

ACT AUDITOR–GENERAL’S REPORT

**INTEGRITY OF DATA
IN THE HEALTH DIRECTORATE**

REPORT NO. 5 / 2015

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AUDIT TEAM

Greg Dare
David Kelly
Protiviti
Brett Stanton

The support of Sophie Butler-Stratton, Ronney Kassem, and Fran Holbert (Stret Pty Ltd) is appreciated.

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PA 15/02

The Speaker
ACT Legislative Assembly
Civic Square, London Circuit
CANBERRA ACT 2601

Dear Madam Speaker

I am pleased to forward to you a Performance Audit Report titled 'Integrity of Data in the Health Directorate' for tabling in the Legislative Assembly pursuant to Subsection 17(5) of the *Auditor-General Act 1996*.

Yours sincerely



Dr Maxine Cooper
Auditor-General
19 June 2015

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SUMMARY

Overall conclusion

The integrity of Activity Based Funding (ABF) data reported by the ACT Health Directorate to the Independent Hospital Pricing Authority (IHPA) for Admitted Patient and Emergency Department services is adequate.

Non-admitted Patient data integrity is inadequate. The Health Directorate needs to continue to address the root causes and impacts of errors in Non-admitted Patient data, and develop and implement policies and procedures for improvement, as a high priority. This is needed to improve the integrity of data for management information purposes and for presenting accurate information to IHPA so the ACT receives the appropriate funding. The Health Directorate estimates that for the last six months the errors in Non-admitted patient data, detected by the Audit Office, could have resulted in 'around \$2 million to \$3 million' being underclaimed. The Health Directorate has an opportunity to correct this data before its next submission, which is due in September 2015.

With the exception of Non-admitted Patient data the Health Directorate's management of ABF data is generally effective; however, there are opportunities for improvement.

Chapter conclusions

GOVERNANCE AND ACCOUNTABILITY

Improvements have been made in relation to governance over the integrity of health data since the ACT Auditor-General's report on *Emergency Department Performance Information* in 2012. However, there is scope for further improvement. Governance arrangements need to be strengthened by ensuring greater clarity in the allocation of roles and responsibilities across the Health Directorate, its Performance Information Branch, Canberra Hospital and Calvary Public Hospital in relation to data integrity. Further, the lack of outcome measures and Key Performance Indicators (KPIs) by which to manage data integrity, and the lack of assurance activities targeted at managing the key data integrity risks associated with ABF data submissions, need to be addressed.

Considerable effort has been directed to addressing most of the findings in the Audit Office's *Emergency Department Performance Information* report. Improvements in areas such as training staff in systems usage, managing user access to the systems, procedural improvements and data integrity routines implemented in the Health Directorate data warehouse environment have contributed to improved data integrity. However, there is more work to be done with respect to training, documentation and allocation of responsibilities, outcome measures, evaluation, corrective actions and assurance.

COLLECTION PROCESSES FOR ABF DATA

The internal controls for the collection of ABF-related data are adequate at both hospitals' Emergency Department and Admitted Patient areas in addressing relevant data integrity risks. Controls are established and operating such that the risk of missing data, duplication of data and data not recorded in the correct period are minimised. The risks are mitigated by both application controls in the ACT Patient Admission System (ACTPAS) and the Emergency Department Information Solution (EDIS), as well as process controls in the Admitted Patient and Emergency Department areas. ACTPAS and EDIS, as the key operational systems of the hospitals, are used in relation to every patient visit, and staff are well versed in the use and collection of ABF-related data.

Internal controls for the collection of ABF-related data in both hospitals' Non-Admitted Patient areas are inadequate to address the relevant data integrity risks. There are insufficient controls to detect missing data, duplication of data and data not recorded in the correct period, or to provide an appropriate level of data integrity over ABF-related data.

The completeness, accuracy and consistency of data collection is heavily reliant on the experience and training of clerical staff. Therefore it is important for the ACT Health Directorate to develop and implement standard policies, procedures, systems and training to assist hospital personnel, especially in the Non-admitted Patient areas.

VALIDATION OF ABF DATA

The internal controls for the validation of ABF-related data are adequate at both hospitals' Emergency Department and Admitted Patient areas in addressing relevant data integrity risks. Controls are established and operating such that the risk of invalid data is minimised.

Internal controls in the Non-Admitted Patient areas are inadequate to address the relevant data integrity risks. There are insufficient validation controls to detect mismatched or unreasonable data.

REPORTING OF ABF DATA

The ACT Health Directorate's internal controls for the reporting of ABF data are inadequate for both the ABF six monthly and annual costing data submissions, in addressing the relevant data integrity risks.

The informality of procedures adversely affects the integrity of the reporting process and places a heavy reliance on a few key individuals. The lack of analytical review of the ABF six monthly data submission, and limited validation activities for the ABF costing submission, need to be addressed.

TESTING OF ABF DATA

The Admitted Patient and Emergency Department ABF data reported to IHPA has an adequate level of data integrity. Testing identified coding errors, largely associated with front-end data entry, in the Admitted Patient and Emergency Department data; however the error rate was low. The clinical coding error rate was around seven per cent, which is reasonable. There is a low risk that the Admitted Patient and Emergency Department data reported to the Independent Hospital Pricing Authority is materially incorrect.

The quality of the Non-admitted Patient ABF data reported to IHPA requires urgent attention at both hospitals and at the Health Directorate level. The Audit Office's high level review of the data identified a high number of errors. These appear to have been due to the variety of clinics and systems that feed into the Non-admitted Patient data, the lack of standardised methods and systems across the various outpatient facilities in the two hospitals, and the lack of data assurance conducted by the hospitals and the Health Directorate. The high number of errors means that the ACT could forego Commonwealth funding (because of records with an unknown funding source).

Further, the Health Directorate does not have accurate information to plan, manage and report on Non-admitted hospital services.

Key findings

GOVERNANCE AND ACCOUNTABILITY

Paragraph

The ACT Health Directorate's *Data Quality Policy* (DGD14-006) and associated *Data Quality Framework*, both dated December 2013, existed within the Directorate during the period 1 July 2014 to 31 December 2014, and therefore supported data integrity over the Independent Hospital Pricing Authority (IHPA) submission (31 December 2014). However, despite the generic outline of roles and responsibilities of different individuals in applying the *Data Quality Policy* and Framework, there is limited understanding and a lack of documentation of data integrity roles and

2.7

responsibilities in relation to ACTPAS and EDIS. For example, Canberra Hospital's Ward Division was unclear on the procedure to resolve data validation errors or whom to go to for escalation or clarification of such errors. In addition, there was confusion generally as to responsibilities between the two hospitals and the Health Directorate's Performance Information Branch in relation to data integrity.

Shared Services ICT facilitates management of the key IT general controls of relevance to ACTPAS and EDIS: user access administration, the software change process and IT operational controls. These were tested during this audit and found to support data integrity in these systems adequately. IT general controls over the EDIS system for Calvary Hospital were also tested and found to support data integrity in the system adequately. 2.15

The Health Directorate's December 2013 *Data Quality Framework* states that the number of business units that had implemented the Framework, and the number of Data Quality Statements and indicator scores being used to benchmark data quality and monitor improvements in data quality, would be measured. Performance Information Branch was restructured and a new strategy for information management is under development. No outcome based reporting, as outlined in the *Data Quality Policy*, has been undertaken. The number of business units that have implemented the *Data Quality Framework*, and the number of Data Quality Statements and indicator scores being used to benchmark data quality and monitor improvements in data quality, have also not been measured. The effectiveness of data quality initiatives undertaken by the Health Directorate since December 2013 and any improvements that resulted are therefore unknown. 2.25

No data integrity assurance activities were undertaken by the Health Directorate to confirm that the 31 December 2014 data submission was correct. Consequently, the Health Directorate did not identify a range of data integrity issues subsequently detected by the Audit Office during fieldwork for this audit. These were: 2.28

- Admitted Patients data not able to be traced between ACTPAS and the IHPA data submission;
- data matching errors;
- significant errors and omissions associated with Non-admitted Patient data detected by the Audit Office's high level review; and
- the data errors identified in the Audit Office's substantive testing.

Further, there are no assurance activities outlined in the *Data Quality Policy* and Framework. The Health Directorate is developing a new *Information Management Strategy 2015-2016*, and this presents an opportunity to introduce the concept of assurance-related activities over ABF data into this strategy, and subsequently to apply appropriate assurance activities over IHPA data submissions in future. 2.30

COLLECTION PROCESSES FOR ABF DATA

Paragraph

Significant process design improvements have been implemented in the last two years, including:

3.5

- implementation of ICT Security Plans for ACTPAS at both hospitals and the Health Directorate, and for EDIS at Canberra Hospital. The ICT Security Plans outline the commitment by the Business System Owners to put in place adequate measures to avoid, mitigate or transfer risks associated with an information system. They include security objectives, a risk assessment, logical access controls, training requirements and requirements for audit; and
- implementation of IMPRIVATA in Canberra Hospital to provide a single log on to EDIS. This was implemented under the Rapid Sign-On initiatives. It allows users to access EDIS via swipe card technology, and also strengthens the security and accountability of EDIS records. IMPRIVATA removes the need to repeatedly type usernames and passwords, which streamlines and provides efficiency in the Emergency Department process. It enables clinicians and clerical staff to access EDIS quickly and securely.

Data mapping is different in the two hospitals' Emergency Departments. In the case of 'Review' codes, this has compromised the validity of the Health Directorate's ABF data, with possible funding implications¹ and a distortion of management information regarding the type of visit.

3.16

At both Canberra Hospital and Calvary Public Hospital there are some controls in place to enable the key aspects of EDIS usage to be monitored and to reduce the risk of data manipulation by unauthorised personnel. Both hospitals have implemented a timeframe for locking Emergency Department patient records after discharge. During a patient's care in the Emergency Department, the patient record can be changed by authorised users and all the changes are logged. On patient discharge, front-end EDIS users only have a certain period to amend patient records, and this requires an additional password to make any changes. After the specified timeframe, any changes to the patient records require action from an EDIS administrative user. Currently, this specified timeframe is different in the two hospitals. Canberra Hospital has implemented a two-day timeframe, while Calvary Public Hospital has implemented a seven-day timeframe. Given the extended timeframe, Calvary Public Hospital has an increased risk that data could be manipulated or changed within the time period.

3.18

As a general rule, training is required for all users before they are given access to EDIS. Calvary Public Hospital has developed an *EDIS Competency Assessment Framework* to support the EDIS training required by different EDIS users. The Framework covers the various EDIS user groups including ED Doctor, Clerk, Clinical

3.19

¹ The Health Directorate estimates that the value of overclaiming from the Australian Government due to the data mapping issue is in the order of \$16,000 over the six month period covered by the IHPA submission (December 2014).

Staff, ED Support, Nursing, Clinical Manager and Other units. The Competency Assessment sheet requires sign off by the trainer prior to an individual being granted access to EDIS. Canberra Hospital provides on-the-job training for Emergency Department clerical staff and doctors; however, no formalised training material is maintained centrally. Training documents prepared for training Canberra Hospital staff remain in draft (variously dated from December 2014 to April 2015).

The audit logs produced in both hospitals are insufficient to adequately monitor EDIS user activities, including through supporting reporting of unauthorised information processing activities. This deficiency increases the risk that any unauthorised information processing might not be detected. 3.22

There are inconsistent data collection processes across different Non-admitted patient areas and there are different referral management repositories in use, such as ACTPAS, Concerto, hospital share drive and e-referral system. The *Non-Admitted Patient Activity Data Standards - Data standards for the recording and counting of non-admitted patient activity*, which Health Directorate commenced work on in June 2013, are still in draft. There are no overarching policies and procedures to standardise data collection activities in the Non-admitted patient areas. This significantly compromises the accuracy and consistency of ABF-related data collected by the Non-admitted patient areas in both hospitals, as demonstrated by the testing results reported in Chapter 6. 3.39

VALIDATION OF ABF DATA

Paragraph

Calvary Public Hospital has its own policies and procedures for EDIS data validation processes. Canberra Hospital commenced developing draft EDIS policies and procedures related to the validation processes in August 2014; however, they have not been finalised and published for use by hospital personnel. This is resulting in inconsistent practices and different terminology for the types of validation activities undertaken by the hospitals. A data validation policy and associated standard procedures need to be developed and implemented covering all data validation activities in the Health Directorate, Canberra Hospital and Calvary Public Hospital. 4.12

There is a lack of tracking of the validation activities flagged by the data warehouse. Performance Information Branch is unable to keep track of whether potential errors have been addressed, or to identify the root cause of errors. For example, once action officers from the hospitals request to un-flag a potential error, the patient visit entry will disappear from the potential error list. An audit log could be generated from the data warehouse, which would identify who made changes to the data and when; however, this capability is not used. There is a risk that errors remain unaddressed by the incorrect unflagging of potential errors and there is no ability for the Health Directorate to identify error trends and systemic issues. 4.22

There are no KPIs in place to monitor data integrity activities undertaken at the hospitals or in the ACT Health Directorate. For example, there is no KPI for the timeliness of correcting flagged potential errors. An email reminder is sent to the 4.23

hospital action officers weekly; however, the data warehouse does not provide an ageing report stating the number of outstanding days for uncorrected potential errors. The capability is available in the data warehouse but has not been used.

