

# Activity-Based Costing System and Digital Transformation—A Teaching Case

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COVID-19 placed increased pressure and urgency for effective cost management, resulting in unprecedented financial strains for hospitals. The pandemic also became a catalyst for accelerating digital transformation to improve operations and services in the healthcare industry. Morningdale Hospital is a large and reputable general hospital with a long history in the U.K. You are an intern in the Finance Department of the Hospital. The CEO has asked you to complete a patient-level cost analysis of endoscopic procedures in the Gastrointestinal Department. In your final report, you plan to include a SWOT analysis and a cost analysis using Activity-Based Costing accounting method.

*Keywords:* Activity-Based Costing, digital transformation, cost control

## Overview

Morningdale Hospital is a renowned general hospital with a long history of distinguished services in healthcare. It provides general practitioner- and nurse practitioner-led treatment for urgent but non-life threatening illnesses and injuries. The Chief Executive Officer (CEO) of Morningdale, Andrea, is a chartered professional accountant. She is known for her financial discipline in controlling costs and improving profitability. It is a skill that appeals to Morningdale's Board of Directors as the COVID-19 pandemic put pressure on hospital revenues.

You only have one month left to complete your internship in the Finance Department of Morningdale Hospital. You read in healthcare journals that to improve financial health, hospitals must make cost-reduction decisions using the most appropriate cost management method based on reliable patient-level cost and quality data. Andrea was impressed with your knowledge of accounting information systems and cost analysis in the healthcare industry. She asked you to work on a project analyzing the healthcare costs of endoscopic procedure at Morningdale Hospital. You are now collating the cost data collected through interviews with employees, reviewing financial information from the Finance Department, and preparing to present the results of your analysis to Andrea.

## Background

Morningdale Hospital was founded in 1886 as a Poor Law orphanage. Middlesex County Council began admitting elderly people to the facility in 1930 and it developed into a nursing home for elderly people.

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During WWII, Morningdale cared for wartime casualties under the Emergency Medical Program. The facility joined the National Health Service (NHS) in 1948 under the management of Enfield Group Hospital Management Committee, part of the North East Metropolitan Regional Hospital Board. Since then Morningdale has been serving the Greater London Enfield community, a large town with a population of approximately 330,000, covering an area of 19.5 square miles (51 square kilometer). In 2004, Morningdale made European history by performing the first endoscopic surgery on a patient, who was discharged in just 27 hours. At the time in the U.K., the average length of stay was 11 days. Morningdale is now a top-ranked hospital in the region with its renowned gastroenterology services, which include endoscopic procedures, and Orthopedics Department.

After several restructurings and reorganizations, in 2014 Morningdale joined Royal Free London National Health Service Foundation Trust (one of the largest trusts in U.K. with more than 10,000 employees) and became one of the three hospitals under the administration of Royal Free Hospital. Joining Royal Free Group allowed Morningdale to focus on strengthening its expertise in gastroenterology services and dermatology (Royal Free London National Health Service Foundation Trust, 2019).

### **Facts About Morningdale Hospital**

Royal Free London National Health Service Foundation Trust's mission is to provide world class expertise and local care. As one of the three hospitals managed by the Trust, Morningdale provides a full range of adult, elderly, and children services across a range of medical and surgical specialties. There are 36 rehabilitation beds, 25 reablement beds, 39 general surgery beds, 25 orthopedic surgery beds, and four high-dependency unit beds. The hospital does not provide any non-elective surgeries or pediatric inpatient services. In 2014 Morningdale treated 29,437 patients, an average of 80 patients per day. Since then the number of patients steadily increased. In 2020, a total of 38,723 patients were treated (106 per day), of which 28 percent were children, and Morningdale's treatment capacity grew to 150 patients per day.

#### **COVID-Free Hub**

The COVID-19 pandemic created challenges for hospitals around the world. In many cases, the number of COVID-19 cases exceeded hospital capacity. Two of the three hospitals in the Royal Free London National Health Service Foundation Trust were assigned to admit patients with COVID-19, but Morningdale was not designated to receive patients with COVID-19. As a result, Morningdale has been able to remain completely COVID-free. Consequently, Morningdale played a key role for the group and the community in treating cancer, high-priority, and surgical patients during the pandemic.

#### **Strained Financial Revenues**

On January 30, 2020, the World Health Organization declared the COVID-19 outbreak a public health emergency of international concern. On February 20, 2020, the European Center for Disease Prevention and Control also warned that the risk of health system capacity being exceeded was high and imminent. Protecting the NHS became the U.K. government's top priority. As hopes of containing the virus faded, the government subsequently imposed a nationwide lockdown. Freeing up in-patient and critical care capacity was an important part of the health service's preparedness to respond to the pandemic. Supported by emergency legislation and funding, all non-urgent elective surgeries were postponed, and medically-ready patients were discharged from hospitals. Almost all hospitals experienced increasingly severe financial strain since large number of hospital

services had to be postponed or canceled, coupled with a significant reduction in routine patient volumes and significant amount of COVID-related expense.

