CONTENTS

2  Introduction
3  Mediclinic Southern Africa
12  Hirslanden
19  Mediclinic Middle East
27  Mediclinic International
27  Conclusion
28  Company Information

FURTHER INFORMATION

This Clinical Services Report is published as part of a set of reports, as listed below. The icons below are used as a cross-referencing tool to refer to the relevant pages of these reports or within this Clinical Services Report.

- Annual Report and Financial Statements 2017
- Clinical Services Report 2017
- Sustainable Development Report 2017
- Notice of Annual General Meeting 2017

GLOSSARY

Please refer to the glossary of terms included in the Annual Report and Financial Statements of Mediclinic for the financial year ended 31 March 2017.

CONTACT US

We welcome the opinions of our stakeholders. For any suggestions or enquiries relating to this report, please contact:

Dr Ronnie van der Merwe
Chief Clinical Officer
Mediclinic Corporate Office
25 Du Toit Street
Stellenbosch
7600
South Africa
Tel: +27 21 809 6500
E-mail: rvdm@mediclinic.com
Website: www.mediclinic.com
INTRODUCTION

During the year under review the clinical performance of the business was satisfactory across all operating platforms, and several patient safety and clinical effectiveness indicators showed improvement over time. In addition, many initiatives in support of clinical performance and quality improvement were launched and completed during the year. Highlights include the strengthening of clinical services leadership at hospital and corporate level in Mediclinic Southern Africa, close collaboration between Mediclinic Southern Africa and supporting doctors in certain disciplines, the launch of patient reported outcomes after large joint surgery in Hirslanden, progress in the implementation of an integrated care model in Hirslanden, the establishment of a comprehensive cancer centre in Mediclinic Middle East, and the selection of a new electronic health record ("EHR") system in Mediclinic Middle East.

Much of the progress can be attributed to a strong collaborative effort between the clinical services teams of the respective operating platforms.

This report summarises the most important characteristics of each operating platform, reports on clinical performance for the calendar year 1 January 2016 to 31 December 2016, and summarises the Group’s progress against clinical strategic objectives.

Mediclinic provides a wide range of hospital-related clinical services throughout its operating platforms. This includes outpatient consultation services and pre-hospital emergency services, hospital-based emergency centres, day case surgery, acute care inpatient services, and highly specialised services. Support services include laboratory, radiology and nuclear medicine.

When reviewing clinical performance please bear in mind that:

- the scope of services and model of delivery of each platform differ significantly between the platforms;
- all indicators are reported per calendar year to ensure completeness and consistency, as a significant time lag needs to be provided for in the collection of clinical data; and
- for comparative purposes the case mix indexes of the platforms were calculated by using the internally developed clinical and cost-related groupings ("CCRG") system.

Subsequent to the combination of Mediclinic International Limited and Al Noor Hospitals Group plc, the Board established a Clinical Performance and Sustainability Committee (the "Committee"), which assists the Board in, as far as it relates to its clinical performance duties:

- monitoring the clinical performance of the Group;
- evaluating patient safety, infection prevention and control ("IPC") performance and quality improvement performance;
- evaluating compliance with the Company’s patient safety and quality clinical care standards, policies and procedure and regulation and accreditation standards at the operating platforms; and
- evaluating the annual Clinical Services Report and other publicly reported clinical content.

The newly established committee met twice during the reporting period, and is functioning well, with an established agenda.

The Committee reviewed and approved this report on 22 May 2017. The Committee’s report on its composition, responsibilities and activities during the year is included in the 2017 Annual Report.
OVERVIEW

Mediclinic Southern Africa operates 52 hospitals, two day clinics and emergency services in 46 of its facilities throughout South Africa and Namibia. ER24 offers emergency transportation services from its 58 bases throughout South Africa.

The hospital services range from routine procedures and medical treatment plans provided in 15 smaller secondary care community hospitals, to complex and technologically advanced treatment modalities provided in 34 larger tertiary care city hospitals, as well as highly specialised and transplant medicine provided in three quaternary care hospitals. The majority of cases are elective in nature, but a significant portion is unscheduled, emergency and trauma related. Admitting doctors, excluding emergency care specialists within certain emergency centres, are self-employed and practise independently. Radiology, laboratory and oncology services are also provided by independent practices.

The burden of disease of the Southern African population consists mainly of communicable (infectious) diseases of which HIV and pulmonary TB are prominent, followed by chronic diseases and trauma. In the medical scheme population, as a subset of the general population, chronic diseases are more prominent, followed by communicable diseases and trauma.

The proportion of patients who were admitted to the group’s hospitals with chronic underlying medical conditions in 2016 was 32.5%, and 69.3% of adult patients admitted were overweight or obese. Hypertension, diabetes mellitus and hyperlipidaemia were the most common underlying chronic conditions.

The CCRG case mix index of Mediclinic Southern Africa for 2016 was 1.22 compared to 1.50 for Hirslanden and 1.09 for Mediclinic Middle East. The inpatient length of stay measured in calendar days of Mediclinic Southern Africa for 2016 was 4.0 compared to 4.9 days for Hirslanden and 3.06 for Mediclinic Middle East.

Leadership is indispensable in the promotion of quality and safety of patient care. Therefore, Mediclinic Southern Africa reorganised its clinical departments at corporate office into one multidisciplinary team, and appointed clinical specialists in the areas of theatre management, critical care, obstetrics and neonatology. The multi-disciplinary clinical hospital committees drive quality and safety and promote cooperation between doctors, nursing staff and management at hospital level.

Doctors are monitored through annual validation of registration, investigations of deteriorating hospital clinical quality indicators, mortality audits, serious adverse events investigations, complaints from patients, doctors and staff, medico-legal investigations, ethics line reports, clinical hospital committee meetings, direct reporting by doctors, and informal feedback from staff regarding any recurrent concerns.

Quality and safety of patient care are reliant on a well-trained, skilled and experienced healthcare workforce. Mediclinic Southern Africa is refining its performance surveillance and continuous professional development capabilities, and the company spent approximately 3.2% of payroll on training during the year.

CLINICAL PERFORMANCE

PATIENT SAFETY

A core, collective priority of clinical care delivery at Mediclinic Southern Africa is to prevent harm from reaching the patients in our care. This system-wide improvement work starts with entrenching a reporting culture where events of patient harm are freely reported for analysis and learning so that barriers of defence can be strengthened. Recognised as a global challenge, under-reporting of errors has and will continue to receive austere attention as the organisation acknowledges the fundamental importance of understanding all threats to patient safety.

The system through which safe clinical care is delivered is robust and balances quality control and improvement, with responsive action planning based on the most recent clinical outcomes data. Advances of this system include capacitating the clinical leadership and frontline to deliver effective patient safety initiatives, and paving the way for further improvement work.
ADVERSE EVENTS

Nursing care sensitive indicator outcomes are seen in Figure 1. The rate of medication errors shows an increase from the previous reporting period, which is mainly attributed to an initiative undertaken by pharmacy to improve the identification and reporting of medication errors. Patient fall rates reduced to 1.07 and the in-hospital pressure ulcer rate increased with 0.01 to 0.27. Improvement work in these domains continue under the leadership of hospital clinical teams.

INFECTION PREVENTION AND CONTROL

HEALTHCARE-ASSOCIATED INFECTIONS

The prevention of healthcare-associated infections ("HAI") remains a major challenge due to the significant worldwide increase in antimicrobial resistance. As a result, IPC is a key performance indicator and hospitals are focused on this aspect of their operations. The majority of the group’s hospitals have dedicated IPC specialists who are responsible for the implementation of a comprehensive IPC programme.

Mediclinic Southern Africa experienced a 15% decrease in the overall HAI rate in 2016 partly due to a strong focus on IPC, the adoption of a multi-modal approach and a change in the definitions of the Centre for Disease Control and Prevention ("CDC"). Figure 2 reflects the HAI rate per 1 000 patient days, in line with international reporting trends. A reduction of 15% in the HAI rate was reported in 2016.

The three major initiatives which Mediclinic Southern Africa is focusing on to reduce the development of HAI are: the implementation of care bundles to reduce device-associated and surgical site infections ("SSI"); improvement of hand hygiene compliance; and the implementation of an antimicrobial stewardship programme.