Validation Reports from the data warehouse are generally communicated, via either SharePoint² or emails, with the hospital action officers on a weekly basis. However, this does not always occur. Ambulatory Care staff at Canberra Hospital (a Non-admitted Patient area) indicated that they had never received any validation reports from SharePoint. Additionally, the Calvary Public Hospital's Emergency Department and Casemix and Performance Unit staff indicated that they had not received any validation reports via email for the Emergency Department or Non-admitted Patients area since August 2014. The Health Directorate advised that validation reports to Calvary have been intentionally suspended until Calvary completes work to update its classification system version. The Health Directorate further advised that validation reports for the Non-admitted Patients area were not being generated into SharePoint due to the migration of data into the data warehouse in 2014 and the implementation of new business rules. The Health Directorate is also still in the process of agreeing the new business rules. Emergency Department validation reports have been ceased due to consideration of standardising the Emergency Department validation method between the two hospitals in the data warehouse. In these circumstances, unacceptable risks to the integrity of ABF-related data remain. Many potential errors in Emergency Department and Non-admitted Patient data in both hospitals are not being examined or corrected.

4.25

During the audit, the Audit Office identified a process improvement opportunity in the validation process. Validation reports are linked to the 'Visit Identifier'/'Episode Number' for all flagged potential errors. Errors related to a patient's demographics will therefore re-flag each time the patient re-presents. If demographic validation flags were linked to the patient's 'Unit Record Number' rather than the 'Visit Identifier'/'Episode Number', multiple flags requiring attention would be reduced. For example, if a 100 year old patient presents to the hospital and is subsequently discharged home, the validation reports will flag it as a potential error due to the age of the patient. The hospital will check the potential error against the patient record and confirm that it is not an error, and therefore un-flag the entry. If the same patient presents again, the validation report will flag it as a potential error again due to the linkage to the 'Visit Identifier'/'Episode Number'. If it were linked to the patient's 'Unit Record Number' the error would not re-flag.

4.26

REPORTING OF ABF DATA

Paragraph

The six monthly ABF data submission by the Health Directorate to the Independent Hospital Pricing Authority is largely prepared by one staff member from the Information Support Unit. There is no formal review of the accuracy or completeness of the data before submission, despite the fact that this data is published externally and is used to determine funding of health services in the ACT. IHPA's submission error reporting process, and validation processes undertaken on data in the data warehouse, examine data validity (i.e. conformance with business

5.9

² SharePoint is an intranet, content management, and document management platform.

rules). However, these controls do not provide assurance as to the reasonableness of the data submission. For example, errors may occur during the process to extract ABF-related data from the data warehouse, and/or in the process to modify the raw data to meet the relevant ABF reporting requirement, that will not be detected without an appropriate level of review.

The allocation of roles and responsibilities between the Health Directorate and hospitals in the review of costing data are unclear to both the hospitals and the Business Intelligence Unit.

5.20

TESTING OF ABF DATA

Paragraph

A high level review conducted by the Audit Office of the half-yearly IHPA submission for the July to December 2014 period revealed significant errors and omissions associated with Non-admitted Patient data. Of the 525,608 records in the dataset:

6.4

- 189,272 (36 per cent) contained funding source '98' (Not known)
- 310,089 (59 per cent) contained the default postcode, 9999.

These errors and omissions are concerning, for two reasons. First, they demonstrate that the integrity of Non-admitted data in the submission is low, confirming the results of the Audit Office's substantive testing of a sample of records. Second, they indicate a risk that the ACT might not be claiming its correct funding levels; Australian Government funding is not paid for services where the funding source, as reported in the IHPA submission, contains the value '98' (Not known).

The Health Directorate advised that:

6.5

Of the 189,272 records noted by the Audit Report that do not have a funding source:

155,030 records (or 82 percent of the records) related to community mental health services. While these do not have a 'funding source' within the system in which they are captured, they do have a national funding source of 'block funded'. The absence of the 'funding source' field in the data set does not impact on the level of funding from the Commonwealth for these services.

A further 15,370 records (8 percent) relate to services which are not covered by Commonwealth funding arrangements (including breast screening, primary health care and aged care assessment services).

The remaining 10 percent of cases without a valid funding source code equate to 3.9 per cent of total non-admitted services and less than one per cent of total in-scope public hospital services. ACT Health is working to address these outstanding items prior to the final submission of data to the IHPA in September 2014.

Also, in determining the state of residence of a patient or health care consumer, the 'state of residence' field is used instead of post codes. While the correct data should be provided, this error [310,089 records containing the default postcode, 9999] did not impact on funding streams to the ACT. This error has been amended and the final submission to the Commonwealth will incorporate correct postcode information.

These claims by Health were not audited.

The Health Directorate estimates that for the last six months the errors in Non-admitted patient data, detected by the Audit Office, could have resulted in 'around \$2 million to \$3 million' being underclaimed, out of an estimated total of \$304 million for 2014-15 in Australian Government funding for hospital and health services. Health has an opportunity to correct this data before its next submission, which is due in September 2015. Health needs to continue to identify the root causes and take corrective action, as noted in Recommendation 17. 6.7

The targeted sampling detected errors for Admitted Patients length of stay, Admitted Patients overlapping admissions and Emergency Department type of visit. However, the errors detected are unlikely to have a material impact on overall ABF payments. 6.18

The substantive testing identified several data fields with extremely high error rates. These require urgent investigation. The highest error rates were associated with Non-admitted patient data, particularly for the indigenous status, postcode and funding source fields. There were also a high proportion of patient notes missing for Non-admitted patient services. The results of the substantive testing indicate that there are systemic issues associated with the integrity of Non-admitted patient data. 6.22

The Health Directorate advised that the postcode error rate was related to the new IHPA submission process for the data warehouse and has subsequently been rectified, and that a new submission to IHPA with corrected postcode data has been provided and accepted by that organisation. 6.23

The two hospitals had similar clinical coding critical error rates (errors that may have an impact on ABF payments, or do not capture the episode of care correctly). The critical error rate (around seven per cent) is reasonable³. 6.26

³ As a comparison, a 2014 clinical coding audit program across 50 National Health Service hospitals in the United Kingdom detected an average error rate of 7%. See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/364476/The_quality_of_clinical_coding_in_the_NHS.pdf. Published results of Australian clinical coding audits include Cheng, Gilchrist, Robinson and Paul (2009): 16% error rate; Reid, Allen and McIntosh (2005): 15% error rate; and MacIntyre et al. (1997): 22% error rate.

Recommendations and auditee responses

The audit made 18 recommendations to address the audit findings detailed in this report. Ten recommendations have been identified as High Priority to assist in prioritising the implementation of recommendations.

In accordance with section 18 of the *Auditor-General Act 1996*, a final proposed report was provided to the Director-General of the Health Directorate and the Chief Executive Officer of Calvary Health Care Bruce for consideration and comment. The Director-General and the Chief Executive Officer of Calvary Health Care Bruce provided an overall response. In addition, the Chief Executive Officer of Calvary Health Care Bruce provided responses to each recommendation. These responses are presented after each recommendation.

Health Directorate overall response:

ACT Health welcomes the Audit Report on data integrity related to ABF systems and processes.

ACT Health notes that the report confirms that systems and processes in place for the overwhelming majority of ACT Health services accurately measures activity within our public hospitals. The report supports the initiatives undertaken in terms of counting inpatient service activity and noted the improvements in the management of Emergency Department information. While further improvements are required in terms of Non-admitted services data, there have been considerable improvements in the capture of this information over recent times.

The material impact of the issues found in relation to Non-admitted services is relatively minor. In 2014-15, the ACT estimates that it will receive approximately \$304 million in payments from the Commonwealth for public hospital services. The improvements in capturing additional Non-admitted services accurately will add approximately 1 percent to that total (or about \$2 million to \$3 million). Notwithstanding this, ACT Health is working to address this matter and anticipates that the additional activity will be able to be captured prior to the final national submission for 2014-15 which is due at the end of September 2015.

The need to establish more robust Non-admitted data systems and counting is recognised nationally. In terms of the development of nationally consistent classification systems, Non-admitted data processes are less mature than inpatient and Emergency Department services due to their breadth and the considerable variation in the provision of these services across health services in Australia.

ACT Health has already undertaken processes in relation to Non-admitted services that have enabled it to capture considerably more services for Non-admitted patients. This work increased our estimated number of national weighted activity units for Non-admitted patients from the original estimate for 2014-15 of 10,000 units to approximately 17,000 units. The additional work required to capture activity noted in the audit report will increase this figure to approximate 18,000 units for 2014-15.

In total, the ACT has estimated that we will produce a total of more than 133,000 national weighted activity units for activity that is in-scope for Commonwealth funding. While ACT Health will continue to improve the counting of Non-admitted services, the outstanding services that require capture within ABF processes in 2014-15 are estimated at less than 1 percent of total in-scope activity.

The report also notes a range of data quality assurance processes that need to be strengthened within ACT Health. While ACT Health accepts these findings, it is important to note that for 99 per cent of ACT Health services the information captured that is required to assess activity for Commonwealth funding purposes is accurate. Additional data improvements will provide for increased management information within ACT Health and provide an improved basis for understanding activity patterns and trends in service delivery.

ACT Health had already identified the need to further improve data quality assurance processes in relation to Non-admitted services and has established a range of processes to maximise data quality control within the Directorate. These include:

- The establishment of a new, comprehensive data credentialing framework which provides for more robust data validation processes across all aspects of data management from data entry, through to data collection, storage, transformation, reporting and archiving;
- The establishment of a new Branch (in 2014) to build the agency's data management capabilities and provide the means to provide a more responsive, skilled and transparent data management system for ACT Health; and
- The development of new forums that provide for improved feedback to staff in relation to data quality issues and provide for more robust reporting of data quality issues across ACT Health.

These initiatives, which have been developed over recent times will further improve the quality of ACT Health's information assets.

The Audit Report will provide a valuable tool in evaluating the effectiveness of these new processes and ensure continued improvement in data validation and quality assurance processes within ACT Health.

Calvary Health Care overall response:

Calvary welcomes the performance audit by the Auditor General in relation to the ACT Health Directorate's Data Integrity and the resultant opportunity to improve on the effectiveness of the management of health data at Calvary. We concur with the key findings of the report that the Integrity of ABF data reported for Admitted Patient and Emergency Department Services is adequate and that Non-admitted Patient data integrity is inadequate.

However we note lack of consistent Non-admitted Patient data capture is common across jurisdictions and it is generally recognised that there is not a fully developed recording system.

Calvary Health Care believes that this a project that needs immediate resources applied to improve the definition, capture, recording and counting of Non-admitted Patient data to ensure completeness of recording of all hospital data.

Further, we believe data governance could be improved across the jurisdiction if in addition to the individual reviews of the ACTPAS and related patient information systems proposed, there is a post-implementation review of ACTPAS and surrounding businesses processes including a review of reports and validation reports that both hospitals use. Calvary supports the engagement of all Health Services and ACT Health in achieving this

RECOMMENDATION 1 CHANGE MANAGEMENT (CHAPTER 2)

As the Health Directorate implements its *Information Management Strategy 2015-2016*, change management activities should include:

- a) training Health Directorate and hospital staff to ensure they have an adequate understanding of the Strategy and specifically data integrity activities; and
- b) documenting and allocating responsibility for data integrity activities for the key systems, including ACTPAS, EDIS and the Health Directorate data warehouse.