### **Urgent Need for Accurate Information**

Andrea told you that some of the cost management methods used by the hospital were obsolete. Morningdale must have a viable and appropriate cost accounting system to help improve operations and operating margins. She commented that Activity-Based Costing (ABC) could provide insight into how resources were used and by whom, allowing for an accurate measure of clinical costs.

### **Care Quality Commission Report**

Care Quality Commission (CQC) is an independent regulator for health and social care in England. Its mission is to ensure that health and social care services provided to the public are safe, effective, compassionate, and of high-quality, as well as to encourage improvement in the delivery of care services. One of the CQC's roles is to monitor, inspect, and evaluate hospital services. The CQC judges hospital services to determine if they are safe, effective, caring, responsive, and well-managed. During its inspection of Morningdale in 2019, CQC spoke with clinical and non-clinical staff members, patients, and their relatives, as well as examined patient records. The CQC observed the environment and examined a wide variety of documents, including policies, incident records, audit results, performance data, care pathways, meeting minutes, and action plans. The CQC's ratings for Morningdale are presented in Table 1 (Care Quality Commission, 2019b).

Table 1

*Care Quality Commission Ratings of Morningdale*

|                                    | Safe                 | Effective | Caring | Responsive | Well-led | Overall |
|------------------------------------|----------------------|-----------|--------|------------|----------|---------|
| Urgent and emergency services      | Good                 | Good      | Good   | Good       | Good     | Good    |
| Medical care                       | Requires improvement | Good      | Good   | Good       | Good     | Good    |
| Surgery                            | Good                 | Good      | Good   | Good       | Good     | Good    |
| End-of-life care                   | Good                 | Good      | Good   | Good       | Good     | Good    |
| Outpatients and diagnostic imaging | Good                 | N/A       | Good   | Good       | Good     | Good    |
| Overall                            | Good                 | Good      | Good   | Good       | Good     | Good    |

According to the CQC report published on May 10, 2019, issues identified in the previous inspection that affected safety and responsiveness of services had not been corrected by Morningdale. In addition, current mandatory staff training in key skills, including safeguarding, fell short of the Trust's target for compliance. Furthermore, the report stated that Morningdale staff did not consistently follow best practices when prescribing, dispensing, recording, storing, and disposing of medicines, and Morningdale did not always have an adequate number of appropriately qualified and skilled staff to ensure patient safety and provide appropriate care and treatment (Care Quality Commission, 2019b). The report concluded that medical care services at Morningdale needed improvement.

On the other hand, CQC inspectors found that the staff at Morningdale worked together as a team to deliver effective patient-centered care. Patients were treated with kindness, dignity, and respect. Patient feedback on their care was consistently positive. Most employees felt that management was supportive and encouraged effective teamwork.

The inspectors reported positively that at Morningdale, all patients undergoing endoscopy were assigned individual pods with en-suite bathroom facilities. Patients could use the assigned pods before the procedure and for recovery afterwards. This arrangement allowed them to maintain privacy throughout the entire endoscopic procedure (Care Quality Commission, 2019a).

### Morningdale's Digital Innovation

Morningdale is widely regarded as a leader in the “digital hospital” model. In July 2014, seven months after the launch of its digital transformation, Morningdale was designated as a Healthcare Information and Management Systems Society (HIMSS) Electronic Medical Record Adoption Model (EMRAM) Stage-6 hospital (second to the highest level). The HIMSS EMRAM allows an organization to track its progress in adopting electronic patient record technology against the organization's digital plan and against other healthcare providers from around the world. HIMSS EMRAM is an eight-stage model ranging from Stage 0 (least mature) to seven (most mature). At each stage, an organization needs to demonstrate a progressive and eventual elimination of paper, increased pervasiveness of usage and compliance statistics, and an increasing reliance on automation and clinical decision support.

In recognition of Morningdale's digital innovation within the NHS, on January 28, 2019, Matt Hancock, Secretary of State for Health and Social Care, referenced Morningdale in his keynote address to the Health Tech Alliance as “one of the most digitally advanced hospitals in the country” and one of the hospitals “getting it right” (McMahon, 2020).

Table 2 describes the eight stages of the HIMSS EMRAM structure (Rayner & Chinwadzimba, 2019).