Figure 1: Adverse Events - Mediclinic Southern Africa

<table>
<thead>
<tr>
<th>Adverse event type</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication errors</td>
<td>1.02</td>
<td>0.86</td>
<td>1.18</td>
</tr>
<tr>
<td>Falls</td>
<td>1.05</td>
<td>1.14</td>
<td>1.01</td>
</tr>
<tr>
<td>In-hospital pressure ulcers</td>
<td>0.25</td>
<td>0.26</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Figure 2: Healthcare-Associated Infections - Mediclinic Southern Africa

<table>
<thead>
<tr>
<th>Calendar year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate per 1 000 patient days</td>
<td>2.72</td>
<td>2.19</td>
<td>1.85</td>
</tr>
</tbody>
</table>
**Figure 3** illustrates the sustained reduction in device-associated infection rates in 2016 compared to 2015 and 2014. There was a significant improvement of 28% in the ventilator-associated pneumonia (“VAP”) rate when compared to 2015, which is mostly the result of improved adherence to the VAP bundle and to basic IPC principles.

**Figure 4** illustrates the continued reduction in the SSI rate in 2016 compared to 2015 and 2014.

The second initiative is focused on hand hygiene. Hand hygiene compliance is monitored continuously. Compliance measurement, calculation of the rates and the reporting methodology are currently being refined. Guidelines and training material are based on recommendations from the World Health Organisation (“WHO”), the CDC and the Canadian Institute for Healthcare Improvement.

The third initiative involves the promotion of the rational use of antimicrobials through a comprehensive antimicrobial stewardship programme.

**ANTIMICROBIAL STEWARDSHIP**

The antimicrobial indicators are set out in **Figure 5**. The percentage of Mediclinic Southern Africa hospitals with active antimicrobial stewardship teams has remained relatively stable at 77.6%, as compared to 80% reported for the 2015 calendar year. These teams are multi-disciplinary, meet regularly and test ideas to improve the rational use of antimicrobials. The improvement initiatives resulted in a 6% reduction in the utilisation of undesired drug choices for surgical prophylaxis in 2016 compared to 2015, which can be attributed to the availability of more specific international, and national surgical prophylaxis guidelines, as well as the continuous focus on this indicator from the hospital antimicrobial stewardship teams. The number of days on four or more simultaneous antimicrobials decreased by 10% (2.60 per 1 000 patient days to 2.30 per 1 000 patient days) from 2015 to 2016. There was a small improvement of 6% in the number of patient exposures on longer than seven days of therapy due to dedicated quality improvement projects at a number of hospitals. Possible areas for improvement for the indicator were identified during this project.

**FIGURE 3: DEVICE-ASSOCIATED INFECTIONS – MEDICLINIC SOUTHERN AFRICA**

![Graph showing device-associated infections](image)

**FIGURE 4: SURGICAL SITE INFECTIONS – MEDICLINIC SOUTHERN AFRICA**

![Graph showing surgical site infections](image)
CLINICAL EFFECTIVENESS

Mediclinic Southern Africa is committed to providing safe care for its patients. Clinical performance is measured and reported on a monthly basis, and measures that allow for the assurance and improvement of the quality of care given to patients is strived for. The trends and individual results of indicators are interpreted in conjunction with other system investigations. This allows for a comprehensive view of care systems to be generated.

The effectiveness indicators and database overviews include:

- hospital mortality index;
- Simplified Acute Physiological Score (“SAPS”) 3 used in adult Critical Care Units (“CCUs”);
- 30-day re-admission rate;
- extended length of stay index;
- Adult Cardio-Thoracic Database (“ACTD”); and
- Vermont Oxford Network (“VON”) neonatal CCU database.

MORTALITY

Mortality measurements are used globally as indicators of the quality and efficacy of care. The Hospital Standardised Mortality index remains one of the most pertinent indicators used in Mediclinic Southern Africa in the monitoring of care quality. This indicator is calculated by assessing the relation of a hospital’s actual in-hospital mortalities to its expected mortalities. A risk-adjusted statistical model is used to calculate the number of expected mortalities for each hospital.

Figure 6 reflects the aggregated hospital results for Mediclinic Southern Africa for 2014, 2015 and 2016. As depicted in the figure, the crude (actual) mortality rate displays normal variation. There was a consecutive decrease in the inpatient mortality index from 1.04 in 2014 to 1.02 in 2015 and 0.95 in 2016. This is a positive trend with a desired result of less than 1.

The risk-adjusted statistical mortality model that is used to assess the expected mortality figure has been refined in recent months, which is not yet reflected in this report. The impact on future results may see a slight shift in values but ultimately the trends depicted in Figure 6 remain the same.

FIGURE 5: ANTIMICROBIAL UTILISATION INDICATORS – MEDICLINIC SOUTHERN AFRICA

Antimicrobial utilisation indicators

- Percentage of undesired prophylaxis (%)
- Rate per 1,000 days
- Rate per 1,000 exposures

2014 2015 2016

Undesired agents utilised for surgical prophylaxis:
- 7.10
- 6.12
- 5.73

Days on multi-cover (> 4 antimicrobials):
- 270
- 260
- 230

Prolonged treatment per 1,000 exposures:
- 7.21
- 7.25
- 6.95

FIGURE 6: INPATIENT MORTALITY – MEDICLINIC SOUTHERN AFRICA

Calendar year

- Crude mortality rate
- Expected mortality rate
- Mortality index

2014 2015 2016

Mortality rate:
- 1.28%
- 1.23%
- 1.26%
- 1.24%
- 1.22%
- 1.28%
SAPS3 CRITICAL CARE MORTALITY

Mediclinic Southern Africa had been using the Acute Physiology and Chronic Health Evaluation (“APACHE”) IV score from 2013 as a predicted mortality tool in critical care. However, from February 2016 Mediclinic Southern Africa gradually shifted from using the APACHE® IV to using the SAPS3 within the adult CCUs.

As noted in Table 1, a total of 15,016 cases were captured in 2016 throughout the CCUs of the 42 participating hospitals. Although the number of captured cases is somewhat lower than the previous year, this is believed to be due to the gradual change in the predicted mortality models through 2016. Given the change in model, a year-on-year comparison is not possible. However, the SAPS3 mortality index of 0.974 in 2016, a result congruent with hospital mortality index (0.95), is promising. Continued focus on critical care skill and staffing aims to further impact these trends going forward.

EXTENDED STAY

The extended stay indicator is now documented as an index value as opposed to the extended stay rate noted in the previous reports. The extended stay index is the relation of the actual number of extended stay cases to the expected number of extended stay cases. Ideally Mediclinic Southern Africa strives to achieve an extended stay index value of one.

On comparison of the 2015 and 2016 calendar year results, the extended stay index remained stable, as reflected in Figure 7. This index is unadjusted and may be influenced by certain hospital, clinical and patient demographic factors. Given that there are no set external benchmarks against which to compare results, internal trends of the extended stay index are monitored per hospital on a monthly basis.

<table>
<thead>
<tr>
<th>TABLE 1: SAPS3 MORTALITY INDEX – MEDICLINIC SOUTHERN AFRICA</th>
<th>FIGURE 7: EXTENDED STAY INDEX – MEDICLINIC SOUTHERN AFRICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2016</strong></td>
<td></td>
</tr>
<tr>
<td>Cases</td>
<td>15,016</td>
</tr>
<tr>
<td>Average age of patients (years)</td>
<td>61.61</td>
</tr>
<tr>
<td>Number of mortality cases</td>
<td>2,513</td>
</tr>
<tr>
<td>Mortality rate (%)</td>
<td>16.74%</td>
</tr>
<tr>
<td>SAPS3 expected mortalities (cases)</td>
<td>2,580</td>
</tr>
<tr>
<td>SAPS3 expected mortality rate (%)</td>
<td>17.18%</td>
</tr>
<tr>
<td>SAPS3 mortality index</td>
<td>0.974</td>
</tr>
<tr>
<td>Average SAPS3 score</td>
<td>50.67</td>
</tr>
</tbody>
</table>

Calendar year
RE-ADMISSION

Re-admission rates are used as a proxy measure to assess the delivery of quality care provision. The re-admission rates depicted in Figure 8 review the total number of patients re-admitted within the 30-days post-discharge from hospital. Hospital re-admissions may include planned and unplanned re-admissions. The unplanned re-admissions are of greater importance as they may represent a late complication of the initial admission. Given the difficulty in delineating the planned and unplanned re-admissions in these total numbers, Mediclinic Southern Africa also monitors seven and 15-day re-admission rates. Monitoring the seven-day re-admission rate and its trends is thought to provide better insight into re-admissions secondary to problems in care provision.

From 2014 to 2016 there has been mild variation of the 30-day re-admission rate with a negligible 0.2 percentage point increase in 2016. The seven and 15-day re-admission rates remained stable.

ADULT CARDIO-THORACIC DATABASE

The ACTD is modelled on the Society of Thoracic Surgeons’ database originating in the United States. The database aims to monitor and improve outcomes of cardio-thoracic units in Mediclinic Southern Africa and has been in use since 2005.