Calvary Health Care response:

- a) Accepted
- b) Accepted

RECOMMENDATION 2 OUTCOME MEASURES (CHAPTER 2)

Outcome measures for data quality (including data integrity metrics) should be developed and incorporated into the Health Directorate's *Information Strategy 2015-2016*. These should be monitored to assure the adequacy of data integrity, particularly for ABF-related data.

Calvary Health Care response:

Accepted

RECOMMENDATION 3 EVALUATION, CORRECTIVE ACTIONS AND ASSURANCE (CHAPTER 2)

The ACT Health Directorate's *Information Management Strategy 2015-2016* should clearly articulate the following:

- a) key data integrity risks associated with ABF-related data and ACT Health Directorate's IHPA data submissions; and
- b) frequency and scope of controls assessments and other assurance activities that will be undertaken to provide assurance in relation to ABF data integrity.

The ABF data integrity risks and controls assessments above will need to be updated from year to year as IHPA's data submission requirements change.

Calvary Health Care response:

- a) Accepted
- b) Accepted

RECOMMENDATION 4 DEFINE ABF-RELATED DATA MAPPING (CHAPTER 3)**HIGH PRIORITY RECOMMENDATION**

Health Directorate should develop an Emergency Department Data Dictionary to standardise the definition of ABF-related data and define ABF-related data mapping from EDIS in both hospitals to the data warehouse.

Calvary Health Care response:

Accepted

RECOMMENDATION 5 PATIENT RECORD CLOSE PERIOD (CHAPTER 3)

- a) Calvary Public Hospital should align its EDIS record close period (i.e the period after which records are locked) with that of Canberra Hospital.
- b) The Health Directorate should undertake a monthly assessment to monitor changes to patient records after the close period.

Calvary Health Care response:

- a) Accepted
- b) Accepted

RECOMMENDATION 6 TRAINING MATERIALS (CHAPTER 3)

Canberra Hospital should finalise its draft EDIS training documents and implement a mandatory requirement for staff to complete EDIS training before receiving access to the system.

Calvary Health Care response:

Not applicable

Calvary Public Hospital has sound and solid training processes with EDIS

RECOMMENDATION 7 AUDIT LOGS (CHAPTER 3)

HIGH PRIORITY RECOMMENDATION

Both Canberra Hospital and Calvary Public Hospital should establish useable audit logs for EDIS to allow monitoring activities after the close off period. The audit logs should be reviewed regularly, with results presented to the accountable hospital executives and to the Health Directorate.

Calvary Health Care response:

Accepted

RECOMMENDATION 8 GUIDELINE FOR THE NON-ADMITTED PATIENT DATA COLLECTION PROCESS (CHAPTER 3)

HIGH PRIORITY RECOMMENDATION

The Health Directorate should finalise and implement the *Non-Admitted Patient Activity Data Standards - Data standards for the recording and counting of non-admitted patient activity*.

Calvary Health Care response:

Accepted

RECOMMENDATION 9 VALIDATION PROCESSES (CHAPTER 4)**HIGH PRIORITY RECOMMENDATION**

The Health Directorate should develop and implement overarching policies and procedures related to data validation processes and activities. These should provide a consistent framework that is flexible and adaptable when needed to reflect local processes and organisation structure.

Calvary Health Care response:

Accepted

RECOMMENDATION 10 TRACKING OF VALIDATION ACTIVITIES (CHAPTER 4)

The Health Directorate should review the capability of its data warehouse and develop robust processes to track the validation activities performed by the hospitals. It should also define and promulgate the business rules required in correcting ABF-related data to ensure consistency across hospitals.

Calvary Health Care response:

Accepted

RECOMMENDATION 11 KEY PERFORMANCE INDICATORS (CHAPTER 4)**HIGH PRIORITY RECOMMENDATION**

The Health Directorate should develop KPIs for the validation of data that can be supported by information from the data warehouse.

Calvary Health Care response:

Accepted

RECOMMENDATION 12 DISTRIBUTION OF VALIDATION REPORTS (CHAPTER 4)

HIGH PRIORITY RECOMMENDATION

The Health Directorate should finalise its new business rules for data validation and incorporate these in its data warehouse, then re-commence the distribution of validation reports for the Non-admitted Patient areas at Canberra Hospital and Calvary Public Hospital and for the Calvary Public Hospital Emergency Department.

Calvary Health Care response:

Accepted

RECOMMENDATION 13 ANALYTICAL REVIEW OF REPORTING (CHAPTER 5)

HIGH PRIORITY RECOMMENDATION

The Health Directorate should perform an analytical review to quality assure the six-monthly ABF data submission before it is sent to IHPA.

Calvary Health Care response:

Not applicable

RECOMMENDATION 14 REPORTING OF ABF COSTING DATA (CHAPTER 5)

HIGH PRIORITY RECOMMENDATION

The Health Directorate should develop and publish a costing framework which:

- a) allocates roles and responsibilities between the Health Directorate and hospitals;
- b) specifies a firm schedule for hospitals to submit costings;
- c) incorporates a costing data specification;
- d) outlines a costing review and validation process; and
- e) includes an urgent issue escalation process.

Calvary Health Care response:

Accepted

RECOMMENDATION 15 RISK BASED APPROACH TO INVESTIGATIONS (CHAPTER 6)**HIGH PRIORITY RECOMMENDATION**

- a) The Health Directorate should undertake further investigation into the inconsistencies and anomalies identified by the data analytics, taking a risk-based approach to the investigation and focussing on the areas that have the potential to materially affect ABF data and funding.
- b) As a priority, the Health Directorate should review the mapping processes used to extract data from EDIS to the data warehouse , and ensure that Admitted Patient principal diagnosis and Emergency Department type of visit are mapped appropriately.

Calvary Health Care response:

- a) Accepted
- b) Accepted

RECOMMENDATION 16 LENGTH OF STAY, OVERLAPPING ADMISSIONS AND TYPE OF VISIT (CHAPTER 6)

- a) Canberra Hospital and Calvary Public Hospital should review patient records on a random and weekly basis with a focus on the fields that are included in ABF reporting.
- b) Canberra Hospital and Calvary Public Hospital should conduct refresher training for Emergency Department clerical staff on how to appropriately classify the 'type of visit' for patients presenting to the Emergency Department.

Calvary Health Care response:

- a) Accepted
- b) Accepted

RECOMMENDATION 17 NON-ADMITTED PATIENT DATA AND SYSTEMS (CHAPTER 6)

HIGH PRIORITY RECOMMENDATION

- a) The Health Directorate and Calvary Public Hospital should investigate the root causes of errors in Non-admitted patient data, including errors in the indigenous status, postcode and funding source fields in the source data and the IHPA submission and develop and implement policies and procedures for improvement.
- b) The Health Directorate should implement a single patient management system, and standardise data management policies and procedures, across all public outpatient clinics.

Calvary Health Care response:

- a) Accepted
- b) Not accepted. A single patient management system across outpatient clinics would only be appropriate for Calvary if integrated with existing systems that record outpatient data that meet specific clinical requirements

RECOMMENDATION 18 CLINICAL CODING (CHAPTER 6)

Canberra Hospital and Calvary Public Hospital should improve their clinical coding with the following process changes.

- a) Where coding is completed before the availability of the discharge summary, the medical record should be flagged, to facilitate subsequent identification of potentially incorrectly coded episodes.
- b) Where the discharge summary directly conflicts with information in the record, a query should be forwarded to the treating clinician for clarification. These queries should be followed-up and documented for future reference.

Calvary Health Care response:

- a) Accepted
- b) Accepted

1 INTRODUCTION

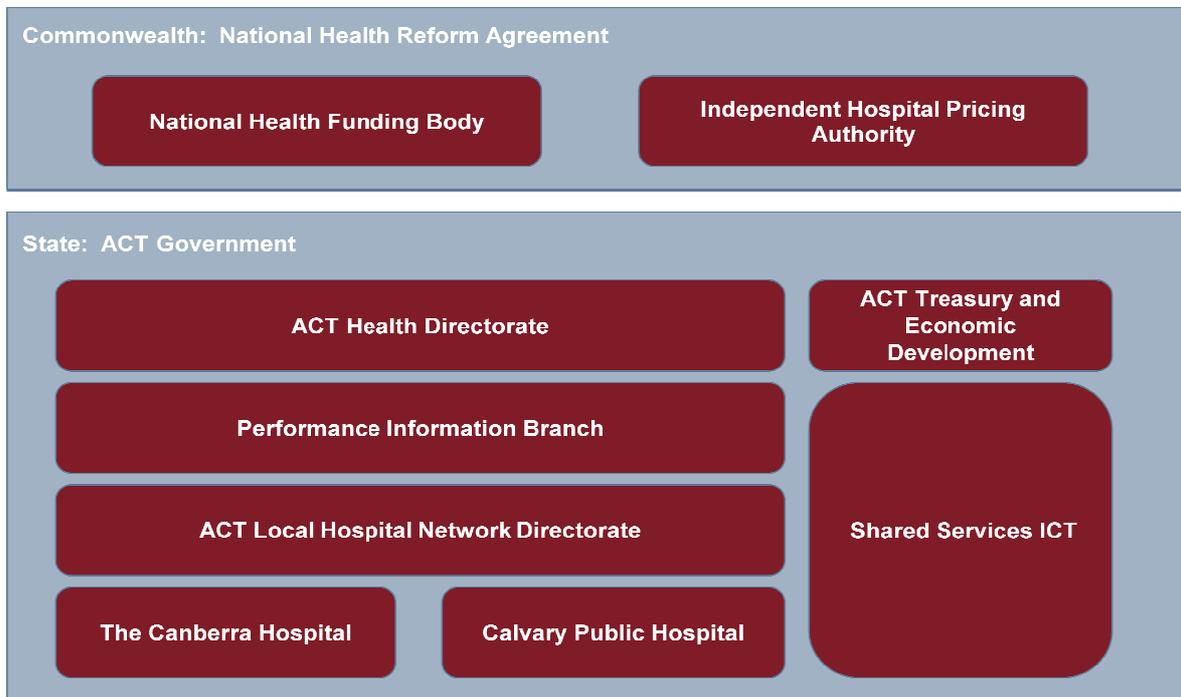
Background

- 1.1 In August 2011 the ACT Government, along with the other states and territories, entered into the *National Health Reform Agreement* (the Agreement). The Agreement sets out the shared intention to work in partnership to improve health outcomes for all Australians and to ensure the sustainability of the Australian health system. A key aim of the Agreement was to provide a stronger financial basis for the health system. This included the introduction and use of Activity Based Funding (ABF)⁴ to determine the level of payments provided by the Australian Government to the states and territories for public hospital admitted, emergency and outpatient (non-admitted) services⁵.
- 1.2 Under the ABF arrangements set out in the Agreement, state and territory governments provide activity estimates for the coming year, and report activity data monthly and six monthly to the Independent Hospital Pricing Authority (IHPA). IHPA determines the costs of treating a patient and the National Efficient Cost for public hospital services, forming the basis for ABF to be assessed by the National Health Funding Body and paid to the states and territories from the National Health Funding Pool. Data submitted to IHPA by the states and territories includes the activities, costs and expenditure for inpatient admissions, Emergency Department presentations and outpatient appointments.
- 1.3 Under the Agreement, state and territory governments are required to report high quality, robust activity data to IHPA. The ACT Health Directorate prepares IHPA submissions relating to health services data for the Australian Capital Territory. This includes information provided by Canberra Hospital and Calvary Public Hospital. There are a number of stakeholders involved in the collection, validation and assurance of this activity data. These stakeholders are shown in Figure 1-1 and paragraphs 1.4 to 1.6.

⁴ Abbreviations used throughout this report are listed at Appendix A.

⁵ The ACT Health Directorate advised that activity-based funding mechanisms for Australian Government funding of public hospital services are expected to cease after the 2016-17 financial year, with a reversion to Special Purpose Arrangements based on population and indexation calculations. However, there is no certainty of this until appropriate legislative changes are made.