Table 2

#### *Stages of the Healthcare Information and Management Systems Society Electronic Medical Record Adoption Model*

| Stage | Electronic medical record adoption model cumulative capabilities                                                                                                                                                         |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7     | Complete Electronic Medical Record (EMR); External Health Information Exchange (HIE); data analytics, governance, disaster recovery, privacy and security                                                                |
| 6     | Technology enabled medication, blood products, and human milk administration; risk reporting; full Clinical Decision Support (CDS)                                                                                       |
| 5     | Physician documentation using structured templates; intrusion/device protection                                                                                                                                          |
| 4     | Computerized Physician Order Entry (CPOE) with Clinical Decision Support (CDS); nursing and allied health documentation; basic business continuity                                                                       |
| 3     | Nursing and allied health documentation; Electronic Medication Administration Record (eMAR); role-based security                                                                                                         |
| 2     | Clinical Data Repository (CDR); internal interoperability; basic security                                                                                                                                                |
| 1     | Ancillaries—laboratory, pharmacy, and radiology/cardiology information systems; Picture Archiving and Communications systems (PACs); digital non-Digital Imaging and Communications in Medicine (DICOM) image management |
| 0     | None of the three ancillaries installed                                                                                                                                                                                  |

### Outpatient Digitized Journey at Morningdale

At Morningdale, Intouch's Flow Manager is the control center of the outpatient journey. Using Flow Manager on desktop, laptop, or tablet, authorized hospital staff can see instantly when patients arrive for their appointment. The patients' precise locations in the hospital are displayed on an electronic device. Patients are also called forward for their appointment by a digital calling screen. At the end of the patients' appointments, clinicians use the system to access an electronic outcome form (eOutcomes). The form allows them to accurately record procedures and referral treatment codes or request follow-up appointments.

Hospital staff also use Intouch's real-time business intelligence module, Performance Manager, to monitor Key Performance Indicators (KPIs). These indicators alert operations staff to long clinic delays and also identify any clinics that are not completing eOutcome forms.

### **Morningdale's Challenges**

#### **Fragmentation of Revenues**

According to Andrea, various forces are driving the fragmentation of Morningdale's revenues in unpredictable ways. One such force is COVID-19. The nationwide lockdown in the U.K. due to the pandemic led to a reduction in the use of revenue-generating elective procedures and emergency services. Andrea also commented that the pandemic has increased the use of telehealth, which should be taken into account when evaluating future operations and operating margins. Other driving forces include a struggling economy, as people lost their jobs and employer-sponsored health insurance, as well as patients postponing treatment to avoid going to the hospital.

#### **Shortages in Medicine Supply**

During a recent budget meeting, Andrea mentioned the rising cost of medicines due to shortages caused by COVID-19. The reasons for global drug shortages are complex, but are generally due in part to global factory closures, and for other reasons such as delays at border checkpoints as a result of Brexit and longer time in shipping, flights, and transportation caused by the pandemic.

#### **Need for Accurate Cost Determination**

The continued move from fee-for-service to value-based care amid revenue fragmentation put Morningdale under greater pressure to calculate its costs more accurately. This meant Morningdale had to have a way to precisely measure activities, resources, and patients. Knowing the costs accurately will allow Morningdale to identify revenues and expenses at the patient level and gain a comprehensive understanding of costs across its clinical and service line.

### **Cost Analysis**

With only one month left before the end of your internship, you are working hard to collect cost data by interviewing hospital staff and researching accounting information from the Finance Department. Due to time constraints and given the quality and quantity of data available, you decide to use Activity-Based Costing (ABC) method in your cost analysis, focusing on endoscopic procedures.

#### **Activity-Based Costing**

ABC is an example of a bottom-up approach of cost analysis. Under the ABC method, activities are identified and costs are allocated to each activity based on the resources or services used by that activity. The advantage of ABC is that it converts indirect costs and overhead into direct costs. By using this method, organizations can better understand the different cost elements of their products and services, allowing them to identify and/or eliminate unprofitable or ineffective activities, thereby improving productivity.

The first step in the application of ABC is to identify and classify the activities involved in the endoscopic procedure. Ten patients who underwent the in-patient endoscopy at Morningdale were observed. Figure 1 shows the series of activities involved in the procedure (Goldberg & Kosinski, 2011).