The ACTD mortality index increased slightly in the recent year to 0.39 but shows normal variability, as reflected in Table 2. Having seen a sharp increase in re-operation rates in 2015, this has settled somewhat to 4.4% in 2016. Infections rates have also improved from previous years. Review of the mild increase in 30-day re-admission rates revealed no single attributing factor with a mild increase in respiratory infections/pneumonia noted in this group.

During the coming year Mediclinic Southern Africa will move to the updated European System for Cardiac Operative Risk Evaluation (“EuroSCORE”) II. The aim of this shift is to continuously optimise the group’s data quality and relevance.

| TABLE 2: GENERAL INDICATORS AS A PERCENTAGE OF CASES – MEDICLINIC SOUTHERN AFRICA |
|---|---|---|
| **Post-operative outcomes** | 2014 | 2015 | 2016 |
| Infections | 3.7% | 5.0% | 3.3% |
| Re-operations | 2.8% | 6.3% | 4.4% |
| **Mortality** |  |  |  |
| Expected mortality (EuroSCORE) | 11.8% | 10.3% | 12.4% |
| Actual mortality | 4.6% | 3.6% | 4.8% |
| Mortality index | 0.39 | 0.35 | 0.39 |
| Re-admission (within 30 days) | 8.3% | 8.6% | 10.7% |

| FIGURE 8: RE-ADMISSION RATES – MEDICLINIC SOUTHERN AFRICA | 12.7% | 12.3% | 12.5% |
| Calendar year | 2014 | 2015 | 2016 |
NEONATAL CRITICAL CARE – VERMONT OXFORD NETWORK
Mediclinic has contributed to the VON since 2001 and currently has 26 hospitals registered on the network. The VON is an international initiative aimed at improving the quality of care of infants. There are currently over 1 000 participating centres around the world.

Although Mediclinic Southern Africa captures all infants admitted to Neonatal Critical Care Units, included in this report are the very low birth weight (“VLBW”) newborns. This group includes neonates who weigh between 401g and 1 500g at birth or fall into a gestational age range of 22 to 29 weeks.

Figure 9 reflects the average birth weight, gestational age and number of admissions for VLBW infants. The gestational age distribution is normal, with a peak in admissions at 28 to 29 weeks’ gestation.

The average number of admissions decreased slightly and with that mortality has seen a slight decrease. However, while the overall morbidity and mortality remains less than the VON average, this has increased in the last year from 39% to 41%. This is due to an increase in cases of Necrotising Enterocolitis (“NEC”) from 6% to 8% and any late infections from 17% to 19% both well above the VON averages of 5% and 13% respectively. The past years have seen a decrease in chronic lung disease and retinopathy of prematurity which has been maintained. Focus is now moved to decreasing late infections and NEC – this being associated with early antibiotic use with no confirmed infection. The VON collaborative “Choosing Antibiotics Wisely” is being rolled out to all neonatal units and the availability of safe donor human milk for this vulnerable population is being ensured.

Units are being compared with each other per region and in-depth audits on late infection and mortality instituted from 2017.

Figure 10 reflects the key performance measures through the past three calendar years for Mediclinic Southern Africa as a percentage of cases seen.

STANDARDS
ACCREDITATION
The Council for Health Service Accreditation of Southern Africa (“COHSASA”) is contracted to accredit Mediclinic Southern Africa hospitals for compliance to healthcare standards. COHSASA is accredited by the International Society for Quality in Healthcare (“ISQua”). Thirty-seven Mediclinic Southern African hospitals are included in the COHSASA contract. Thirty-one of these hospitals hold current COHSASA accreditation. The remaining six hospitals are scheduled for external surveys during 2017 and are expected to achieve their accreditation status.
INTEGRATED CARE

CARE EXPERT

2016 was the first full year of Care Expert (hip and knee arthroplasty) product roll-out to build a network for an arthroplasty service line of hospitals and providers, having sold the product partial global fee to about 41% of the medical aid schemes’ market. At the end of 2016, 22 hospitals were fully operational on Care Expert with 53 surgeons and 302 cases done for the year. The next development stage commences with the inclusion of anaesthetists and physiotherapists to complete the global fee in 2017, as well as targeting additional qualifying schemes.

Clinical outcomes data tracking through an outcomes database, and individualised dashboard views provided great insight into a number of operational organisational structures, processes and practices. Early indications of success of the product include improved operational efficiencies, promising improvements in clinical outcomes (pulmonary embolisms, SSI reductions and all-cause re-admissions) as well as successful implementation of the clinical navigation strategy in hospitals and departments. The implementation of the Care Expert model has also produced a number of unintended benefits, like better integration and communication between the doctors and the hospital personnel, and improved patient experience outcomes.

OBSTETRIC INDICATORS DASHBOARD

An Obstetric Indicators Dashboard was created and verified in 2016. There are a number of measurements, including a weighted adverse outcome score ("WAOS") that measures 10 adverse events. The 10 measures comprise six maternal indicators (death, return to theatre, admission to CCUs, uterine rupture, third and fourth degree cervical tear, blood transfusion) and four term neonatal indicators (death within seven days of birth, APGAR score of <7 at five minutes, admission to neonatal CCUs for longer than 24 hours, and severe birth injury). Each event has a weight, which is divided by the number of deliveries to give a score – the lower the score the better for the unit. The term neonatal indicators are only for babies that weigh more than 2.5kg and are older than 37 weeks’ gestation.

A number of additional indicators are measured including HIV status at birth, stillbirth rate, type of delivery and reason for caesarean section. The indicators are made up of data collected from coding. There is no data collected by the nursing staff.

The WAOS varies widely between the hospitals from <2 to >10 (the low score being better). Specific audit documents will be used in 2017 for feedback on the WAOS score and action plans for improving the score documented on same.

FIGURE 10: KEY PERFORMANCE MEASURES – MEDICLINIC SOUTHERN AFRICA

1 CLD – chronic lung disease
2 IVH – intraventricular hemorrhage
3 PVL – periventricular leukomalacia
4 ROP – retinopathy of prematurity

---

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality excluding early deaths</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death or morbidity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any late infection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Necrotizing Enterocolitis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLD &lt; 33 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumothorax</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe IVH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cystic PVL &lt;3 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe ROP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PROGRESS AGAINST OBJECTIVES

**PATIENTS FIRST AT MEDICLINIC**
- Updated its patient safety strategy to incorporate clinical risk management.
- Developed and implemented specific training initiatives in the areas of theatre, obstetrics and infection control.
- Reviewed the current nursing management model.
- Improved the measurement of clinical performance through various initiatives.
- Shared clinical information with doctors.
- Further reduced infection rates through continuous compliance and improvement initiatives.

**INTEGRATED CARE**
- Appointed an additional seven hospital clinical managers (total of 11 appointed).
- Implemented two clinical pathways in orthopaedic surgery led by doctors.
- Developed a comprehensive and integrated emergency medicine strategy.

**CLINICAL INFORMATION SYSTEMS**
- Collaborated with Mediclinic Middle East and Hirslanden to obtain a clear understanding of detailed requirements for an EHR system along with platform’s readiness as part of the preparation work in the EHR system project.

FUTURE OBJECTIVES

**PATIENTS FIRST AT MEDICLINIC**
- Complete the implementation of specific patient safety initiatives aimed at preventing adverse events.
- Implement specific training initiatives that will further enable staff to drive quality improvement continuously.
- Develop and implement action plans that will improve hand hygiene compliance further.
- Develop action plans to improve medication safety.
- Refine clinical performance measures further.
- Share more detailed clinical information with doctors.
- Further reduce infection rates through the implementation of a comprehensive infection prevention and control strategy.

**INTEGRATED CARE**
- Phase in further hospital clinical manager appointments.
- Implement a new clinical performance oversight and governance model in collaboration with supporting doctors.
- Develop (in collaboration with supporting doctors) and implement more clinical pathways led by doctors.
- Develop a comprehensive and integrated critical care strategy.
- Implement a national stroke management strategy.

**CLINICAL INFORMATION SYSTEMS**
- Develop a clinical information readiness strategy along with an implementation roadmap.
HIRSLANDEN

OVERVIEW

Hirslanden operates 16 facilities and four outpatient clinics across 11 cantons in Switzerland. The hospital services range from routine procedures and medical treatment plans in seven smaller secondary care community hospitals to highly specialised, complex and technologically advanced treatment modalities in seven larger tertiary care city hospitals.

The majority of cases are elective in nature, and services like advanced neonatal critical care and major trauma are provided by the cantonal and university teaching facilities. Most admitting doctors are self-employed, but doctors working in the fields of hospital-based specialties like anaesthetics and internal medicine are employed at certain hospitals. Radiology, nuclear medicine and radiation oncology services are in most instances owned and operated by the hospitals themselves.