Figure 1-1 Stakeholders involved in the collection, validation and assurance of activity data



Source: Prepared by Protiviti on behalf of the ACT Audit Office

- 1.4 The Performance Information Branch of the Health Directorate is responsible for the overall management of ABF-related data, providing support for data related issues to Canberra Hospital and Calvary Public Hospital, and IHPA monthly and six monthly reporting.
- 1.5 The ACT Local Hospital Network Directorate (within the Health Directorate) provides a network for public health service providers which include Canberra Hospital, Calvary Public Hospital, Clare Holland House and the Queen Elizabeth II Family Centre⁶. The purpose of the Directorate is to receive ABF and block funding from the National Health Funding Pool (contributed by the Australian Government and the ACT Government), and to purchase hospital services from ACT public hospitals. Canberra Hospital is part of the Health Directorate; the Little Company of Mary provides public hospital services through Calvary Public Hospital under a contractual agreement with the Directorate.
- 1.6 Shared Services Information Communication and Technology provides a range of technology services to the ACT Government. This includes infrastructure, business systems development and support, policy and project services. In particular, it provides IT support to the hospitals, including management of system access and Information, Communications and Technology (ICT) change management.

⁶ Clare Holland House and the Queen Elizabeth II Family Centre were not within the scope of this audit.

Audit objective and scope

- 1.7 The objective of this audit was to provide an independent opinion to the Legislative Assembly on the integrity of ABF data reported by the Health Directorate to IHPA, and to report on the effectiveness of the management of the data.
- 1.8 The audit included consideration of the adequacy of the internal controls for data integrity in the Health Directorate, Canberra Hospital and Calvary Public Hospital. This consideration extended to the governance framework and the collection, management and reporting processes for ABF data.
- 1.9 The audit considered computer system and manual controls, and performed detailed analysis and testing of ABF-related data (provided by the hospitals) and ABF data (reported to IHPA by the Health Directorate).

Audit criteria, approach and method

- 1.10 The integrity of ABF data reported by the Health Directorate to IHPA, and the effectiveness of the management of the data, were considered using the following criteria:
- The Health Directorate's ABF reporting during the period 1 July 2014 to 30 June 2015 has been accurate and complete.
 - The Health Directorate and Calvary Public Hospital have adequate controls and procedures to ensure high quality ABF data capture, recording and reporting.
 - The Health Directorate effectively manages the ACT Government's ABF reporting.
- 1.11 The audit was conducted in line with the Audit Office's *Performance Audit Methods and Practices* and related policies, practice statements and guidance papers. These policies and practices have been designed to comply with the requirements of the *Auditor-General Act 1996* and relevant professional standards (including ASAE 3500 – Performance Engagements).
- 1.12 The audit included:
- examination of processes and controls used between 1 July 2014 and 31 March 2015; and
 - detailed analysis and testing of data integrity in the data and submissions to IHPA for the period 1 July 2014 to 31 December 2014.
- 1.13 For this audit the definition of data integrity is based on the *VPS Data Integrity Manual: Guidance manual for the management of data integrity within the Victorian Public Sector (VPS)*, Department of Treasury and Finance (Victoria), 2010. This defines data integrity as a component of data quality and relates to the completeness, consistency, accuracy, validity and timeliness of data.

1.14 Figure 1-2 illustrates the definition of data integrity. The diagram highlights that ‘user needs (fitness for purpose)’ is outside the scope of this audit. An example of how data quality differs from data integrity is where data is prepared on a monthly cycle. This data may be complete, consistent, accurate, valid and timely. However, if users require management reports on a weekly basis to aid decision making, then the data prepared has integrity but does not meet user needs and therefore does not meet overall data quality requirements.

Figure 1-2 Definition of data quality and data integrity



Source: *VSP Data Integrity Manual: Guidance manual for the management of data integrity within the Victorian Public Sector (VPS)*, Department of Treasury and Finance (Victoria), 2010

1.15 The audit approach is founded on two elements: the review and assessment of controls (design element), and the testing of transactions (execution element). This approach was influenced by the ICT systems used, the findings from previous reports and a data integrity risk focus.

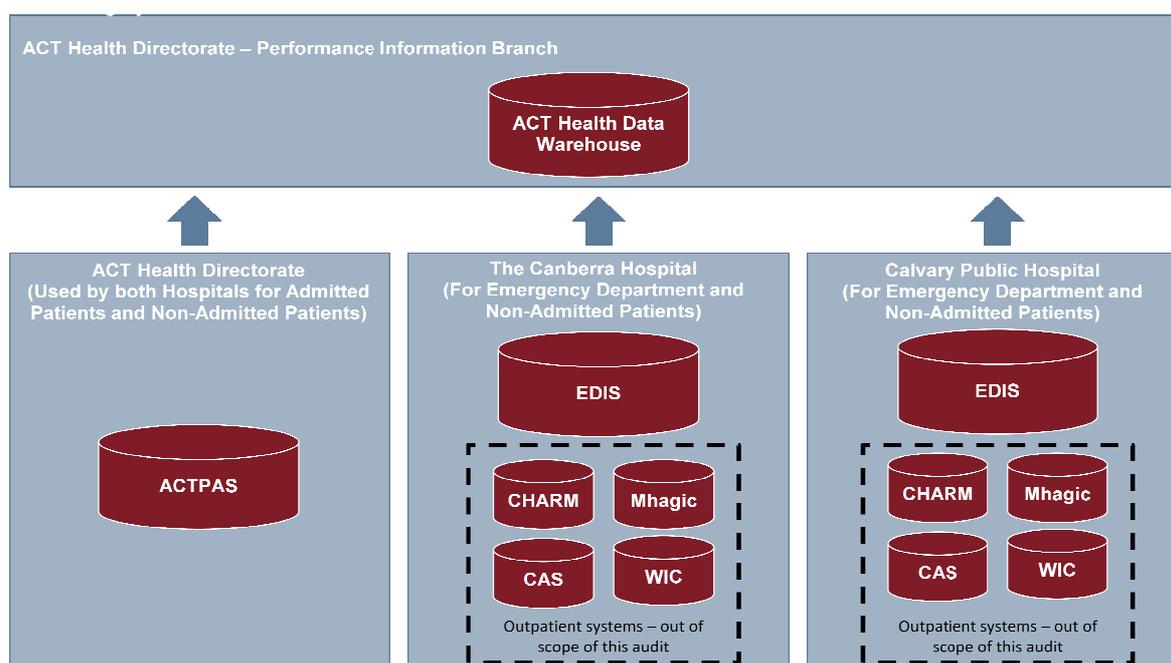
ICT Systems

1.16 A single data warehouse , maintained by the Health Directorate, is used to collate, analyse and distribute health data to a wide audience of users. The data warehouse holds the data used for IHPA reporting. The two primary ICT systems that capture health services-related data that feeds into the data warehouse , and that are the main focus for this audit, are:

- ACTPAS for admitted patients and most outpatient services; and
- EDIS for emergency services.

1.17 A common software version of the ACTPAS system is used by both Canberra Hospital and Calvary Public Hospital. A common software version of EDIS is used in both hospitals; however, this software alignment only occurred as recently as March 2015. The diagram below highlights the ICT systems considered during this audit and how they interact.

Figure 1-3 ICT systems examined



Source: Prepared by Protiviti on behalf of the ACT Audit Office

1.18 ACTPAS manages all administrative aspects of patient care within a single system. ACTPAS provides functionality including:

- patient flow management;
- scheduling (waitlist, outpatient); and
- common services including ‘admission discharge transfer’, links to the unique patient index, links to patient billing, links to clinical coding, and information management.

1.19 EDIS tracks patient attendances, movement, and subsequent care in the two Emergency Departments by enabling access to patient demographics, nursing, and clinical data. EDIS interfaces with ACTPAS in sourcing demographic information and updating ACTPAS with details of attendances and admissions entered (or amended) in EDIS.

Previous reports

1.20 Two reports over the last three years have examined ACT public hospital data.

- ACT Auditor-General’s Office, *Performance Audit Report: Emergency Department Performance Information, Report No. 6/2012*. This report concluded that there were poor systems and practices in place in the Health Directorate and Canberra Hospital for preparing and publicly reporting performance information. There was also a lack of monitoring, review and assurance processes of the integrity and accuracy of performance information. The report also noted that a newer version of EDIS was used at the Calvary Public Hospital, with more effective system access and user controls than at Canberra Hospital but using generic user logons with very poor password controls.

- PricewaterhouseCoopers Report: *Health Directorate Emergency Department Information System Data Integrity Summary Report*, June 2012. This report identified a number of process and control improvements to enhance data integrity, particularly related to establishing appropriate accountability, developing and communicating policies and procedures, and restricting access to information.

Risk focus

1.21 The ICT systems used, and the previous challenges related to systems and processes, have raised a number of potential risks which could reduce the effectiveness of the ACT Health Directorate’s management of data and the integrity of data submitted to IHPA. These potential risks were considered during the audit and an assessment was made of the adequacy of internal controls to mitigate these risks. The potential risks considered and the data integrity attribute that the risk relates to are outlined in Figure 1-4.

Figure 1-4 Potential risks to management of activity data

| Risks examined | Data Integrity | | | | |
|---|----------------|-------------|----------|----------|------------|
| | Completeness | Consistency | Accuracy | Validity | Timeliness |
| Missing data | ✓ | | | | |
| Duplication of data | ✓ | | | | |
| Use of incorrect coding, standards or policy | | ✓ | | ✓ | |
| Services did not occur | | | | ✓ | |
| False or inaccurate information | | | ✓ | | |
| Manipulation of data / unauthorised change | | | ✓ | ✓ | |
| Data is not recorded in the correct period | | | | | ✓ |
| Inability to trace / cope with emerging issues or changes | | | | | ✓ |

Source: Prepared by Protiviti on behalf of the ACT Audit Office. Format of table adapted from: *VPS Data Integrity Manual: Guidance manual for the management of data integrity within the Victorian Public Sector (VPS)*, Department of Treasury and Finance, 2010

2 GOVERNANCE AND ACCOUNTABILITY

- 2.1 This chapter analyses governance over the data submitted to IHPA by the ACT Health Directorate. Assessing governance arrangements over this data enables a broader consideration of factors that influence data integrity. Subsequent chapters of this report address the more detailed processes of collection, validation and reporting of data to IHPA.

Summary

Conclusions

Improvements have been made in relation to governance over the integrity of health data since the ACT Auditor-General's report on *Emergency Department Performance Information* in 2012. However, there is scope for further improvement. Governance arrangements need to be strengthened by ensuring greater clarity in the allocation of roles and responsibilities across the Health Directorate, its Performance Information Branch, Canberra Hospital and Calvary Public Hospital in relation to data integrity. Further, the lack of outcome measures and Key Performance Indicators (KPIs) by which to manage data integrity, and the lack of assurance activities targeted at managing the key data integrity risks associated with ABF data submissions, need to be addressed.

Considerable effort has been directed to addressing most of the findings in the Audit Office's *Emergency Department Performance Information* report. Improvements in areas such as training staff in systems usage, managing user access to the systems, procedural improvements and data integrity routines implemented in the Health Directorate data warehouse environment have contributed to improved data integrity. However, there is more work to be done with respect to training, documentation and allocation of responsibilities, outcome measures, evaluation, corrective actions and assurance.

Key findings

The ACT Health Directorate's *Data Quality Policy* (DGD14-006) and associated *Data Quality Framework*, both dated December 2013, existed within the Directorate during the period 1 July 2014 to 31 December 2014, and therefore supported data integrity over the Independent Hospital Pricing Authority (IHPA) submission (31 December 2014). However, despite the generic outline of roles and responsibilities of different individuals in applying the *Data Quality Policy* and Framework, there is limited understanding and a lack of documentation of data integrity roles and responsibilities in relation to ACTPAS and EDIS. For example, Canberra Hospital's Ward Division was unclear on the procedure to resolve data validation errors or whom to go to for escalation or clarification of such errors. In addition, there was

Paragraph

2.7

confusion generally as to responsibilities between the two hospitals and the Health Directorate's Performance Information Branch in relation to data integrity.