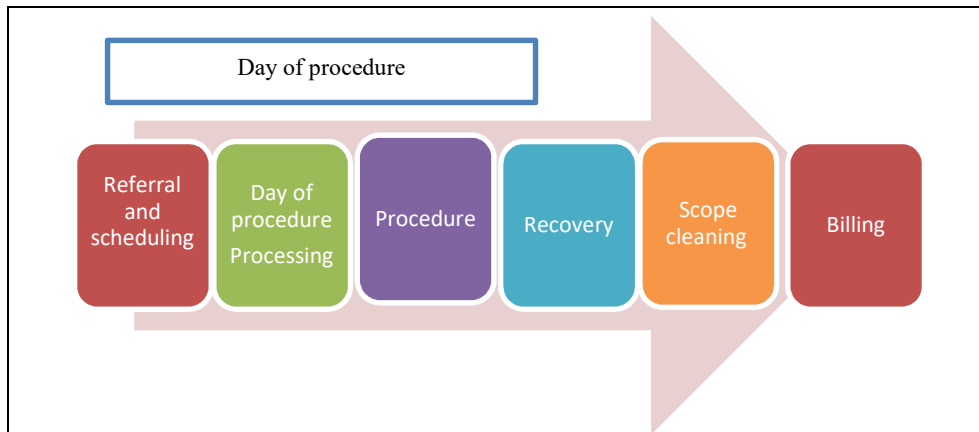


Figure 1. Patient pathway map for an endoscopic procedure.

The second step in applying ABC is to identify the resources used for each activity. This process helps determine which cost pools each resource uses. Figure 2 lists the resources needed for an endoscopic procedure (Goldberg & Kosinski, 2011).

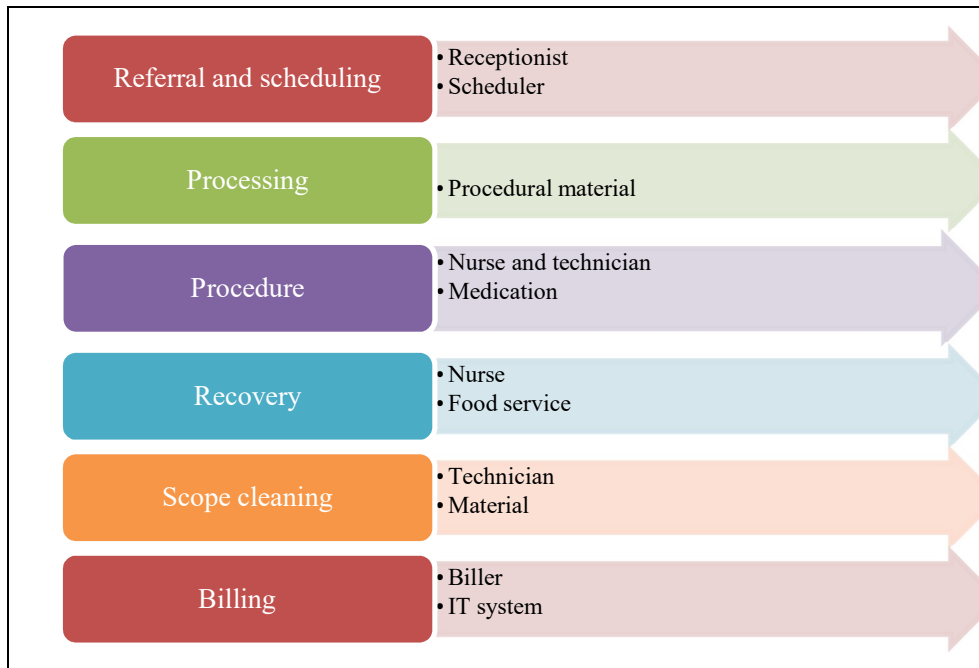


Figure 2. Identification of resources needed for an endoscopic procedure.

The third step in ABC application is to assign each resource to a cost category: labor, material, or general overhead. These categories are then assigned to either direct or indirect cost categories. Direct costs are those directly related to the performance of the endoscopy, whereas indirect costs are either not attributable to the endoscopic procedure or cannot be traced back to the procedure. Table 3 shows the cost categories of activity involved in an endoscopy.

Table 3

*Cost Categories of Activities Involved in an Endoscopic Procedure*

| Component activity                      | Cost category   |                   |              |                |
|-----------------------------------------|-----------------|-------------------|--------------|----------------|
|                                         | Direct material | Indirect material | Direct labor | Indirect labor |
| Pre-procedure: Referral and scheduling  |                 |                   |              |                |
| Scheduling pod                          |                 |                   |              |                |
| Office secretary                        |                 |                   |              |                |
| Day of procedure: Endoscopic processing |                 |                   |              |                |
| Patient registration—RN                 |                 |                   |              |                |
| IV insertions                           |                 |                   |              |                |
| IV tubing                               |                 |                   |              |                |
| Nasal cannula                           |                 |                   |              |                |
| Electrocardiography leads               |                 |                   |              |                |
| Day of procedure: Endoscopic procedure  |                 |                   |              |                |
| Nurse                                   |                 |                   |              |                |
| Technician                              |                 |                   |              |                |
| Medication—Demerol                      |                 |                   |              |                |
| Medication—Versed                       |                 |                   |              |                |
| Depreciation—equipment                  |                 |                   |              |                |
| Depreciation—GI Laboratory              |                 |                   |              |                |
| Laboratory supervisory                  |                 |                   |              |                |
| Hospital overhead                       |                 |                   |              |                |
| Day of procedure: Recovery              |                 |                   |              |                |
| Food services                           |                 |                   |              |                |
| Nurse                                   |                 |                   |              |                |
| Day of procedure: Scope cleaning        |                 |                   |              |                |
| Technician                              |                 |                   |              |                |
| Materials                               |                 |                   |              |                |
| Post procedure: Overhead costs          |                 |                   |              |                |
| Billing                                 |                 |                   |              |                |