The burden of disease of the Swiss population consists mainly of chronic diseases commonly associated with lifestyle and old age. The burden of communicable (infectious) diseases and trauma is very small. The chronic underlying medical conditions that might be present in a patient on admission to a hospital may have a significant impact on the level of care the patient receives and/or length of stay such a patient will experience during hospitalisation. During 2016 the proportion of patients admitted to hospital with chronic underlying diseases was approximately 20%, and hypertension, diabetes mellitus and obesity were the most common diseases present.

The CCRG case mix index of Hirslanden was 1.50 in 2016. This is mainly due to its high load of complex and technologically advanced cases in an older population. In keeping with a high case mix index its inpatient length of stay measured in calendar days for 2016 was at 4.88 days.

Hirslanden has a well-developed organisational structure in clinical management. Every Hirslanden hospital has a quality manager, an infection control specialist, a critical incident manager as well as several sub-committees for quality, infection prevention and control and critical incident reporting. The Clinical Services department at the Hirslanden Corporate Office coordinates the activities of the sub-committees, and clinical key performance indicators monitor their activities. The affiliated doctors are integrated into this structure by established boards in several specialties. In addition, the Clinical Services department performs annual audits on various clinical policies introduced in the hospitals of the group.

There are strict entry criteria for doctors to become affiliated to Hirslanden hospitals. A comprehensive credentialling process, assisted by a clinical committee, is followed. Every doctor is evaluated at least once a year with regards to case numbers, infections, reoperations, and liability cases. Any abnormality is taken seriously and investigated by the management of the hospital. Staff is able to report problems with doctors’ performance anonymously. Impairment in performance is addressed by hospital management teams and doctors’ committees, and insufficient performance improvements lead to de-accreditation.

The recruitment and credentialling of nursing staff is a rigorous process that includes a trial period of three months during which three formal assessments take place. The continuous training of nurses is coordinated by training managers in every hospital, and resuscitation training takes place on an ongoing basis.
CLINICAL PERFORMANCE

PATIENT SAFETY

Theatre management is one of the main focus areas of patient safety. The WHO introduced the concept of a safe surgery checklist in 2007. The promising results of the evaluation period motivated Hirslanden to launch a project in 2010, and the safe surgery checklist has now been implemented across the group. Adherence is checked by unheralded annual hospital inspections, and after a second round of inspections took place the commitment to the adoption of the checklist, and especially the important team time out I are high and accepted throughout the group.

A comprehensive Patient Safety Policy summarised all patient safety improvement efforts two years ago. In 2016, the level of implementation was audited throughout the group. Most hospitals completed the introduction of missing items in the year under review.

ADVERSE EVENTS

An important aspect of improving the quality and safety of patient care is the prevention of adverse events that could cause harm to patients. However, the very low occurrence of some events prevents a systematic analysis of underlying factors. In this case, the gathering of information on near misses is a very effective method to improve the processes of care. Hirslanden diligently records all near misses.

The weighted average fall rate increased slightly in 2016, as reflected in Figure 11. The affected hospitals analysed the reasons for the increasing trend and introduced improvement measures. The incidence rates are still in line with the national prevalence.

The weighted average in-hospital pressure ulcer rate remained stable in 2016, as reflected in Figure 12, and is in line with the national prevalence.

FIGURE 11: WEIGHTED AVERAGE FALL RATE – HIRSLANDEN

FIGURE 12: WEIGHTED AVERAGE IN-HOSPITAL PRESSURE ULCER RATE – HIRSLANDEN
INFECTION PREVENTION AND CONTROL

HEALTHCARE-ASSOCIATED INFECTIONS

HAIs remain a significant risk to patients and the management thereof remains a focus. Infection prevention and control are a key performance indicator and hospitals are strongly focused on this aspect of their operations.

Figure 13 reflects a decrease in all device-associated infections in 2016. Trends which were observed in the second half of 2015 continued.

The infection rates for coronary artery bypass graft, hip and knee replacement, and colon surgery decreased when compared to 2015, as reflected in Figure 14. Every case with an infection is taken seriously and is carefully investigated at hospital level by an infection specialist who executes action plans based on their findings.

CLINICAL EFFECTIVENESS

Hirslanden has been participating in the International Quality Indicator Project (“IQIP”) since 2006. The initiative was developed over 16 years ago in the United States and by 2013 more than 400 organisations in 18 countries participated in the initiative. Although the IQIP initiative was officially discontinued by Press Ganey in 2014, and the IQIP benchmarks are no longer available for comparison, Hirslanden continues to use the indicators for internal purposes because it is convinced of the benefit of the programme.

![Figure 13: Device Associated Infections - Hirslanden](image1)

![Figure 14: Post-Operative Wound Infections for Specific Types of Procedures - Hirslanden](image2)
MORTALITY
Compared to 2015, the mortality rate decreased slightly, as reflected in Figure 15. It is still in line with international benchmarks according to the spectrum of services provided.

ADULT CRITICAL CARE MORTALITY – SAPS II
The SAPS II adult critical care mortality prediction methodology for patients in the adult critical care setting is used in the CCUs of all Hirslanden hospitals as it is a national requirement. This explains the migration to the more advanced SAPS3 which is already available.

Table 3 reflects some important statistics, the most important being the mortality index, which is the relationship between the actual and predicted mortalities. The mortality index of 0.20 in 2016 remained unchanged, and implies that the overall mortality of the scored cases was 80% better than expected. It has to be respected that a higher number of elective cases are treated in the Hirslanden CCUs.

RE-ADMISSION
The re-admission rate decreased slightly compared to the previous year, as reflected in Figure 16.

<table>
<thead>
<tr>
<th></th>
<th>HIRSLANDEN</th>
<th>SAPS II BENCHMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>7,948</td>
<td>7,861</td>
</tr>
<tr>
<td>Expected</td>
<td>11.6%</td>
<td>12.3%</td>
</tr>
<tr>
<td>Actual</td>
<td>2.5%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Mortality index</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>Average age of patients</td>
<td>67.1</td>
<td>70.0</td>
</tr>
<tr>
<td>Average length of stay in CCUs (days)</td>
<td>1.5</td>
<td>2.1</td>
</tr>
<tr>
<td>Percentage of ventilated patients</td>
<td>39.13%</td>
<td>33.30%</td>
</tr>
</tbody>
</table>

FIGURE 15: WEIGHTED AVERAGE MORTALITY – HIRSLANDEN

FIGURE 16: RE-ADMISSION RATES – HIRSLANDEN
UNSCHEDULED RETURNS TO THE OPERATING THEATRE

The weighted average rates for unscheduled returns to the operating theatre for the last three calendar years are reflected in Figure 17. Unscheduled returns to the operating theatre are not planned and are believed to be the result of early complications. The return rate increased marginally from 1.44% in 2015 to 1.45%, but the change is not statistically significant.

STANDARDS

Hirslanden hospitals participate in the International Standards Organisation (“ISO”) 9001:2008 certification in cooperation with the Swiss Association for Quality and Management Systems. In the updated requirements of ISO 9001:2015, some areas, such as risk and opportunity management and management of interested parties, are emphasised. Institutions have until the end of 2018 to adopt the new requirements. The initiative focuses on processes and is embraced by the objectives of the European Foundation for Quality Management (“EFQM”) initiative. The EFQM Excellence Model is a non-prescriptive framework based on nine criteria. The five “Enabler” criteria are concerned with what an organisation does and how it is done. The four “Results” criteria measure organisational achievements. The main objective of this model is to add value to patients and other stakeholders of the business.

FIGURE 17: IQIP WEIGHTED AVERAGE UNSCHEDULED RETURNS TO OPERATING THEATRE RATE – HIRSLANDEN
INTEGRATED CARE

PATIENT-RELATED OUTCOME MEASUREMENTS

Patient-related outcome measurements ("PROM") are seen as the future of quality evaluation in healthcare. Hirslanden initiated a pilot for orthopaedic patients facing joint replacement. Based on the SF36 survey quality of life was evaluated before and after surgery. The results, illustrated in Figure 18, are promising, and more than 300 patients could be included in the study. Pain and movement are significantly improved which underpins correct indication and process of joint replacement.

IQM

The Initiative on Quality Medicine ("IQM") is a quality measurement scheme applied by Hirslanden. The initiative has three principles: to measure quality on the basis of routine data, to publish the results, and to promote transparency and improve quality with a peer review procedure. The initiative comprises performance indicators for results, data sets and processes as well as clinical pictures and treatment forms. Over 380 hospitals participate in the initiative in Germany and Switzerland, with Hirslanden being a member since 2012.