Shared Services ICT facilitates management of the key IT general controls of relevance to ACTPAS and EDIS: user access administration, the software change process and IT operational controls. These were tested during this audit and found to support data integrity in these systems adequately. IT general controls over the EDIS system for Calvary Hospital were also tested and found to support data integrity in the system adequately. 2.15

The Health Directorate's December 2013 *Data Quality Framework* states that the number of business units that had implemented the Framework, and the number of Data Quality Statements and indicator scores being used to benchmark data quality and monitor improvements in data quality, would be measured. Performance Information Branch was restructured and a new strategy for information management is under development. No outcome based reporting, as outlined in the *Data Quality Policy*, has been undertaken. The number of business units that have implemented the *Data Quality Framework*, and the number of Data Quality Statements and indicator scores being used to benchmark data quality and monitor improvements in data quality, have also not been measured. The effectiveness of data quality initiatives undertaken by the Health Directorate since December 2013 and any improvements that resulted are therefore unknown. 2.25

No data integrity assurance activities were undertaken by the Health Directorate to confirm that the 31 December 2014 data submission was correct. Consequently, the Health Directorate did not identify a range of data integrity issues subsequently detected by the Audit Office during fieldwork for this audit. These were: 2.28

- Admitted Patients data not able to be traced between ACTPAS and the IHPA data submission;
- data matching errors;
- significant errors and omissions associated with Non-admitted Patient data detected by the Audit Office's high level review; and
- the data errors identified in the Audit Office's substantive testing.

Further, there are no assurance activities outlined in the *Data Quality Policy* and Framework. The Health Directorate is developing a new *Information Management Strategy 2015-2016*, and this presents an opportunity to introduce the concept of assurance-related activities over ABF data into this strategy, and subsequently to apply appropriate assurance activities over IHPA data submissions in future. 2.30

Data governance

- 2.2 Data governance encompasses all activities that ensure important data assets are formally managed throughout an organisation. The system of internal control within an organisation is the foundation upon which data governance and data integrity are established, and the *Internal Control – Integrated Framework*, by the Committee of Sponsoring Organisations of the Treadway Commission, May 2013 (COSO framework) is a recognised, global framework of internal control.
- 2.3 This audit assessed governance over the data submitted by the Health Directorate to IHPA by utilising the COSO framework as a guide and adapting it to the scope of this audit. In summary, the framework requires management oversight; clearly allocated responsibilities and competent staff; formal policies, procedures, controls and supporting systems; measures or KPIs to manage by; and risk based assurance activities to achieve an appropriate level of data integrity.
- 2.4 The COSO framework, its key elements and how it has been adapted to the scope of this audit is outlined in Table 2-1.

Table 2-1 COSO framework and its key elements

| COSO Component | Relevant COSO Principle (number) | Brief Description of requirement in a Data Governance context using Health Directorate terminology |
|-------------------------------|--|---|
| Control Environment | Governing Committee (3) | Committee exists with oversight responsibility for data integrity, typically an Information Technology (IT) Committee or Information Management (IM) Committee |
| Control Environment | Competent Individuals (4) | Training is delivered to ensure effective use of systems and thereby establish data holdings with appropriate integrity |
| Control Environment | Responsibility and accountability clear (5) | Responsibility allocated for business system owners, system administrators, data integrity, and associated system support roles |
| Risk Assessment | Risks understood and managed (7) | Data integrity risks assessed and actions in place to manage these risks |
| Control Activities | Procedures and controls (10) | Documented Standard Operating Procedures (including controls) exist for all aspects of systems covering the end to end process including data collection and validation |
| Control Activities | IT general controls (11) | IT general controls support the ongoing integrity of the systems and associated data holdings including information security requirements |
| Control Activities | Policies established (12) | Policy and administrative guidance, security classification of data, data quality policy and other relevant policies established |
| Information and Communication | Information to manage (13) | Information measures or KPIs are available to support the management of data, data governance and data integrity |
| Monitoring Activities | Evaluation and corrective actions to provide assurance (16 and 17) | Controls assessments, corrective action tracking and auditing plans ensure compliance with the above policy and procedures and support data integrity |

Source: COSO Framework

Governing Committee

2.5 The Health Directorate established an Information Management framework in 2012, which included Data Quality as one of the principles informing the Directorate's approach to managing information. The Health Directorate Information Management/Information Communication and Technology Committee oversaw the effectiveness of this framework. The Health Directorate advised that the Committee meets on a regular basis; however, as noted in paragraphs 2.24 and 2.25 under the 'Information to Manage' heading, no outcome-based reporting has been undertaken to inform this Committee on the effectiveness of data integrity.

Competent Individuals

- 2.6 Training materials exist for ACTPAS and EDIS. These training materials do not include data integrity activities, which is appropriate given the materials are designed for generic users of these systems. However, as outlined in Recommendation 1 below, data integrity training should be addressed as part of the implementation of the new Health Directorate *Information Strategy 2015-2016*. Without such training, data integrity relies largely on the experience of the individuals involved and is therefore more likely to be inconsistently undertaken.

Responsibility and Accountability

- 2.7 The ACT Health Directorate's *Data Quality Policy* (DGD14-006) and associated *Data Quality Framework*, both dated December 2013, existed within the Directorate during the period 1 July 2014 to 31 December 2014, and therefore supported data integrity over the Independent Hospital Pricing Authority (IHPA) submission (31 December 2014). However, despite the generic outline of roles and responsibilities of different individuals in applying the *Data Quality Policy* and Framework, there is limited understanding and a lack of documentation of data integrity roles and responsibilities in relation to ACTPAS and EDIS. For example, Canberra Hospital's Ward Division was unclear on the procedure to resolve data validation errors or whom to go to for escalation or clarification of such errors. In addition, there was confusion generally as to responsibilities between the two hospitals and the Health Directorate's Performance Information Branch in relation to data integrity.
- 2.8 Calvary Public Hospital advised that:

We believe these matters would be best addressed by re-establishing the overarching ACT Health governance around data management including the previous meeting structures which included Calvary. Over the last 12 months, with restructures occurring at ACT Health the many data governance working parties and committees have fallen away, which has impacted on the level and timeliness of consultation with Calvary Health Care.

In relation to the development of the *Information Management Strategy 2015-2016* it is noted that the consultation that occurred between the two organisations was after the document had been prepared; Calvary was not involved in the development phase.

RECOMMENDATION 1 CHANGE MANAGEMENT

As the Health Directorate implements its *Information Management Strategy 2015-2016*, change management activities should include:

- a) training Health Directorate and hospital staff to ensure they have an adequate understanding of the Strategy and specifically data integrity activities; and
- b) documenting and allocating responsibility for data integrity activities for the key systems, including ACTPAS, EDIS and the Health Directorate data warehouse.

Risks Understood & Managed

- 2.9 Security Plans are required in the ACT Government for all critical systems, in accordance with the *ACT Government ICT Security Policy* (September 2014). Security Plans establish defined business ownership and system administrator responsibility for systems, and these exist for the data warehouse, ACTPAS and for EDIS at both hospitals.

Procedures and Controls

- 2.10 Procedures and controls were in general found to exist and were adequate to support data collection at the two hospitals, with the exception of Non-admitted Patient data. However, these procedures largely exclude data integrity activities. Further details in relation to the lack of such procedures are provided in the subsequent chapters of this report.

IT General Controls

- 2.11 The patient journey at the two hospitals is supported primarily by two systems, ACTPAS for admitted patients and most outpatient services, and EDIS for emergency services. A number of other less significant systems support specific outpatient services; however, these were not within the scope of this audit.
- 2.12 A common software version of the ACTPAS system is used by both Canberra Hospital and Calvary Public Hospital. Similarly, a common software version of EDIS is used by both hospitals; however, this alignment of software versions only occurred as recently as March 2015. ACTPAS and the EDIS system for Canberra Hospital are both supported by the ACT Government's Shared Services' ICT function. Support for the EDIS system at Calvary Hospital is provided by the Calvary ICT function.
- 2.13 An ACTPAS Governance Committee operates to maintain a single governance framework over access to, the use of, and changes to the ACTPAS system. The ACTPAS Committee involves broad membership from across the Health Directorate and meets periodically, as required to fulfill its role.

- 2.14 Shared Services ICT has been in operation since 2007 to deliver whole-of-government ICT services across the Territory. It provides and manages all of the underlying IT infrastructure that supports ACTPAS, EDIS for Canberra Hospital and the Health Directorate data warehouse. Calvary Hospital manages the underlying infrastructure that supports its version of EDIS.
- 2.15 Shared Services ICT facilitates management of the key IT general controls of relevance to ACTPAS and EDIS: user access administration, the software change process and IT operational controls. These were tested during this audit and found to support data integrity in these systems adequately. IT general controls over the EDIS system for Calvary Hospital were also tested and found to support data integrity in the system adequately.
- 2.16 As outlined above, Security Plans exist for both ACTPAS and for EDIS at Canberra Hospital. These Plans are based on a risk assessment, and outline plans and actions to maintain appropriate security controls over the data holdings of these systems. Key elements of the information security controls in these plans that contribute to ABF-related data integrity include the following:
- access to these systems is only provided on a need to know basis;
 - access to these systems is only provided to staff with appropriate training;
 - the equipment that the data resides on for these systems is physically secured; and
 - strict software change management procedures and approvals are required over all changes to the ACTPAS and EDIS systems.
- 2.17 A *Services Partnership Agreement* exists between agencies and the ACT Government Shared Services function. This Agreement includes the ICT services provided, the roles and responsibilities of the parties in regard to each service, KPIs and governance arrangements. A Strategic Board, the Shared Services Governing Committee, has been established to provide governance and stewardship of the Shared Services function.
- 2.18 Additional governance layers exist to promote ongoing involvement and collaboration and consist of:
- a Customer Council, made up of deputy directors-general (or executive directors) of each directorate; and
 - Business Unit Collaboration Forums, made up of Director-level executives representing individual corporate service areas at each directorate, including an ICT forum.
- 2.19 The ICT service arrangements between the Health Directorate and Shared Services have not been subject to review within the scope of the audit. However, in regard to ACTPAS and EDIS for Canberra Hospital, no issues were identified that would indicate the support arrangements in regard to these systems are problematic.

Policies

- 2.20 The ACT Health Directorate's *Data Quality Policy* and associated *Data Quality Framework* were established in December 2013. They were developed to address the *Health Directorate Corporate Plan 2012-2017*, which identified strengthening decision support as a key strategy aiding the improvement of health services delivery and, in particular, that high quality data underpins decision support for both clinical and business decisions.
- 2.21 The *Data Quality Policy* applies to all Health Directorate employees, hospital employees, contracted medical officers, contractors, and students and it applies to all data collected, used and reported by the ACT Health Directorate.
- 2.22 The *Data Quality Framework* provides an approach to assessing and improving the quality of data created and managed by the ACT Health Directorate. It includes a data quality assessment tool, which may be used to assess the fitness for purpose of data. The Policy states that 'outcomes are measured by:
- the number of business units that have implemented the *Data Quality Framework*; and
 - Data Quality Statements and indicator scores being used to:
 - benchmark data quality; and
 - monitor improvements in data quality'.
- 2.23 The *Data Quality Policy* and *Data Quality Framework* were in force during the period covered by the 31 December 2014 IHPA data submission.

Information to Manage

- 2.24 As outlined above, data integrity metrics are needed to support the management of data integrity across the ACT Health Directorate's operations.
- 2.25 The Health Directorate's December 2013 *Data Quality Framework* states that the number of business units that had implemented the Framework, and the number of Data Quality Statements and indicator scores being used to benchmark data quality and monitor improvements in data quality, would be measured. Performance Information Branch was restructured and a new strategy for information management is under development. No outcome based reporting, as outlined in the *Data Quality Policy*, has been undertaken. The number of business units that have implemented the *Data Quality Framework*, and the number of Data Quality Statements and indicator scores being used to benchmark data quality and monitor improvements in data quality, have also not been measured. The effectiveness of data quality initiatives undertaken by the Health Directorate since December 2013 and any improvements that resulted are therefore unknown.