The fourth step in ABC application is to determine the cost drivers for each resource and the quantity of resources used. Cost drivers are strongly correlated with costs accumulated in each cost pool. The cost drivers are presented in Table 4. You decided to simplify the analysis by using only number of patients (11,000 annually) or amount of time used (120,000 minutes) as the cost driver.

The fifth and last step in ABC application is to compute cost driver rate (CD rate) by dividing annual cost of the activity by annual quantity of cost driver. After calculating the CD rate, the actual allocation base for an endoscopic procedure is determined.

Through interviews with hospital staff and analysis of accounting information from previous years, you determined that, on average, an endoscopic procedure requires 30 minutes of office secretary time during the referral and scheduling phase. On the day of the procedure, registration with a registered nurse (RN) takes 30 minutes. During the procedure, a nurse and a technician spend 45 and 30 minutes, respectively, with the patient. After the procedure, a nurse spends another 10 minutes with the same patient during recovery. Finally, the technician spends 20 minutes cleaning the endoscope. The costs incurred are shown in Table 5.

Table 4

*Determining Cost Driver of Activities Involved in an Endoscopic Procedure*

| Component activity                      | Category | Annual cost \$ | Cost driver | Annual quantity of cost driver |
|-----------------------------------------|----------|----------------|-------------|--------------------------------|
| Pre-procedure: Referral and scheduling  |          |                |             |                                |
| Scheduling pod                          |          | 169,176        |             |                                |
| Office secretary                        |          | 80,000         |             |                                |
| Day of procedure: Endoscopic processing |          |                |             |                                |
| Patient registration—RN                 |          | 140,000        |             |                                |
| IV insertions                           |          | 9,460          |             |                                |
| IV tubing                               |          | 110,000        |             |                                |
| Nasal cannula                           |          | 7,040          |             |                                |
| Electrocardiography leads               |          | 880,000        |             |                                |
| Day of procedure: Endoscopic procedure  |          |                |             |                                |
| Nurse                                   |          | 140,000        |             |                                |
| Technician                              |          | 66,000         |             |                                |
| Medication—Demerol                      |          | 18,700         |             |                                |
| Medication—Versed                       |          | 40,700         |             |                                |
| Depreciation—equipment                  |          | 647,640        |             |                                |
| Depreciation—GI laboratory              |          | 647,640        |             |                                |
| Laboratory supervisor                   |          | 200,000        |             |                                |
| Hospital overhead                       |          | 1,301,048      |             |                                |
| Day of procedure: Recovery              |          |                |             |                                |
| Food services                           |          | 261,616        |             |                                |
| Nurse                                   |          | 140,000        |             |                                |
| Day of procedure: Scope cleaning        |          |                |             |                                |
| Technician                              |          | 66,000         |             |                                |
| Materials                               |          | 26,292         |             |                                |
| Post procedure: Overhead costs          |          |                |             |                                |
| Billing                                 |          | 401,008        |             |                                |

**Primary Requirement**

To submit a cost analysis report to Andrea, you are required to complete Table 3 to Table 5 and compute the total costs incurred in an endoscopic procedure. In your report, you should also include a SWOT (strengths, weaknesses, opportunities, threats) analysis of Morningdale Hospital.

**Secondary Requirement**

Your colleagues in the Finance Department tell you that they expect Andrea to accelerate the hospital's digital transformation. They know that digital transformation is more important than ever due to the pandemic. Explain to your colleagues why digital transformation in the healthcare industry is inevitable, and why it is paramount to Morningdale's continued success.

