derive a detailed performance matrix of the current process?

   6.2. Conduct and show evidence of at least five relevant KPIs (making the relevant assumptions as deemed required for the analysis).

7. [Optional] Provide a summary document that articulates your understanding and analysis of the current process.

8. Provide some short-term (within 3–6 months) and long-term (within 12–18 months) improvements for this process.

   8.1. Discuss your recommendations and how you derived at it.

      8.1.1. Which approach(es) did you use to generate these improvement options (and why were these approaches chosen)?

      8.1.2. What are the constraints that hinder/influence your recommendations?

   8.2. Summarise your recommendations in a detailed business case.

9. What role can ICT play to improve healthcare?

   9.1. Briefly identify the areas where ICT solutions can aid with the issues and goals of this case.

   9.2. Research and report on information systems that can contribute to transform the functionalities of this hospital.

   9.3. What are the challenges this case must overcome in order to be able to consider deploying these technologies?

10. [Optional] Summarise your recommendations in a detailed report and present as a business case for consideration.

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Appendix

Additional financial information pertaining to the case (including currency conversions)

This Appendix has two parts. Part A provides some additional financial details about the case institute's (Bandaranayake Memorial Ayurvedic Research Institute) running costs. Part B provides Sri Lankan currency conversion details.

Part A: Additional information about running costs
Total Expenditure (Annual) in Sri Lankan Rupees (LKR)

Description	Expenditure for a month	Expenditure for a year
Drugs for OPD	657,132.00	7,885,584.00
Drugs for clinics	956,588.00	11,479,056.00
Drugs for admitted Patients	553,137.00	6,637,644.00
Electricity	278,000.00	3,336,000.00
Telephone	25,000.00	300,000.00
Water	79,000.00	948,000.00

Monthly Drug Expenditure for a patient in Sri Lankan Rupees (LKR)

Description	Expenditure for a month	Expenditure for a year
OPD	103.00	1236.00
Clinics	332.00	3984.00
Admitted	5701.00	68,413.00

Number of patients – OPD (for a month)
New patients   4190
Repeat patients   2187
Total   6377
Number of patients – Clinics (for a month)
New patients   695

Repeat patients   2033

2728

Daily expenditure on meals per patient – Rs 90/-
Number of medical officers = 31

Medical Officers' Salaries (LKR)

Grade	Basic	Allowances	Total
Special grade	55,490.00	26,623.00	82,113.00
Senior medical officer	47,095.00	24,979.00	72,074.00
Junior medical officer	26,160.00	21,032.00	47,192.00

Administration Staff Salaries (LKR)

Grade	Basic	Allowances	Total
Administrative officer	27,695.00	21,209.00	48,904.00
Development officer	15,430.00	18,886.00	34,316.00
Research assistant	17,515.00	19,230.00	36,745.00
Senior management assistant	22,910.00	20,382.00	43,292.00
Junior management assistant	13,990.00	18,648.00	32,638.00
Driver	18,900.00	19,580.00	38,480.00

Grade	Basic	Allowances	Total
Senior nurse	44,785.00	21,788.00	66,573.00
Junior nurse	28,620.00	18,924.00	47,544.00

Minor Staff Salaries (LKR)

Grade	Basic	Allowances	Total
Attendant	17,070.00	19,214.00	36,284.00
Labour – Senior	13,170.00	18,525.00	31,695.00
Labour – Junior	12,330.00	18,399.00	30,729.00

Part B: Currency conversion details
Some currency conversion details are given here to provide a basic understanding of the costs in relation to the country context. The information is current as of March 2016.
The average currency conversion rate for Lankan Rupees (LKR) is as follows:
AU$1.00 = LKR107.80
US$1.00 = LKR146.80
€1.00 = LKR165.09
Average monthly disposable salary (after tax) = LKR37,000.00
Further information of this nature can be obtained from the Central Bank of Sri Lanka (http://www.cbsl.gov.lk/htm/english/_cei/er/e_1.asp) and Department of Census and Statistics, Sri Lanka (http://www.statistics.gov.lk/).