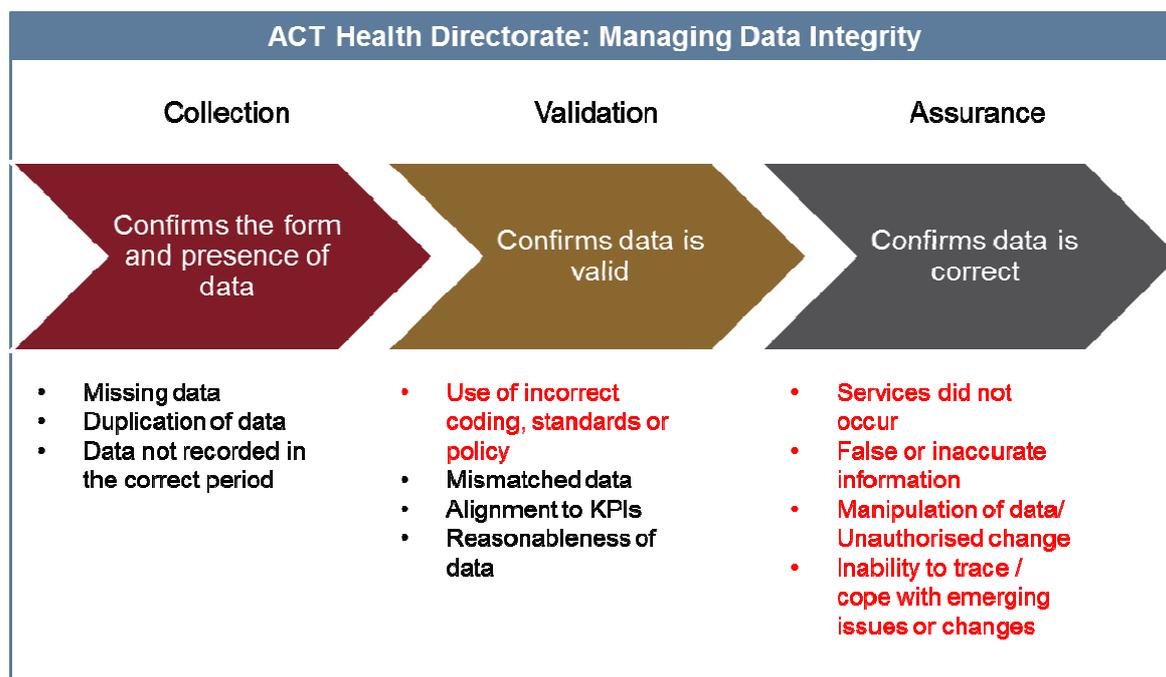
RECOMMENDATION 2 OUTCOME MEASURES

Outcome measures for data quality (including data integrity metrics) should be developed and incorporated into the Health Directorate's *Information Strategy 2015-2016*. These should be monitored to assure the adequacy of data integrity, particularly for ABF-related data.

Evaluation, Corrective Actions and Assurance

- 2.26 Better practice data integrity publications reflect a distinction between the collection, validation, and monitoring and assurance of data integrity. Key attributes of sound data integrity management identified in these publications include the following:
- systems and processes, and in particular procedures and controls, are essential to ensure adequate data integrity with a philosophy of 'getting it right first time' when data is collected;
 - validation of data is required, in particular where data is reported externally. The extent of validation should reflect an assessment of risk of the data being misstated, the importance of the data concerned and the level of accuracy and timeliness required; and
 - assurance activities should be undertaken to meet the needs of those charged with governance. Monitoring of data integrity metrics or KPIs, data quality monitoring improvement initiatives, systems and controls assessments, and auditing plans should ensure compliance with data quality and other relevant policy and procedures.
- 2.27 Material from the external sources referenced in Figure 2-1 has been used to develop and adapt the high-level risks associated with data integrity to the operations of the ACT Health Directorate. Figure 2-1 outlines the high-level risks across the collection, validation and assurance domains and reflects in red the areas where further improvement opportunities exist in respect of data integrity over ABF-related data within the ACT Health Directorate. These high-level risks have a one to one relationship to the data integrity risks within the scope of this audit.

Figure 2-1 High-level risks across the collection, validation and assurance domains in the ACT Health Directorate



Source: Prepared by Protiviti on behalf of the ACT Audit Office based on better practice information from: *Victorian Public Sector Data Integrity Manual*, Department of Treasury and Finance; *Improving information to support decision making*, Audit Commission, UK Government; and the Internal Control – Integrated Framework, COSO

2.28 No data integrity assurance activities were undertaken by the Health Directorate to confirm that the 31 December 2014 data submission was correct. Consequently, the Health Directorate did not identify a range of data integrity issues subsequently detected by the Audit Office during fieldwork for this audit. These were:

- Admitted Patients data not able to be traced between ACTPAS and the IHPA data submission;
- data matching errors;
- significant errors and omissions associated with Non-admitted Patient data detected by the Audit Office's high level review; and
- the data errors identified in the Audit Office's substantive testing.

2.29 Details of the errors the Health Directorate did not identify are at paragraphs 6.4, 6.14 and 6.21.

2.30 Further, there are no assurance activities outlined in the *Data Quality Policy* and Framework. The Health Directorate is developing a new *Information Management Strategy 2015-2016*, and this presents an opportunity to introduce the concept of assurance-related activities over ABF data into this strategy, and subsequently to apply appropriate assurance activities over IHPA data submissions in future.

- 2.31 The importance of such assurance activities is reflected in the summary statement of the UK Audit Commission's *Data Quality Matters – Learning from Audit Commission work on Data Quality in Local Public Services* (February 2015):

Those charged with governance at various levels in different sectors need to consider how to avoid recurring concerns about data quality. Data quality assurance arrangements need to be monitored and adjusted in light of changing circumstances, priorities and risks. Those with a leadership role in organisations and service areas that have not identified recent service failures related to data quality still need to consider their data quality assurance arrangements critically, to ensure these remain robust and effective.

RECOMMENDATION 3 EVALUATION, CORRECTIVE ACTIONS AND ASSURANCE

The ACT Health Directorate's *Information Management Strategy 2015-2016* should clearly articulate the following:

- a) key data integrity risks associated with ABF-related data and ACT Health Directorate's IHPA data submissions; and
- b) frequency and scope of controls assessments and other assurance activities that will be undertaken to provide assurance in relation to ABF data integrity.

The ABF data integrity risks and controls assessments above will need to be updated from year to year as IHPA's data submission requirements change.

Previous recommendations

- 2.32 The ACT Auditor-General's *Performance Audit Report on the ACT Health Directorate's, Emergency Department Performance Information* made a number of recommendations in relation to Emergency Department operations. These recommendations, and their status, are summarised in Table 2-2. Recommendations not included in this table were outside the scope of this audit.

Table 2-2 Summary of previous recommendations and if they have been addressed

| Previous Rec No | Summary description of recommendation | Addressed at Canberra Hospital | Addressed at Calvary Hospital |
|-----------------|---|---|---|
| 2a | Develop an overarching governance statement re the EDIS system | Yes , Security Plan addresses this | Yes, EDIS Framework and Security Plan addresses this |
| 2b | Develop standard operating procedures for use of the system | Yes , these have been developed | Yes , these have been developed |
| 2c | Develop training material covering all dimensions of EDIS | Yes , although need to be formalised – refer Recommendation 7 | Yes , training material exists |
| 2d | Develop a System Security Plan informed by a risk assessment | Yes , Security Plans developed | Yes, EDIS Framework and Security Plan developed |
| 3 | Finalise the draft Business System Support Agreement between Shared Services ICT and the Health Directorate for EDIS | Yes , completed | Not applicable |
| 4a | Review and remove users who do not have a specific and documented requirement to access EDIS | Yes , completed | Yes , completed |
| 4b | Develop policy and procedures that restrict the use of generic user accounts outside the Emergency Department (ED) work environment | Yes , although in draft | No – Calvary Public Hospital advises that this is still in draft |
| 5a | Identify and document responsibilities for user access management and monitoring of access to EDIS | Yes , although see Recommendation 8 on audit logs | Yes although see Recommendation 8 on audit logs |
| 5b | Develop a process to monitor user activity within EDIS and how to report and escalate unusual activity | Partial – user activity is locked out after 2 days from discharge | Partial – user activity is locked out after 7 days from discharge |
| 6a | Link EDIS upgrade project with the Identity and Access Management and Rapid Sign-On initiatives | Yes , this is ongoing work | Not applicable |
| 7b | Develop protocols for EDIS data validation activities post presentation to ED | Validation activities implemented however procedural guidance ineffective – refer Recommendation 10 | Validation activities implemented however procedural guidance ineffective – refer Recommendation 10 |
| 8 | Implement additional review and assurance controls over the preparation and reporting of ED performance data | Partial, Refer Recommendation 6 | Partial, Refer Recommendation |

Source: Prepared by Protiviti on behalf of the ACT Audit Office

3 COLLECTION PROCESSES FOR ABF DATA

3.1 This chapter considers both Canberra Hospital and Calvary Public Hospital ABF-related data collection processes, specifically for the Emergency Department, Non-admitted Patient and Admitted Patient (Acute and Non-acute/Sub-acute) areas. It is primarily based on walkthroughs of the process with the hospital personnel in each area. This chapter also provides an assessment on the adequacy of control design for the collection processes.

Summary

Conclusions

The internal controls for the collection of ABF-related data are adequate at both hospitals' Emergency Department and Admitted Patient areas in addressing relevant data integrity risks. Controls are established and operating such that the risk of missing data, duplication of data and data not recorded in the correct period are minimised. The risks are mitigated by both application controls in the ACT Patient Admission System (ACTPAS) and the Emergency Department Information Solution (EDIS), as well as process controls in the Admitted Patient and Emergency Department areas. ACTPAS and EDIS, as the key operational systems of the hospitals, are used in relation to every patient visit, and staff are well versed in the use and collection of ABF-related data.

Internal controls for the collection of ABF-related data in both hospitals' Non-Admitted Patient areas are inadequate to address the relevant data integrity risks. There are insufficient controls to detect missing data, duplication of data and data not recorded in the correct period, or to provide an appropriate level of data integrity over ABF-related data.

The completeness, accuracy and consistency of data collection is heavily reliant on the experience and training of clerical staff. Therefore it is important for the ACT Health Directorate to develop and implement standard policies, procedures, systems and training to assist hospital personnel, especially in the Non-admitted Patient areas.

Key findings

| | Paragraph |
|--|-----------|
| Significant process design improvements have been implemented in the last two years, including: | 3.5 |
| <ul style="list-style-type: none">implementation of ICT Security Plans for ACTPAS at both hospitals and the Health Directorate, and for EDIS at Canberra Hospital. The ICT Security Plans outline the commitment by the Business System Owners to put in place adequate measures to avoid, mitigate or transfer risks associated with an information system. They include security | |

objectives, a risk assessment, logical access controls, training requirements and requirements for audit; and

- implementation of IMPRIVATA in Canberra Hospital to provide a single log on to EDIS. This was implemented under the Rapid Sign-On initiatives. It allows users to access EDIS via swipe card technology, and also strengthens the security and accountability of EDIS records. IMPRIVATA removes the need to repeatedly type usernames and passwords, which streamlines and provides efficiency in the Emergency Department process. It enables clinicians and clerical staff to access EDIS quickly and securely.

Data mapping is different in the two hospitals' Emergency Departments. In the case of 'Review' codes, this has compromised the validity of the Health Directorate's ABF data, with possible funding implications⁷ and a distortion of management information regarding the type of visit. 3.16

At both Canberra Hospital and Calvary Public Hospital there are some controls in place to enable the key aspects of EDIS usage to be monitored and to reduce the risk of data manipulation by unauthorised personnel. Both hospitals have implemented a timeframe for locking Emergency Department patient records after discharge. During a patient's care in the Emergency Department, the patient record can be changed by authorised users and all the changes are logged. On patient discharge, front-end EDIS users only have a certain period to amend patient records, and this requires an additional password to make any changes. After the specified timeframe, any changes to the patient records require action from an EDIS administrative user. Currently, this specified timeframe is different in the two hospitals. Canberra Hospital has implemented a two-day timeframe, while Calvary Public Hospital has implemented a seven-day timeframe. Given the extended timeframe, Calvary Public Hospital has an increased risk that data could be manipulated or changed within the time period. 3.18

As a general rule, training is required for all users before they are given access to EDIS. Calvary Public Hospital has developed an *EDIS Competency Assessment Framework* to support the EDIS training required by different EDIS users. The Framework covers the various EDIS user groups including ED Doctor, Clerk, Clinical Staff, ED Support, Nursing, Clinical Manager and Other units. The Competency Assessment sheet requires sign off by the trainer prior to an individual being granted access to EDIS. Canberra Hospital provides on-the-job training for Emergency Department clerical staff and doctors; however, no formalised training material is maintained centrally. Training documents prepared for training 3.19

⁷ The Health Directorate estimates that the value of overclaiming from the Australian Government due to the data mapping issue is in the order of \$16,000 over the six month period covered by the IHPA submission (December 2014).

Canberra Hospital staff remain in draft (variously dated from December 2014 to April 2015).