Table 5

*Computation of Cost Driver Rate and Allocation of Activity Cost*

| Component activity                      | Cate-gory | Annual cost \$ | Cost driver | Annual quantity of cost driver | Cost driver rate \$ | Actual quantity of allocation base | Allocated activity cost \$ |
|-----------------------------------------|-----------|----------------|-------------|--------------------------------|---------------------|------------------------------------|----------------------------|
| Pre-procedure: Referral and scheduling  |           |                |             |                                |                     |                                    |                            |
| Scheduling pod                          |           | 169,176        |             |                                |                     |                                    |                            |
| Office secretary                        |           | 80,000         |             |                                |                     |                                    |                            |
| Day of procedure: Endoscopic processing |           |                |             |                                |                     |                                    |                            |
| Patient registration—RN                 |           | 140,000        |             |                                |                     |                                    |                            |
| IV insertions                           |           | 9,460          |             |                                |                     |                                    |                            |
| IV tubing                               |           | 110,000        |             |                                |                     |                                    |                            |
| Nasal cannula                           |           | 7,040          |             |                                |                     |                                    |                            |
| Electrocardiography leads               |           | 880,000        |             |                                |                     |                                    |                            |
| Day of procedure: Endoscopic procedure  |           |                |             |                                |                     |                                    |                            |
| Nurse                                   |           | 140,000        |             |                                |                     |                                    |                            |
| Technician                              |           | 66,000         |             |                                |                     |                                    |                            |
| Medication—Demerol                      |           | 18,700         |             |                                |                     |                                    |                            |
| Medication—Versed                       |           | 40,700         |             |                                |                     |                                    |                            |
| Depreciation—equipment                  |           | 647,640        |             |                                |                     |                                    |                            |
| Depreciation—GI laboratory              |           | 647,640        |             |                                |                     |                                    |                            |
| Laboratory supervisor                   |           | 200,000        |             |                                |                     |                                    |                            |
| Hospital overhead                       |           | 1,301,048      |             |                                |                     |                                    |                            |
| Day of procedure: Recovery              |           |                |             |                                |                     |                                    |                            |
| Food services                           |           | 261,616        |             |                                |                     |                                    |                            |
| Nurse                                   |           | 140,000        |             |                                |                     |                                    |                            |
| Day of procedure: Scope cleaning        |           |                |             |                                |                     |                                    |                            |
| Technician                              |           | 66,000         |             |                                |                     |                                    |                            |
| Materials                               |           | 26,292         |             |                                |                     |                                    |                            |
| Post procedure: Overhead costs          |           |                |             |                                |                     |                                    |                            |
| Billing                                 |           | 401,008        |             |                                |                     |                                    |                            |

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## Teaching Notes--Solutions

### Synopsis

Morningdale Hospital is one of the three hospitals in the Royal Free London National Health Service Foundation Trust. It is a large and reputable hospital that provides a full range of surgical and medical services, with the exception of COVID-19-related treatments during the pandemic. The hospital is renowned across Europe for its gastroenterology services, especially the short recovery hospital stay after endoscopic procedures. You have one month left in your internship at its Finance Department. You are required to perform a cost analysis of patient-level cost of endoscopic procedures in the Gastroenterology Department. You will focus on endoscopic procedure due to time constraints. In your final report, you will include a SWOT (strengths, weaknesses, opportunities, threats) analysis and a cost analysis using Activity-Based Costing (ABC) method.

### Learning Objectives (LO)

LO1: Identify the strengths, weaknesses, opportunities and threats of a digitally-advanced hospital in a revenue-compressing environment due to COVID-19.

LO2: Discuss the impact of the COVID-19 pandemic on organizations' digital transformation.

LO3: Discuss the difference between traditional cost analysis and Activity-Based Costing (ABC) method.

LO4: Compute the cost of an endoscopic procedure at Morningdale Hospital using the ABC method.

LO5: Submit a report to the CEO of Morningdale Hospital.

### Course Plan

This case is suitable for undergraduate or graduate students taking courses such as Managerial Accounting and Accounting Information System. It is also applicable to modules in cost control, ABC, and digital transformation. Instructors using this case can consider the following case questions (CQ):

CQ1: What are Morningdale Hospital's strengths, weaknesses, opportunities, and threats (SWOT)?

CQ2: What is the impact of the COVID-19 pandemic on organizations' digital transformation?

CQ3: What is the difference between traditional cost analysis and Activity-Based Costing (ABC) method?

CQ4: Applying the ABC method, what is the patient-level cost of an endoscopic procedure at Morningdale Hospital?

CQ5: Using creative ideas such as role play, debate, or video filming, present your report to the CEO of Morningdale Hospital.

This case works best if students read it before class and study the material provided by the instructor before participating in class discussions. Table A1 presents suggested teaching guide (excluding student presentations):

Table A1

#### *Suggested Teaching Guide*

| Activity                                                              | Percentage of class time |
|-----------------------------------------------------------------------|--------------------------|
| Case introduction and clarification of requirement                    | 5%                       |
| SWOT discussion                                                       | 20%                      |
| Discussion of digital transformation                                  | 25%                      |
| Discussion of ABC method                                              | 15%                      |
| Discussion of steps one to five regarding ABC analysis of Morningdale | 15%                      |
| Computation of cost and completion of cost tables                     | 20%                      |

## SWOT Analysis

### Strengths

With a history dating back to 1886, Morningdale clearly has a strong foothold in the community. Its established reputation and successful track record can impress and attract potential patients and employees. Joining the Royal Free Hospital National Health Service Foundation Trust provides Morningdale the opportunity to achieve economies of scale.