The peer review procedure is an essential part of the IQM, which originated as a medical procedure during which clinically active doctors (the peer team) systematically analysed processes and structures. A peer review procedure is initialised if the results are significantly above or below the relevant benchmarks. Central to the procedure is the cooperative case discussion. Some of the benefits of the peer review are the possibility of uncovering local specialities, identifying weaknesses and establishing an open error culture. Principles to be applied are, among others, the clarification of statistical peculiarities, clear process rules and interdisciplinary teams.

Of the 300 available indicators, 44 already have defined quality targets and 23 cover patient safety issues. The results, provided on a half-year basis, are published annually and available on Hirslanden’s website at www.hirslanden.ch.

The 44 indicators regarding target achievement were analysed for each hospital of the platform. The performance of the hospitals is exceeding the benchmark of the initiative, as reflected in Table 4. One exception is Hirslanden Salem-Spital where several indicators have a small denominator (<10).

BREAST CANCER COMPETENCE CENTRE

An increasing number of patients suffering from breast cancer is treated in certified centres. Different certifying bodies such as Deutsche Krebsgesellschaft and Schweizerische Krebsliga are available. Existing breast cancer competence centres were recertified in 2016 (Klinik Hirslanden, Zürich and, Hirslanden Klinik Stephanshorn, St Gallen). A new breast cancer competence centre was established at Hirslanden Klinik St. Anna, Lucerne and certified according to the requirements of the Schweizerische Krebsliga. Hirslanden AndreasKlinik, Cham Zug and Hirslanden Klinik Aarau are aiming for a joint certification at the beginning of 2018. Similar projects are being launched at the group’s hospitals in Berne and Lausanne.

FIGURE 18: IMPROVEMENT OF PAIN IN KNEE REPLACEMENT PATIENTS – HIRSLANDEN

<table>
<thead>
<tr>
<th>Scale values</th>
<th>Number of Cases</th>
<th>Cases</th>
<th>F21: Physical pain</th>
<th>Mean</th>
<th>6-months post-operative</th>
<th>Mean</th>
<th>12-months post-operative</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-operative</td>
<td>33.8</td>
<td>61.6</td>
<td>70.4</td>
<td>81.1</td>
<td>62.2</td>
<td>74.4</td>
<td>62.2</td>
<td>86.8</td>
</tr>
<tr>
<td>3-months post-operative</td>
<td>35.9</td>
<td>69.4</td>
<td>72.2</td>
<td>81.1</td>
<td>62.2</td>
<td>74.4</td>
<td>62.2</td>
<td>86.8</td>
</tr>
<tr>
<td>6-months post-operative</td>
<td>243</td>
<td>197</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-months post-operative</td>
<td>119</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PROGRESS AGAINST OBJECTIVES

PATIENTS FIRST AT MEDICLINIC

- Reviewed the compliance of the hospitals with the patient safety policy – the majority of the hospitals implemented every item of the policy or was busy with the implementation of the remaining items.
- Checked the adherence to the safe surgery checklist in unheralded inspections – compared to the previous inspection there was further improvement asserted.
- Initiated a pilot project on patient related outcome measurement – patients were surveyed on quality of life before and after joint replacement. The results show a significant improvement of pain and movement by the procedure.

INTEGRATED CARE

- Compiled a policy on indication quality and introduction of indication boards – the implementation is planned in 2017.
- Successfully started the project on the introduction of fast track orthopaedics in one of the orthopaedic hospitals of the group.
- Introduced a common structure for highly specialised medicine services.

CLINICAL INFORMATION SYSTEMS

- Compiled the definition of the future documentation in catheterisation laboratories and emergency departments – the manufacturer is busy with the implementation in our electronic patient record.
- Completed the re-evaluation of the radiology information system and selected a new system – the pilot project has already started.
- Reviewed the integration of medical source data and decided to connect this project to the Hirslanden transformation exercise.

FUTURE OBJECTIVES

PATIENTS FIRST AT MEDICLINIC

- Identify patient pathway qualifying for standardisation.
- Introduce a continuous patient experience survey for all inpatients.

INTEGRATED CARE

- Continue with the definitions of the requirements of the system provider model, and develop evaluation criteria to determine the introduction status per hospital.

CLINICAL INFORMATION SYSTEMS

- Continue with the roll-out of the radiology information system in a second hospital.
- Introduce a standardised documentation approach for doctors in the electronic patient record.
- Continue with the roll-out of the patient data management system (“PDMS”).
- Conceptualise the integration of the PDMS and the electronic patient record.

| TABLE 4: IQM TARGET ACHIEVEMENT |

<table>
<thead>
<tr>
<th></th>
<th>PROPORTION OF CASES IN IQM INDICATORS (%)</th>
<th>NUMBER OF INDICATORS WITH TARGET ACHIEVEMENT</th>
<th>NUMBER OF INDICATORS WITHOUT TARGET ACHIEVEMENT</th>
<th>ACHIEVEMENT LEVEL (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQM – All participating hospitals</td>
<td>45.23</td>
<td>32</td>
<td>12</td>
<td>73.08</td>
</tr>
<tr>
<td>Klinik Hirslanden</td>
<td>59.74</td>
<td>35</td>
<td>9</td>
<td>79.55</td>
</tr>
<tr>
<td>Hirslanden Klinik Aarau</td>
<td>64.42</td>
<td>35</td>
<td>8</td>
<td>81.40</td>
</tr>
<tr>
<td>Hirslanden Klinik St. Anna</td>
<td>58.98</td>
<td>32</td>
<td>8</td>
<td>80.00</td>
</tr>
<tr>
<td>Hirslanden Klinik Birshof</td>
<td>59.30</td>
<td>20</td>
<td>6</td>
<td>76.92</td>
</tr>
<tr>
<td>Hirslanden Clinique Bois-Cerf</td>
<td>28.82</td>
<td>11</td>
<td>0</td>
<td>100.00</td>
</tr>
<tr>
<td>Hirslanden Klinik Belair</td>
<td>48.78</td>
<td>11</td>
<td>0</td>
<td>100.00</td>
</tr>
<tr>
<td>Hirslanden Klinik Birshof</td>
<td>22.09</td>
<td>10</td>
<td>0</td>
<td>100.00</td>
</tr>
<tr>
<td>Hirslanden Klinik Beau-Site</td>
<td>71.46</td>
<td>29</td>
<td>8</td>
<td>78.38</td>
</tr>
<tr>
<td>Hirslanden Clinique Cecil</td>
<td>78.14</td>
<td>38</td>
<td>1</td>
<td>97.44</td>
</tr>
<tr>
<td>Hirslanden Klinik Im Park</td>
<td>63.78</td>
<td>35</td>
<td>8</td>
<td>81.40</td>
</tr>
<tr>
<td>Hirslanden Klinik Permanence</td>
<td>27.21</td>
<td>15</td>
<td>1</td>
<td>93.75</td>
</tr>
<tr>
<td>Hirslanden Klinik Am Rosenberg</td>
<td>19.78</td>
<td>7</td>
<td>0</td>
<td>100.00</td>
</tr>
<tr>
<td>Hirslanden Salem-Spital</td>
<td>45.23</td>
<td>18</td>
<td>10</td>
<td>64.30</td>
</tr>
<tr>
<td>Hirslanden Klinik Stephanshorn</td>
<td>64.30</td>
<td>34</td>
<td>5</td>
<td>87.18</td>
</tr>
<tr>
<td>Hirslanden Clinique La Colline</td>
<td>32.86</td>
<td>24</td>
<td>2</td>
<td>92.31</td>
</tr>
<tr>
<td>Hirslanden Klinik Meggen</td>
<td>18.36</td>
<td>10</td>
<td>0</td>
<td>100.00</td>
</tr>
</tbody>
</table>
OVERVIEW

The combined Mediclinic Middle East and Al Noor hospitals group (hereinafter referred to as Mediclinic Middle East) is now the largest private healthcare provider in the UAE. The group operates six hospitals and 31 clinics. The North Wing project was successfully commissioned in September 2016 and includes a comprehensive cancer centre (established in close collaboration with Hirslanden in Switzerland), centralised laboratory, and outpatient dialysis and day surgery facilities and is located adjacent to Mediclinic City Hospital.

The relationship between the hospitals and clinics is in the form of a hub and spoke model where the multidisciplinary clinics deliver specialist consultation services as well as follow-up and referrals to the hospitals. The operational model was reorganised and each hospital will have a number of clinics reporting into the hospital structure and will function as a cluster. This will ensure closer collaboration and improve oversight of activities between the hospitals and clinics.

The hospital services range from acute care, secondary care to tertiary care advanced treatment modalities. The majority of the doctors in the group are employed on a full-time basis but are supported by a complement of independent doctors with admission privileges in the hospitals.