The audit logs produced in both hospitals are insufficient to adequately monitor EDIS user activities, including through supporting reporting of unauthorised information processing activities. This deficiency increases the risk that any unauthorised information processing might not be detected. 3.22

There are inconsistent data collection processes across different Non-admitted patient areas and there are different referral management repositories in use, such as ACTPAS, Concerto, hospital share drive and e-referral system. The *Non-Admitted Patient Activity Data Standards - Data standards for the recording and counting of non-admitted patient activity*, which Health Directorate commenced work on in June 2013, are still in draft. There are no overarching policies and procedures to standardise data collection activities in the Non-admitted patient areas. This significantly compromises the accuracy and consistency of ABF-related data collected by the Non-admitted patient areas in both hospitals, as demonstrated by the testing results reported in Chapter 6. 3.39

The process for ABF-related data collection

3.2 To ensure the integrity of ABF-related data during the data collection process, hospitals need to undertake appropriate activities aimed at collecting complete, valid and accurate patient information in a consistent and timely manner.

3.3 Three main areas in the hospitals are involved in the collection of ABF-related data:

- Emergency Department;
- Admitted Patient; and
- Non-admitted Patient.

3.4 Each area is required to obtain a different set of data for the purposes of ABF.

3.5 Significant process design improvements have been implemented in the last two years, including:

- implementation of ICT Security Plans for ACTPAS at both hospitals and the Health Directorate, and for EDIS at Canberra Hospital. The ICT Security Plans outline the commitment by the Business System Owners to put in place adequate measures to avoid, mitigate or transfer risks associated with an information system. They include security objectives, a risk assessment, logical access controls, training requirements and requirements for audit; and

- implementation of IMPRIVATA in Canberra Hospital to provide a single log on to EDIS. This was implemented under the Rapid Sign-On initiatives. It allows users to access EDIS via swipe card technology, and also strengthens the security and accountability of EDIS records. IMPRIVATA removes the need to repeatedly type usernames and passwords, which streamlines and provides efficiency in the Emergency Department process. It enables clinicians and clerical staff to access EDIS quickly and securely.

Emergency Department

- 3.6 Emergency Departments are dedicated hospital-based facilities specifically designed and staffed to provide 24 hour emergency care. The role of the Emergency Department is to diagnose and treat acute and urgent illnesses and injuries. Patients are seen in order of medical urgency, i.e. triage category. Both Canberra Hospital and Calvary Public Hospital provide Emergency Department services.
- 3.7 For both hospitals, the IT systems used for collecting data for Emergency Department patients are ACTPAS and EDIS. Only clerical staff have access to ACTPAS within the Emergency Departments.
- 3.8 The ABF-related data collection requirements are set out by the Australian Institute of Health and Welfare in the *Activity Based Funding: Emergency Service Care Data Set Specification*.
- 3.9 The structure of the Emergency Department Data Collection teams is largely similar in both hospitals. The Emergency Department clerical staff and clinicians are responsible for collecting ABF-related data, specifically the type of visit, triage category, principal diagnosis and episode end status. The first level of ABF-related data review lies with the EDIS administrators in the hospitals. Their responsibility includes ensuring there is no missing data or duplication of data, and that data is recorded in the correct period. Canberra Hospital EDIS administrators report directly to the Performance Information Branch in the Health Directorate; the Calvary Public Hospital EDIS administrators report internally to the Performance and Reporting Manager of the Hospital Casemix and Performance Unit.

The Canberra Hospital and Calvary Public Hospital Emergency Department Process

- 3.10 The Emergency Department data collection process is largely consistent between the two hospitals. The main steps of the ABF-related data collection process in the Emergency Department are as follows:
- 1) Emergency care patients present to Emergency Department.
 - 2) Patients are seen by a registered triage nurse, and basic patient demographic information is recorded to confirm the patient record and previous visit history. Information is recorded within the EDIS system.

- 3) Patients are allocated to a triage category by the triage nurse. This is recorded in the EDIS system.
- 4) Patients then present to the Emergency Department clerical staff window and continue with the Emergency Department client registration process. Other ABF-related data is collected, including type of visit, funding source and Indigenous status. Information is recorded within the ACTPAS system.
- 5) Clinicians attend to patients and the first seen patient time is recorded in EDIS.
- 6) Clinicians document patients' principal diagnosis in the EDIS system and complete a discharge summary on treatment completion.
- 7) Depending on the patient's condition, they may be discharged or admitted as an inpatient. The episode end status and time is recorded in EDIS.

3.11 The main data integrity risks surrounding the data collection process in both hospitals are missing data, duplication of data and data not recorded in the correct period. These are addressed through the controls implemented in the data collection process, including:

- all patients are required to initially present to the triage nurse in the Emergency Department. Once registered in the system by the triage nurse, the patient appears as a workflow item for the clerical staff to continue with the registration process. This reduces the risk of recording duplicate data and recording data in the incorrect period; and
- certain data fields are mandatory in EDIS. These data items have to be recorded prior to completing patient registration or discharge. These data fields include triage category, name of patient, unique record number (which is assigned by the system) and presentation date and time etc. This reduces the risk of missing data.

Emergency Department ABF-related data mapping from EDIS to Data Warehouse

3.12 Hospital Emergency Departments collect both data related to a patient's episode of care (e.g. type of visit, triage category, presentation date and time) and patient demographic data (e.g. name, date of birth and address). All data is entered into EDIS by hospital staff. Data is then interfaced from EDIS to the data warehouse managed by the ACT Health Directorate. The EDIS system, used by both Canberra Hospital and Calvary Hospital, functions independently and has its own set of data fields and codes. In addition, the hospitals have their own rules and processes for entering data. As the data fields and codes used by the hospitals can differ, most of the data needs to be mapped or aligned before being interfaced to the data warehouse. In some instances, the difference may be that an alphabetic code is used by EDIS and a numeric code is required by the data warehouse for IHPA submission. Therefore, the data needs to be mapped, or translated, to a common code set before being aggregated in the data warehouse. If the mapping is conducted differently in the hospitals, it will affect data integrity.

3.13 The national codes set out by Australian Institute of Health and Welfare are illustrated in Table 3-1.

Table 3-1 National codes set out by Australian Institute of Health and Welfare

| Code Value | Meaning | Details |
|------------|------------------------|---|
| 1 | Emergency Presentation | Attendance at the Emergency Department for an actual or suspected condition which is sufficiently serious to require acute unscheduled care. |
| 2 | Planned Return Visit | A planned return to the Emergency Department as a result of a previous Emergency Department presentation (Code 1) or return visit (Code 2). The return visit may be for planned follow-up treatment, as a consequence of test results becoming available indicating the need for further treatment, or as a result of a care plan initiated at discharge. |
| 3 | Pre-arranged Admission | Presentation by a patient at the Emergency Department for either clerical, nursing or medical processes to be undertaken, and admission has been pre-arranged by the referring medical officer and a bed allocated. |
| 4 | Patient in Transit | Where the Emergency Department is responsible for care and treatment of a patient awaiting transport to another facility. |
| 5 | Dead on Arrival | Where a patient is dead on arrival and an Emergency Department clinician certifies the death of the patient. |

Source: Australian Institute of Health and Welfare

3.14 The EDIS codes set out by Canberra Hospital and Calvary Public Hospital and its mapping to the data warehouse are summarised in tables 3-2 and 3-3.

Table 3-2 Canberra Hospital data mapping

| Numerical Code | Alphabetic Code | Description | Mapping to DWH |
|----------------|-----------------|-----------------------|----------------|
| 1 | D | DOA | 5 |
| 2 | N | NEW PT/PROBLEM | 1 |
| 3 | R | REVIEW | 1 |
| 4 | P | PREARRANGED ADMISSION | 3 |
| 5 | T | PATIENT IN TRANSIT | 4 |

Source: Prepared by Protiviti on behalf of the ACT Audit Office

Table 3-3 Calvary Public Hospital data mapping

| Numerical Code | Alphabetic Code | Description | Mapping to DWH |
|----------------|-----------------|-----------------------|----------------|
| 1 | D | DOA | 5 |
| 2 | N | NEW PT/PROBLEM | 1 |
| 3 | R | REVIEW | 2 |
| 4 | P | PREARRANGED ADMISSION | 3 |
| 5 | T | PATIENT IN TRANSIT | 4 |

Source: Prepared by Protiviti on behalf of the ACT Audit Office

- 3.15 As Tables 3-2 and 3-3 show, there are two separate business processes implemented by the hospitals in relation to collection of this data item value. Calvary Public Hospital only uses 'Review' where the visit is planned (mapping it to national code 2), whereas Canberra Hospital uses 'Review' for an unplanned return for the same problem, (mapping it to national code 1).
- 3.16 Data mapping is different in the two hospitals' Emergency Departments. In the case of 'Review' codes, this has compromised the validity of the Health Directorate's ABF data, with possible funding implications⁸ and a distortion of management information regarding the type of visit.
- 3.17 This issue can be addressed through the development of a data dictionary – a centralised repository of information about data such as meaning, relationships to other data, origin, usage, and format.

RECOMMENDATION 4 DEFINE ABF-RELATED DATA MAPPING

HIGH PRIORITY RECOMMENDATION

Health Directorate should develop an Emergency Department Data Dictionary to standardise the definition of ABF-related data and define ABF-related data mapping from EDIS in both hospitals to the data warehouse.

Locking of Emergency Department Patient Records After Discharge

- 3.18 At both Canberra Hospital and Calvary Public Hospital there are some controls in place to enable the key aspects of EDIS usage to be monitored and to reduce the risk of data manipulation by unauthorised personnel. Both hospitals have implemented a timeframe for locking Emergency Department patient records after discharge. During a patient's care in the Emergency Department, the patient record can be changed by authorised users and all the changes are logged. On patient discharge, front-end EDIS users only have a certain period to amend patient records, and this requires an additional password to make any changes. After the specified timeframe, any changes to the patient records require action from an EDIS administrative user. Currently, this specified timeframe is different in the two hospitals. Canberra Hospital has implemented a two-day timeframe, while Calvary Public Hospital has implemented a seven-day timeframe. Given the extended timeframe, Calvary Public Hospital has an increased risk that data could be manipulated or changed within the time period.

⁸ The Health Directorate estimates that the data mapping issue has resulted in overclaiming from the Australian Government in the order of \$16,000 over the six month period covered by the IHPA submission (December 2014).

RECOMMENDATION 5 PATIENT RECORD CLOSE PERIOD

- a) Calvary Public Hospital should align its EDIS record close period (i.e the period after which records are locked) with that of Canberra Hospital.
- b) The Health Directorate should undertake a monthly assessment to monitor changes to patient records after the close period.

Training prior to EDIS access

- 3.19 As a general rule, training is required for all users before they are given access to EDIS. Calvary Public Hospital has developed an *EDIS Competency Assessment Framework* to support the EDIS training required by different EDIS users. The Framework covers the various EDIS user groups including ED Doctor, Clerk, Clinical Staff, ED Support, Nursing, Clinical Manager and Other units. The Competency Assessment sheet requires sign off by the trainer prior to an individual being granted access to EDIS. Canberra Hospital provides on-the-job training for Emergency Department clerical staff and doctors; however, no formalised training material is maintained centrally. Training documents prepared for training Canberra Hospital staff remain in draft (variously dated from December 2014 to April 2015).

RECOMMENDATION 6 TRAINING MATERIALS

Canberra Hospital should finalise its draft EDIS training documents and implement a mandatory requirement for staff to complete EDIS training before receiving access to the system.

Monitoring of EDIS Audit Logs

- 3.20 Both Canberra Hospital and Calvary Public Hospital have a large population of active users for EDIS. As a result, the hospitals are required to develop and implement mechanisms to detect unauthorised information processing activities. This can be implemented through the use of audit logs to monitor EDIS user activities and ensure that users are only performing activities that have been authorised. The audit logs must be practical to use and enable effective management review on a periodic basis.
- 3.21 At Canberra Hospital there is no capability to generate a report of all visits; instead each visit must be looked at individually. At Calvary Public Hospital the log is not generated in a reader-friendly format, and the system slows down significantly when the audit log tool is switched on.
- 3.22 The audit logs produced in both hospitals are insufficient to adequately monitor EDIS user activities, including through supporting reporting of unauthorised information processing activities. This deficiency increases the risk that any unauthorised information processing might not be detected.