The recognition of Morningdale's accomplishment in digital transformation reflects the Board of Directors' and the management team's commitment to investing in information technology (IT). As a result, Morningdale has emerged as a leader in technology among its competitors in the healthcare industry.

### Weaknesses

The Care Quality Commission (CQC) report (2019) identified a number of areas where Morningdale needed improvement. Morningdale failed to correct some issues identified in a previous CQC report. In addition, it failed to meet the Trust's compliance target in relation to mandatory training and safeguarding. Its staff did not always follow best practices when prescribing, dispensing, recording, storing, and disposing of medicines. Furthermore, it did not always have sufficient number of appropriately qualified and skilled medical staff to ensure patient safety and provide appropriate care and treatment.

### Opportunities

In response to the COVID-19 pandemic, companies unexpectedly surpassed their expectations in their digital initiatives. A study by McKinsey & Company reported that their digital transformation speed and success rate advanced seven years in just a few months (Consultancy.uk, 2020). Many of Morningdale's counterparts have only just embarked on the journey of digital transformation due to the additional pressure brought on by the pandemic. However, since Morningdale was designated as a COVID-free hub, it did not have to bear the same heavy burden in terms of manpower and resources as the other hospitals did. It could, therefore, focus on strengthening the provisions of its medical services and other support systems. In addition, since the CEO, Andrea, is an experienced accounting and cost system reformer, Morningdale should take advantage of this opportunity to improve its cost management and operations to remain as leader in the industry.

### Threats

Morningdale's performances in IT development and medical services is likely to be surpassed by other peers. Currently only three hospitals in the U.K. (Sunderland Royal Hospital, Cambridge University Hospitals, and Great Ormond Street Hospital) have attained Stage 7 status, which is the highest level, of the Healthcare Information and Management Systems Society (HIMSS) Electronic Medical Record Adoption Model (EMRAM). With its Stage 6 attainment, Morningdale should set its target on attaining Stage 7 of the model as soon as possible in order to stay competitive. As the full impact of the pandemic on elective care in England continues to emerge, the threat to all healthcare facilities remains imminent. Although Morningdale was still offering elective surgeries in addition to regular care services during the pandemic, people simply avoided going to any healthcare facility out of fear that they might contract the COVID-19 virus.

## Impact of the Pandemic on Digital Transformation

The pandemic led to governments around the world ordering lockdowns. Many organizations quickly realized they had to adapt and rely on technology to engage with customers and allow for workplace flexibility.

The pandemic accelerated digital transformation and created a landscape that will continue to encourage innovation and technological adoption moving forward. As businesses better understand the capabilities of modern technology, they will begin to take advantage of the opportunities that lie before them even after the pandemic ends (Sointu, 2020).

Morningdale must build strong links that include organizational, financial, and clinical structures and processes. The hospital needs to integrate telehealth technology with electronic health records. To address its revenue challenges, Morningdale should adopt a value-based care system. In addition to managing revenue, Morningdale must also focus on reducing costs and limiting budgets. At the height of the pandemic, management of the hospital needed to accelerate its decision-making process to address challenges such as shortage of medicines, personal protective equipment, and personnel, as well as to develop protocols for treating patients safely and protecting staff. The urgency of the crisis prompted rapid experimentation with new ways of managing operational processes. Morningdale needs to continue to identify and adopt new digital health technologies. Digital transformation plays a crucial role in Morningdale's optimization process, helping to increase operational and financial efficiency (Glaser, Overhage, Gupitill, & Appleby, 2020).

### **Traditional Costing and Activity-Based Costing**

Traditional standard costing methods use a single overhead rate to allocate costs, resulting in distortions in indirect costs and accounting reports. These methods do not typically provide managerial interpretation and definition of tasks that determine the control of deviations relevant to specific problems. Growing dissatisfaction with traditional standard costing methods led to the creation of Activity-Based Costing (ABC) method. Table A2 presents the key concepts of ABC method (Weygandt, Kimmel, & Kieso, 2018).

Table A2

#### *Key Concepts of Activity-Based Costing Method*

| Key concepts       | Explanations                                                                                                           |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| Activity           | Any event, action, transaction, or work sequence that incurs costs when a product is produced or service is performed. |
| Activity cost pool | Cost attributed to a distinct activity (e.g., ordering materials or setting up machines).                              |
| Cost driver        | Any factor or activity that has a direct cause-effect relation with the resources consumed.                            |

#### **Compute Patient-Level Costs Using ABC Method**

In Step 3 of the ABC method, costs are categorized into one of the following five categories: Direct Material (DirM), Indirect Material (IndM), Direct Labor (DirL), Indirect Labor (IndL), and Indirect Cost (IndC). Step 4 identifies the cost drivers as either number of patients (No.pat = 11,000 annually) or time used (Min. = 120,000 minutes). Step 5 computes cost driver rates, which are applied to services rendered to calculate the cost of allocated activities. Information on actual quantity of allocation base can be found in Step 5 in the case.