Oversight for clinical services is provided on corporate level by the Chief Clinical Officer who is supported by two senior corporate medical directors, quality and patient safety officers, clinical governance managers, as well as a range of oversight committees. A group Quality and Patient Safety Committee was established to discuss quality, patient safety, clinical indicators, to identify areas improvement and to approve corrective action plans. A patient safety strategy for the combined group was agreed upon.

Every doctor is evaluated once a year through a structured doctor performance appraisal process. This includes feedback from peers and patients, review of key performance indicators and any incidents and quality issues. Privileging is reviewed annually and depends on the physician's activity during the past year and additional skills obtained. Incident reporting is comprehensive and any concerns raised are dealt with by the medical director and the clinical quality patient safety committee. All patient complaints are carefully investigated. If any problems arise at any time immediate action is taken which can range from counselling, remedial action, suspension of privileges or if appropriate, termination of privileges.

The burden of disease of the UAE population mainly consists of chronic diseases of lifestyle and communicable diseases. The chronic underlying medical conditions that might be present in a patient on admission to a hospital may have a significant impact on the level of care the patient receives and/ or length of stay such a patient will experience during hospitalisation.

All Mediclinic Middle East hospitals have full-time medical directors coordinating the clinical activities in the facility, and each hospital has active and functioning clinical hospital committees. The medical affairs board gives feedback to the senior management team and provides the clinical oversight and leadership in the hospitals. The multi-disciplinary medical affairs board is chaired by the medical director. There are six sub-committees covering key areas such as infection control, clinical risk management, credentialling, research, patient safety and pharmaceutical use.

Each of the multi-disciplinary outpatient clinics also has a practising clinician as its medical director. The medical director is responsible for all the clinical aspects of the clinic and forms an integral part of the platform's clinical management structure. All physicians undergo a formal credentialling and privileging process through a well-structured and functioning credentialling and privileging committee. A standardised physician appraisal process has been agreed in the group and will be rolled out during 2017.

The 2016 CCRG case mix index of Mediclinic Middle East was the lowest of the three platforms at 1.09 due to its young patient population. Inpatient length of stay measured in calendar days was a relatively short, at 3.06 days, which is in keeping with its low case mix index.
A formal affiliation agreement with the Mohamed Bin Rashid University of Medicine and Health Sciences was concluded and signed in May 2016, and Mediclinic City Hospital was approved as a training site for medical students. The first medical student intake took place in September 2016. The affiliation agreement defines the relationship between Mediclinic City Hospital as a training site and the university.

CLINICAL PERFORMANCE

PATIENT SAFETY

A revised patient safety strategy, that includes the following key deliverables has been agreed to be in line with the Patients First strategic objective of Mediclinic International:

- standardisation of policies and documents;
- JCI accreditation plan;
- group Quality and Patient Safety Committee;
- standardised clinical indicators to comply with regulatory requirements;
- clinical audit and documentation plan;
- alignment with the six international patient safety goals of the JCI;
- extensive use of audits;
- mandatory use of the surgical safety checklist across the group; and
- standardisation of physician appraisal throughout the group.

ADVERSE EVENTS

There was an increase in the medication error rate – categorised in different categories (prescription errors, administration errors and dispensing errors) – from 0.6 to 1.3 per 1 000 patient days in 2016. Although the rate increased, the vast majority of medication errors (approximately 98%) were prescription errors and were identified and rectified before reaching the patient. The early identification of prescription errors was enabled by a pharmacy initiative, focussing on identification and reporting of prescription errors. Medication management continues to be a focus area for the group and is monitored and investigated on an ongoing basis.

There was a marginal increase in the fall rate recorded for inpatients during 2016. Fall assessments and the required interventions were reinforced across the group. The rate of inpatient pressure ulcers shows a marked decrease from 0.5 to 0.2 per 1 000 patient days. This can be mainly attributed to the implementation of the appropriate clinical risk prevention strategies and protocols in all clinical areas.

Figure 19 reflects the most pertinent adverse events during 2016.
INFECTION PREVENTION AND CONTROL

HEALTHCARE-ASSOCIATED INFECTIONS

Prevention of HAI remains a key patient safety objective for Mediclinic Middle East. This includes standardisation of processes around infection control (based on international best practices), implementation of care bundles (SSI, VAP, central line-associated bloodstream infections ("CLABSI") and catheter-associated urinary tract infections ("CAUTI") and a surveillance programme with a multilayer methodology.

This methodology includes surveillance that is active and passive, patient and laboratory-based, prospective and retrospective, priority-directed and comprehensive.

A group Infection Control Committee was established to standardise the infection control policies and procedures across the group. There are dedicated, internationally certified, infection control officers in each hospital and in the ambulatory care facilities. This is the combined responsibility of the head nurse and the medical directors of the clinic. Infection control link team members are identified for each facility and receive regulatory authority accredited training.

Figure 20 reflects the overall HAI rate for the group. The HAI rate is low and decreased from 1.6 to 1.3 largely due to the implementation of reliable evidence-based practices.

While there was a marginal increase in the CAUTI rate for 2016 from 0.3 to 0.4 per 1 000 device days, as reflected in Figure 21, there was a significant reduction in the VAP rates and CLABSI rates for 2016. This can be attributed to implementation of reliable evidence-based practices, such as the use of strict antimicrobial guidelines and bundles. The CDC ventilator-associated event methodology was implemented across the group.

Figure 22 indicates the SSI rate, which increased from 3.4 in 2015 to 4.8 per 1 000 device days in 2016. The majority of SSI were recorded post-caesarean section. After a root-cause analysis was done, corrective action plans were implemented, with a specific focus on the appropriate surgical antibiotic prophylaxis and a review of the current infection control practices.
CLINICAL EFFECTIVENESS

MORTALITY

Figure 23 reflects the actual mortality rates for Mediclinic Middle East hospitals. These figures have not as yet been adjusted for severity of disease, types of surgery or other patient factors. For the same reasons, expected mortality figures cannot be calculated.

Actual mortality decreased from 0.26% to 0.24% in 2016 and remained lower than the actual mortality for both Mediclinic Southern Africa and Hirslanden. This is due to the fact that the UAE has a young population (average age of 32 years), and the types of surgery performed are in general not as invasive and complex as in the other two operating platforms.

ADULT CRITICAL CARE MORTALITY – APACHE® IV

Mediclinic Middle East used the APACHE® IV scoring system in the CCUs in the two hospitals in Dubai until September 2016. SAPS3 was subsequently rolled out in all the hospitals in Mediclinic Middle East in October 2016 and reports will be available in next year’s Clinical Services Report.

A summary of the key statistics in Table 5 only reflects the data of Mediclinic City Hospital and Mediclinic Welcare Hospital in Dubai until September 2016.

RE-ADMISSION

Figure 24 reflects the 30-day re-admission rate for the hospitals. The re-admission rate markedly decreased from 1.9% to 1%. All admission types, except oncology, are included in the calculation. Comparable benchmarks are not readily available.

### Table 5: APACHE® IV Mortality Index – Mediclinic Middle East

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>1,398</td>
<td>1,388</td>
</tr>
<tr>
<td>Average age of patients (years)</td>
<td>54.2</td>
<td>55.9</td>
</tr>
<tr>
<td>Number of mortality cases</td>
<td>22</td>
<td>39</td>
</tr>
<tr>
<td>Mortality rate (%)</td>
<td>1.6%</td>
<td>2.8%</td>
</tr>
<tr>
<td>APACHE® IV expected mortalities (cases)</td>
<td>52.1</td>
<td>63.2</td>
</tr>
<tr>
<td>APACHE® IV expected mortality rate (%)</td>
<td>3.7%</td>
<td>4.6%</td>
</tr>
<tr>
<td>APACHE® IV mortality index</td>
<td>0.42</td>
<td>0.62</td>
</tr>
<tr>
<td>Average CCU length of stay (days)</td>
<td>1.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Average APACHE® IV expected CCU length of stay (days)</td>
<td>3.3</td>
<td>3.4</td>
</tr>
<tr>
<td>Average APACHE® IV length of stay index</td>
<td>0.59</td>
<td>0.53</td>
</tr>
<tr>
<td>Average APACHE® IV score</td>
<td>25.4</td>
<td>27.6</td>
</tr>
<tr>
<td>Average APS score</td>
<td>17.8</td>
<td>19.2</td>
</tr>
<tr>
<td>Number and percentage of ventilated cases</td>
<td>72 (5.2%)</td>
<td>85 (6.1%)</td>
</tr>
</tbody>
</table>

### Figure 23: Inpatient Mortality – Mediclinic Middle East

### Figure 24: Re-admission Rates – Mediclinic Middle East
ADULT CARDIO-THORACIC SURGERY
The ACTD has been implemented at Mediclinic City Hospital since 2009. Although the primary aim of the ACTD initiative is to measure and improve the clinical outcomes of cardio-thoracic surgery, it also enables the comparison of results between the Mediclinic Group’s operating platforms. The updated version will be released in 2017 and will be rolled out across Mediclinic Middle East.