#### **Completion of the Cost Analysis: Compute Patient-Level Total Costs Using ABC Method**

Summation of the total allocated activity costs gives a final total cost of \$575.80 for an endoscopic procedure at Morningdale Hospital (see Table A3).

Table A3

*Computation of Cost Driver Rate and Allocation of Activity Cost*

| Component activity               | ABC<br>Step 3 | ABC Step 4        |             | ABC Step 5                           |                           |                                          |                                  |
|----------------------------------|---------------|-------------------|-------------|--------------------------------------|---------------------------|------------------------------------------|----------------------------------|
|                                  | Cate-<br>gory | Annual cost<br>\$ | Cost driver | Annual<br>quantity of<br>cost driver | Cost<br>Driver rate<br>\$ | Actual<br>quantity of<br>allocation base | Allocated<br>activity cost<br>\$ |
| Pre-procedure:                   |               |                   |             |                                      |                           |                                          |                                  |
| Referral and scheduling          |               |                   |             |                                      |                           |                                          |                                  |
| Scheduling pod                   | IndL          | 169,176           | No.pat      | 11,000                               | 15.38                     | 1                                        | 15.38                            |
| Office secretary                 | DirL          | 80,000            | Min.        | 120,000                              | 0.67                      | 30                                       | 20.00                            |
| Day of procedure:                |               |                   |             |                                      |                           |                                          |                                  |
| Endoscopic processing            |               |                   |             |                                      |                           |                                          |                                  |
| Patient registration—RN          | DirL          | 140,000           | Min.        | 120,000                              | 1.17                      | 30                                       | 35.00                            |
| IV insertions                    | DirM          | 9,460             | No.pat      | 11,000                               | 0.86                      | 1                                        | 0.86                             |
| IV tubing                        | DirM          | 110,000           | No.pat      | 11,000                               | 10.00                     | 1                                        | 10.00                            |
| Nasal cannula                    | DirM          | 7,040             | No.pat      | 11,000                               | 0.64                      | 1                                        | 0.64                             |
| Electrocardiography leads        | DirM          | 880,000           | No.pat      | 11,000                               | 80.00                     | 1                                        | 80.00                            |
| Day of procedure:                |               |                   |             |                                      |                           |                                          |                                  |
| Endoscopic procedure             |               |                   |             |                                      |                           |                                          |                                  |
| Nurse                            | DirL          | 140,000           | Min.        | 120,000                              | 1.17                      | 45                                       | 52.50                            |
| Technician                       | DirL          | 66,000            | Min.        | 120,000                              | 0.55                      | 30                                       | 16.50                            |
| Medication—Demerol               | DirM          | 18,700            | No.pat      | 11,000                               | 1.70                      | 1                                        | 1.70                             |
| Medication—Versed                | DirM          | 40,700            | No.pat      | 11,000                               | 3.70                      | 1                                        | 3.70                             |
| Depreciation—equipment           | IndC          | 647,640           | No.pat      | 11,000                               | 58.88                     | 1                                        | 58.88                            |
| Depreciation—GI laboratory       | IndC          | 647,640           | No.pat      | 11,000                               | 58.88                     | 1                                        | 58.88                            |
| Laboratory supervisor            | DirL          | 200,000           | No.pat      | 11,000                               | 18.18                     | 1                                        | 18.18                            |
| Hospital overhead                | IndC          | 1,301,048         | No.pat      | 11,000                               | 118.28                    | 1                                        | 118.28                           |
| Day of procedure: Recovery       |               |                   |             |                                      |                           |                                          |                                  |
| Food services                    | IndL          | 261,616           | No.pat      | 11,000                               | 23.78                     | 1                                        | 23.78                            |
| Nurse                            | DirL          | 140,000           | Min.        | 120,000                              | 1.17                      | 10                                       | 11.67                            |
| Day of procedure: Scope cleaning |               |                   |             |                                      |                           |                                          |                                  |
| Technician                       | DirL          | 66,000            | Min.        | 120,000                              | 0.55                      | 20                                       | 11.00                            |
| Materials                        | IndM          | 26,292            | No.pat      | 11,000                               | 2.39                      | 1                                        | 2.39                             |
| Post procedure: Overhead costs   |               |                   |             |                                      |                           |                                          |                                  |
| Billing                          | IndL          | 401,008           | No.pat      | 11,000                               | 36.46                     | 1                                        | 36.46                            |

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