Table 6 reflects the relevant indicators and clinical outcomes for cardiac surgery cases for Mediclinic City Hospital when compared over a three-year period. There were no actual mortalities recorded.

**TABLE 6: GENERAL INDICATORS AS A PERCENTAGE OF CASES**

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-operative outcomes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infections</td>
<td>0.0%</td>
<td>1.4%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Re-operation</td>
<td>0.0%</td>
<td>4.2%</td>
<td>1.7%</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected mortality (EuroSCORE)</td>
<td>7.7%</td>
<td>7.7%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Actual mortality</td>
<td>3.0%</td>
<td>1.4%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Mortality index</td>
<td>0.40</td>
<td>0.18</td>
<td>0.00</td>
</tr>
<tr>
<td>Re-admission (30 days)</td>
<td>1.5%</td>
<td>2.8%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

**FIGURE 25: AVERAGE BIRTH WEIGHT, GESTATION AGE AND ADMISSIONS FOR VLBW INFANTS – MEDICLINIC MIDDLE EAST**

NEONATAL CRITICAL CARE – VERMONT OXFORD NETWORK
Both Mediclinic Middle East hospitals in Dubai have been participating in the initiative for some time, with good results. Although all infants admitted to the neonatal CCUs are included in the programme, this report focuses on all infants eligible for the VLBW database (infants with birth weights between 401g and 1500g or gestational ages between 22 and 29 weeks). Refer to Figure 25.

The reported performance measures were changed to bring the measures in line with the “key performance” measures reported by VON. The conditions reported in the “key performance” measures contribute to the long-term clinical outcomes of the infants and are used in the calculation of the “Death or Morbidity” measure.

The Al Noor hospitals in Abu Dhabi and Al Ain commenced participation in the VON database from 1 January 2017 and will be included in next year’s report.
**Figure 26** indicates the key performance indicators for the last three calendar years as a percentage of cases. At the time of reporting, the VON annual report for 2016 was not yet published. For comparison purposes, the VON results for the last three calendar years are shown as benchmarks.

During 2016, there were only 76 infants in the VLBW category for the two participating hospitals. There was a decrease in the percentage of death or morbidity cases, late infections and CLD (infants below 33 weeks) in the 2016 results. Cases with early onset of ROP however decreased significantly in 2016. This can be attributed to the standardisation of the diagnostic method and inclusion criteria.

**STANDARDS**

Hospital accreditation is a mandatory requirement of the Dubai Healthcare City Authority ("DHCA"), the Dubai Healthcare Authority ("DHA") and the Health Authority of Abu Dhabi ("HAAD"). All the Dubai facilities, as well as the Al Noor Al Ain hospital were successfully re-accredited by JCI during the latter part of 2016.

Mediclinic Corniche (Abu Dhabi) and Mediclinic Al Hili (Al Ain) were successfully accredited by JCI in July 2016. Mediclinic Al Noor Hospital (formerly Al Noor Khalifa Street Hospital) will go through a full JCI re-accreditation in November 2017. A strategy is in place to ensure that all Mediclinic Middle East facilities (both hospitals and ambulatory care facilities) are successfully accredited by JCI in 2019.

In addition to the JCI accreditation, the Mediclinic City Hospital laboratory also achieved the prestigious College of American Pathologists ("CAP") accreditation in 2009, 2011, 2013 and 2015. This laboratory also obtained ISO 15189:2009 certification in 2010, 2013 and 2016. The Mediclinic Middle East laboratories in the Abu Dhabi emirate will be certified by ISO 15189:2009 in the second quarter of 2017.

Regular inspections from the regulatory authorities (HAAD, DHA and DHCA) ensure that standards are maintained at all times. The Abu Dhabi emirate facilities nominated by HAAD are approved and certified by the Abu Dhabi environment, health and safety management system.

---

**FIGURE 26: KEY PERFORMANCE MEASURES – MEDICLINIC MIDDLE EAST**

---

1. CLD – chronic lung disease
2. IVH – intraventricular haemorrhage
3. PVL – periventricular leukomalacia
4. ROP – retinopathy of prematurity
INTEGRATED CARE

BREAST CENTRE

The Mediclinic City Hospital Breast Centre was established to offer patients an internationally recognised multi-disciplinary approach to breast disease management. The team offers a range of integrated breast care services for benign and malignant diseases, including Well Woman reviews, tumour removal and breast reconstruction surgery, as well as aftercare.

The Breast Centre relocated to the newly established North Wing of Mediclinic City Hospital. Radiotherapy is now available on-site as part of the Comprehensive Cancer Centre that relocated to the North Wing in September 2016. Aftercare includes the services of breast nurses and patient care coordinators, as well as lymphatic drainage procedures for post-operative patients.

The treatment protocols applied are individually tailored to each patient’s needs, and team member’s work together to ensure the best treatment for the patient concerned. A protocol for the referral and management of patients with breast disease was adopted in Mediclinic Middle East, Dubai. Mediclinic City Hospital is a regional pioneer in the field of breast imaging, with full-field digital mammography and breast MRI. It remains the only centre in Dubai to offer a full range of interventional breast radiology services, specifically stereotactic vacuum-assisted biopsy, for which its services are sought from across the UAE and beyond.

METABOLIC CENTRE

Mediclinic City Hospital established the Metabolic Centre with a full multi-disciplinary team involved in the management of patients with obesity. The unit was established with the guidance and input from the team at Hirslanden Klinik Stephanshorn in St Gallen. Strict guidelines and protocols have been defined for patients to enter the programme and currently two full-time bariatric surgeons are employed by Mediclinic City Hospital.

Al Noor Airport Road Hospital has an active bariatric surgery programme under the leadership of a bariatric surgeon. Strict guidelines and pathways are followed as stipulated by the HAAD. Discussions to standardise and coordinate services between the programmes in Mediclinic City Hospital and Al Noor Airport Road Hospital are well underway.

COMPREHENSIVE CANCER CENTRE

The North Wing project was completed and officially opened in September 2016 and is located adjacent to the Mediclinic City Hospital in Dubai Healthcare City, which hosts a Comprehensive Cancer Centre. The centre includes world-class facilities for the diagnosis and management of cancer in the UAE, Gulf Cooperation Council counties and beyond, and is being established in conjunction with Hirslanden, Switzerland.

A set of quality criteria has been agreed with Hirslanden and compliance will be carefully monitored. The layout of the facility, recruitment of key staff and equipment selection was done in conjunction with the team in Switzerland. The concept of organ-centred tumour boards was established for breast and gastrointestinal, thyroid and head and neck cancers.

CLINICAL RESEARCH

A clinical research manager was appointed to coordinate the clinical research process and develop policies and procedures for clinical research for Mediclinic Middle East. A clinical research and ethics committee was established to provide oversight, and to evaluate and to approve all clinical research projects in the group.

CENTRALISED LABORATORY

There is a clear centralisation and consolidation strategy for laboratory services in the group. The centralisation plan makes sense from a quality and business perspective. Certain clinics will only become collection sites or perform only limited point-of-care testing. The test menus in the facilities will be limited and depend on clinical needs and logistic realities. The centralised laboratory will perform majority of the high-volume tests and certain areas such as microbiology, histopathology and molecular genetics testing will be centralised. Test menus will be expanded based on clinical need and volume.

RENAL TRANSPLANT PROGRAMME

The first successful renal transplant in the UAE took place in Mediclinic City Hospital in close collaboration with Mohamed Bin Rashid University of Medicine and Health Sciences during June 2016. This was coordinated in partnership with the Saudi Centre for Organ Transplantation (“SCOT”) which provided the first two kidneys. SCOT is the reference centre for Organ Transplant in the Gulf Cooperation Countries.

SCOT is a fully government-funded organisation that works in accordance with Sharia law and the Higher Committee of Islamic Affairs in Saudi Arabia. SCOT follows the Istanbul declaration that clearly stipulates that there should be no financial benefits for the donor (or family) and no organ trafficking.

This is a major achievement for Mediclinic City Hospital and a first step to establishing an organ transplant programme, and to be recognised as centre for renal transplant in the UAE.
PROGRESS AGAINST OBJECTIVES

PATIENTS FIRST AT MEDICLINIC

- Appointed patient safety officers, established a quality department and updated its patient safety strategy.
- Successfully had all the Dubai-based facilities as well as the Mediclinic Al Ain hospital re-accredited by JCI in 2016.
- Standardised clinical indicators across the group, and created a central repository:
  - the Vermont Oxford databases were implemented in all the Al Noor facilities; and
  - the SAPS3 was implemented in all the CCUs across the combined group.
- Combined the clinical services departments of the group and implemented clinical oversight committee structures.
- Developed clinical key performance indicators (“KPIs”) for doctors.
- Not implemented, due to infrastructure and resource challenges, a clinical dashboard which does remain a priority for the future.

INTEGRATED CARE

- Signed a formal affiliation agreement with Mohamed Bin Rashid University of Health Sciences in Dubai in May 2016 as an accredited external training facility for medical students, and the first medical students started in September 2016.
- Further developed the current Breast and Metabolic Centres at Mediclinic City Hospital to streamline clinical processes.
- Successfully commissioned and opened the new Comprehensive Cancer Centre in the North Wing expansion at Mediclinic City Hospital.
- Centralised and consolidated laboratory services for the group.
- Relocated the IVF centre previously in Mediclinic Al Noor hospital to Mediclinic Al Ain Hospital.
- Reviewed the existing clinical pathways and developed additional pathways in preparation for the implementation of diagnosis-related groups (“DRG”) and the implementation of an EHR system.

CLINICAL INFORMATION SYSTEMS

- Selected a new EHR system for the group.

FUTURE OBJECTIVES

PATIENTS FIRST AT MEDICLINIC

- Continue to focus on the full integration of clinical services of the combined group.
- Standardise the doctors’ appraisal process for the combined group and implement clinical KPIs for doctors.
- Expand and implement new clinical indicators across the group.
- Expand the outcome database participation and include obstetrics and gynaecology.
- Implement a clinical indicator dashboard across the group.
- Formulate the JCI re-accreditation strategy for all the facilities in the group for 2019.
- Continue to develop clinical pathways as part of preparing for the implementation of DRGs.
- Update the quality and patient safety strategy for the group.

INTEGRATED CARE

- Formulate a clinical strategy for the units and certain key service lines for the group (Comprehensive Cancer Centre, IVF, Metabolic Centre, cardiology, cosmetics, etc.).
- Continue to develop the metabolic surgery services at Mediclinic Airport Road Hospital and prepare for accreditation of the centre.
- Further develop and expand coordinated care initiatives across the group (Breast Centre, Comprehensive Cancer Centre, Metabolic Centre, etc.).
- Continue the centralisation and consolidation strategy for laboratory services in the combined group.
- Complete the ISO certification for the laboratories in the Mediclinic Al Noor hospitals.

CLINICAL INFORMATION SYSTEMS

- Implement the newly selected EHR system across the group, over a three-year period, starting mid-2017.
MEDICLINIC INTERNATIONAL

Mediclinic International’s Clinical Services Department coordinates clinical services across the platforms. The team provides strategic direction, oversight and accountability, coordinates collaboration across operating platforms and is directly involved in selected projects.

PROGRESS AGAINST CURRENT OBJECTIVES

- The first phase of a master data management programme, compiling and governing data relating to doctors, has been concluded in Southern Africa.
- The migration from APACHE®IV to SAPS3, intensive care outcome measurement tool, has been completed in Mediclinic Southern Africa and Mediclinic Middle East.
- Clinical operational dashboards have been refined, and an obstetric management operational dashboard developed for the Southern African platform.
- The measurement of hand hygiene compliance, methodology and data collection tool, has been standardised across Mediclinic Southern Africa and Mediclinic Middle East.
- A master person index has been developed and implemented in Mediclinic Southern Africa for the identification of healthy neonates.
- Initiatives are underway to coordinate health technology assessments centrally, and will be further refined.
- Thought leadership, oversight and close collaboration has been provided in the selection of an EHR system in the Middle East and Southern African platforms.
- Continued collaboration and support are provided to Hirslanden with the implementation of their EHR systems.

FUTURE OBJECTIVES

- Refine clinical performance measures.
- Establish a patient safety sub-committee to standardise and enhance collaboration.
- Coordinate collaboration of nursing services across operating platforms.
- Coordinate collaboration of clinical risk management across operating platforms.
- Source a clinical adverse event and clinical risk management solution suitable for all operating platforms.
- Continue to provide thought leadership, oversight and close collaboration in the selection of an EHR system in Mediclinic Southern Africa.
- Continue to collaborate and provide support to Mediclinic Middle East and Hirslanden with the implementation of their EHR systems.
- Refine and optimise the clinical governance structure to enforce the “Ward-to-Board” accountability framework across the Group.

CONCLUSION

Mediclinic has developed a strong focus on clinical performance to ensure efficient, effective and safe patient care of the highest standard. This includes strategic alignment and effective collaboration between platforms. Early indications are that this approach has been successful, as illustrated by the positive trends in the report. We believe Mediclinic is well positioned to successfully manage the complexities of private healthcare delivery in the geographic areas in which we operate.
COMPANY INFORMATION

COMPANY NAME AND NUMBER

Mediclinic International plc
(formerly Al Noor Hospitals Group plc)
(incorporated and registered in England and Wales)
Company number: 08338604

REGISTERED OFFICE

Mediclinic International plc, 40 Dukes Place, London, EC3A 7HN, United Kingdom
Postal address: PO Box 456, Stellenbosch 7599, South Africa
Tel: +44 20 7954 9600 Fax: +44 20 7954 9886
Ethics Line: +27 12 543 5332 / Toll-free 0800 005 316
(South Africa only) / ethics@mediclinic.com
E-mail: info@mediclinic.com
Website: www.mediclinic.com

LISTING

FTSE sector: Health Care Equipment & Services
ISIN code: GB00B8HX8Z88
SEDOL Number: B8HX8Z8
EPIC Number: MDC
LEI: 2138002S5BSBIZTD5I60
Primary listing: London Stock Exchange (share code: MDC)
Secondary listing: JSE Limited (share code: MEI)
Secondary listing: Namibian Stock Exchange (share code: MEP)

DIRECTORS

Dr Edwin Hertzog (Chairman) (South African),
Danie Meintjes (Chief Executive Officer) (South African),
Jurgens Myburgh (Chief Financial Officer) (South African),
Alan Grieve (ind ne) (British), Seamus Keating (ind ne) (Irish),
Prof Dr Robert Leu (ind ne) (Swiss), Nandi Mandela (ind ne) (South African),
Trevor Petersen (ind ne) (South African),
Desmond Smith (Senior Independent Director) (South African),
Pieter Uys (alternate to Jannie Durand) (South African)

COMPANY SECRETARY

Capita Company Secretarial Services Limited
(Ms Victoria Dalby)
40 Dukes Place, London, EC3A 7HN, United Kingdom
Tel: +44 20 7954 9600
E-mail: Mediclinicinternational@capita.co.uk

INVESTOR RELATIONS CONTACT

Mr James Arnold
Head of Investor Relations
14 Curzon Street, London, W1J 5HN, United Kingdom
Tel: +44 20 3786 8180/1
E-mail: ir@mediclinic.com

REGISTRAR/TRANSFER SECRETARIES

United Kingdom:
Capita Asset Services (up to Friday, 18 August 2017)
The Registry, 34 Beckenham Road, Beckenham, Kent, BR3 4TU
Tel: 0871 664 0300 (UK only) or +44 371 664 0300
(# if dialling from outside the UK)
Computershare (from Monday, 21 August 2017)
The Pavilions, Bridgwater Road, Bristol, BS99 6ZZ, United Kingdom
Tel: +44 370 703 6022
E-mail: WebCorres@computershare.co.uk

South Africa:
Computershare Investor Services (Pty) Ltd
Rosebank Towers, 15 Biermann Avenue, Rosebank, 2196,
PO Box 61051, Marshalltown, 2107
Tel: +27 11 370 5000

Namibia:
Transfer Secretaries (Pty) Ltd
4 Robert Mugabe Avenue, Windhoek,
PO Box 2401, Windhoek
Tel: +264 61 227 647

CORPORATE ADVISORS

Auditors
PricewaterhouseCoopers LLP, London

Corporate Broker and Sponsors
Corporate broker:
Morgan Stanley & Co International plc
JSE (South Africa) sponsor:
Rand Merchant Bank
(a division of FirstRand Bank Limited)
NSX (Namibia) sponsor:
Simonis Storm Securities (Pty) Ltd

Legal Advisors
UK legal advisors: Slaughter and May
SA legal advisors: Cliffe Dekker Hofmeyr Inc.

Remuneration Consultant
New Bridge Street

Communication Agency
FTI Consulting
Tel: +44 20 3727 1000
E-mail: businessinquiries@fticonsulting.com