RECOMMENDATION 7

AUDIT LOGS

HIGH PRIORITY RECOMMENDATION

Both Canberra Hospital and Calvary Public Hospital should establish useable audit logs for EDIS to allow monitoring activities after the close off period. The audit logs should be reviewed regularly, with results presented to the accountable hospital executives and to the Health Directorate.

Admitted Patient (Acute and Non-acute/Sub-acute)

- 3.23 Admission to hospital is a formal process, and follows a clinician making a decision that the patient needs to be admitted for appropriate management or treatment of his or her condition, or for appropriate care or assessment of his or her needs. Admitted Patient care can be divided into acute care, non-acute care and sub-acute care.
- 3.24 Non-acute care patients are those with a care type of 'maintenance care'. Sub-acute patient care comprises rehabilitation care, palliative care, geriatric evaluation and management care, and psychogeriatric care.
- 3.25 For both hospitals, ACTPAS is used for collecting data for Admitted Patients.
- 3.26 The roles and responsibilities for data collection for Admitted Patient data in the hospitals are defined in the hospitals' organisational structures. The main data collection points are at the Emergency Department (when patients are admitted via the Emergency Department) and Admission Office (when patients are directly admitted into the hospital). The first level of ABF-related data validation in Canberra Hospital lies with the ward clerk managers, who review ACTPAS error reports and escalate any unresolved issues. For Calvary Public Hospital, the Casemix and Performance Unit is responsible for ensuring data is free from errors.
- 3.27 The ABF-related data collection requirements are set out by the Australian Institute of Health and Welfare in the *Admitted Patient Care National Minimum Data Set*.

The Canberra Hospital and Calvary Public Hospital Admitted Patient Process

- 3.28 The Admitted Patient data collection process covers both acute inpatients and non-acute/sub-acute Inpatients. It is largely consistent in both hospitals. The main steps of the ABF-related data collection process for Admitted Patients are as follows:
- Patients are admitted into the hospital via three different methods: via the Emergency Department; as part of the elective surgery process ; or by the patient admitting directly as part of a referral or booking. Basic demographic information such as date of birth, indigenous status, address and funding source are recorded in the ACTPAS system.

- The admission date is recorded in ACTPAS when the patient is officially admitted to the hospital as an inpatient.
- Once treatment is completed, the treating clinician records the procedure and diagnosis in ACTPAS.
- If a statistical admission⁹ is required, a hard copy 'Notification of Care Type Change' form is completed and the new care type and change date is recorded in ACTPAS. The admission date for the new care type is the date when care type is changed.
- If a patient is to be discharged, the clinician completes a discharge summary in ACTPAS. The separation date is recorded when the patient is officially discharged from the hospital.

3.29 The main data integrity risks surrounding the data collection process for Admitted Patients are missing data, duplication of data and data not recorded in the correct period. Controls have been implemented in the data collection process to address these risks, including:

- certain data fields are mandatory in ACTPAS. These data items have to be recorded before completing patient registration or discharge. These data fields include admission date, name of patient, and unique record number (which is assigned by the system) etc. This reduces the risk of missing data.
- all patients admitted via the Emergency Department are required to be discharged from EDIS and have an episode end status of 1, i.e. admitted to this hospital (either short stay unit, hospital-in-the-home or non-Emergency Department hospital ward), as well as having a bed in the ward prior to being discharged. This addresses the risk of duplication of data for patients admitted via the Emergency Department;
- all patients are required to present in person during the admission process. This addresses the risk of data being recorded for an incorrect period.

Non-admitted Patient

3.30 Hospitals provide Non-admitted care to patients who do not undergo a formal admission process and do not occupy a hospital bed. For example, services could be provided in hospital outpatient clinics, community based clinics, or in patients' homes.

3.31 Outpatient clinics and other Non-Admitted Patient areas provide services such as consultations with specialists to determine the most appropriate treatment for a patient's condition, and diagnostic procedures including pathology, X-rays and ultrasounds.

⁹ Where a new admitted patient episode is created as a result of a change in the clinical intent of care (for example, a patient's care may move from a focus on acute care to a focus on rehabilitation or palliative care), within the same hospital.

- 3.32 For both hospitals, the IT systems used for collecting data for Non-admitted patients are ACTPAS, CHARM (which manages patient health and treatment information for ACT Health Capital Region Cancer Services); Mhagic (Mental Health Assessment Generation and Information Collection); CAS (for radiation oncology services); and WIC (for Walk-in Centres).
- 3.33 Table 3-4 shows the number of records from each system that were included in the IHPA submission (December 2014).

Table 3-4 Breakdown of outpatient activity data associated with IT systems

| Source System | Records (Jun-Dec 2014) | |
|---------------|------------------------|-------------|
| CAS | 19,082 | 3.63% |
| CHARM | 17,475 | 3.32% |
| ACTPAS | 316,386 | 60.19% |
| WIC | 17,635 | 3.36% |
| Mhagic | 155,030 | 29.50% |
| Total | 525,608 | 100% |

Source: Health Directorate – Performance Information Branch

- 3.34 Although 60.19 per cent of the Non-admitted patient population is managed through ACTPAS, a significant percentage of Non-admitted patient data is collected from the other systems listed at paragraph 0. This data feeds directly into the Health Directorate data warehouse. Multiple systems present the risk of inconsistency in the collection of Non-admitted patient data required for ABF purposes. The Audit Office's testing of the Non-admitted Patient data included in the December 2014 IHPA submission (discussed in Chapter 6) identified that this risk has materialised, with testing results showing very high error rates (see Table 6-3).

The Canberra Hospital and Calvary Public Hospital Non-Admitted Patient Process

- 3.35 The roles and responsibilities for collection of Non-admitted patient data depend on the relevant outpatient clinic's local process. Non-admitted patient data is usually captured by the clerical staff at the outpatient clinic during the patient's booking and on the appointment date.

3.36 Since the Non-admitted patient area covers a diverse range of outpatient clinics, the process differs according to the source system used as well as the local procedure. The main steps of the ABF-related data collection process for Non-admitted patients are as follows:

1. Patients, or their General Practitioner, contact outpatient clinics to create a booking for an outpatient appointment. This appointment should be supported by a referral letter.
2. Outpatient appointments are created in one of the source systems at the clinic. Basic patient demographic information is collected.
3. Several ABF-related data items are registered in the source system during the booking, such as service delivery setting, service delivery mode, outpatient clinic type and service date.
4. On arrival on the day of the appointment, additional patient details are captured including funding source and indigenous status.
5. Once treatment is complete, the service is recorded as complete in the source system.

3.37 As with Admitted patients, the main data integrity risks surrounding the data collection process for Non-admitted patients in both hospitals are missing data, duplication of data and data not recorded in the correct period. Controls have been implemented in the data collection process to address these risks, including:

- Non-admitted patients' ABF-related data is determined based on the Tier 2 coding¹⁰. All Tier 2 coding is mapped in the data warehouse against the clinic where the service is provided, reducing the risk of missing data;
- Non-admitted patient bookings are only made based on a referral letter or an actual service. This reduces the risk of duplication of data; and
- for outpatient clinics that use ACTPAS, certain data fields are mandatory within the system. These data items have to be recorded prior to completing patient registration. They include service date, name of patient, and unique record number (which is assigned by the system). This reduces the risk of missing data.

Consistency of the outpatient client registration process

3.38 The Non-admitted patient category covers a diverse range of data collection points. The in-scope Outpatient clinic types for ABF-related data are listed in Table 3-5.

¹⁰ Code identifying the type of service through which a hospital provides health care to a non-admitted patient.

Table 3-5 In-scope Outpatient clinic types

| | |
|--------------------|----------------------------------|
| Allied Health | Dental |
| Gynaecology | Obstetrics |
| Cardiology | Oncology |
| Respiratory | Medical |
| Gastroenterology | General practice/primary care |
| Endocrinology | Endoscopy |
| Renal medical | Plastic surgery |
| Pediatric medical | Urology |
| Orthopedic surgery | Ear, nose and throat |
| Ophthalmology | Pre-admission and pre-anesthesia |
| Dialysis | Surgery |
| Chemotherapy | Pediatric surgery |

Source: ABF NAP Specifications 2014-15

3.39 There are inconsistent data collection processes across different Non-admitted patient areas and there are different referral management repositories in use, such as ACTPAS, Concerto, hospital share drive and e-referral system. The *Non-Admitted Patient Activity Data Standards - Data standards for the recording and counting of non-admitted patient activity*, which Health Directorate commenced work on in June 2013, are still in draft. There are no overarching policies and procedures to standardise data collection activities in the Non-admitted patient areas. This significantly compromises the accuracy and consistency of ABF-related data collected by the Non-admitted patient areas in both hospitals, as demonstrated by the testing results reported in Chapter 6.

RECOMMENDATION 8 GUIDELINE FOR THE NON-ADMITTED PATIENT DATA COLLECTION PROCESS

HIGH PRIORITY RECOMMENDATION

The Health Directorate should finalise and implement the *Non-Admitted Patient Activity Data Standards - Data standards for the recording and counting of non-admitted patient activity*.

4 VALIDATION OF ABF DATA

- 4.1 This chapter considers the validation processes for Activity Based Funding (ABF)-related data at Canberra Hospital and Calvary Public Hospital. This chapter also identifies the role of the ACT Health Directorate's data warehouse in validating ABF data. It is primarily based on walkthroughs of the processes with hospital and Health Directorate staff.

Summary

Conclusions

The internal controls for the validation of ABF-related data are adequate at both hospitals' Emergency Department and Admitted Patient areas in addressing relevant data integrity risks. Controls are established and operating such that the risk of invalid data is minimised.

Internal controls in the Non-Admitted Patient areas are inadequate to address the relevant data integrity risks. There are insufficient validation controls to detect mismatched or unreasonable data.

Key findings

Calvary Public Hospital has its own policies and procedures for EDIS data validation processes. Canberra Hospital commenced developing draft EDIS policies and procedures related to the validation processes in August 2014; however, they have not been finalised and published for use by hospital personnel. This is resulting in inconsistent practices and different terminology for the types of validation activities undertaken by the hospitals. A data validation policy and associated standard procedures need to be developed and implemented covering all data validation activities in the Health Directorate, Canberra Hospital and Calvary Public Hospital.

Paragraph

4.12

There is a lack of tracking of the validation activities flagged by the data warehouse. Performance Information Branch is unable to keep track of whether potential errors have been addressed, or to identify the root cause of errors. For example, once action officers from the hospitals request to un-flag a potential error, the patient visit entry will disappear from the potential error list. An audit log could be generated from the data warehouse, which would identify who made changes to the data and when; however, this capability is not used. There is a risk that errors remain unaddressed by the incorrect unflagging of potential errors and there is no ability for the Health Directorate to identify error trends and systemic issues.

4.22

There are no KPIs in place to monitor data integrity activities undertaken at the hospitals or in the ACT Health Directorate. For example, there is no KPI for the timeliness of correcting flagged potential errors. An email reminder is sent to the hospital action officers weekly; however, the data warehouse does not provide an ageing report stating the number of outstanding days for uncorrected potential errors. The capability is available in the data warehouse but has not been used.

4.23

Validation Reports from the data warehouse are generally communicated, via either SharePoint¹¹ or emails, with the hospital action officers on a weekly basis. However, this does not always occur. Ambulatory Care staff at Canberra Hospital (a Non-admitted Patient area) indicated that they had never received any validation reports from SharePoint. Additionally, the Calvary Public Hospital's Emergency Department and Casemix and Performance Unit staff indicated that they had not received any validation reports via email for the Emergency Department or Non-admitted Patients area since August 2014. The Health Directorate advised that validation reports to Calvary have been intentionally suspended until Calvary completes work to update its classification system version. The Health Directorate further advised that validation reports for the Non-admitted Patients area were not being generated into SharePoint due to the migration of data into the data warehouse in 2014 and the implementation of new business rules. The Health Directorate is also still in the process of agreeing the new business rules. Emergency Department validation reports have been ceased due to consideration of standardising the Emergency Department validation method between the two hospitals in the data warehouse. In these circumstances, unacceptable risks to the integrity of ABF-related data remain. Many potential errors in Emergency Department and Non-admitted Patient data in both hospitals are not being examined or corrected.

4.25

During the audit, the Audit Office identified a process improvement opportunity in the validation process. Validation reports are linked to the 'Visit Identifier'/'Episode Number' for all flagged potential errors. Errors related to a patient's demographics will therefore re-flag each time the patient re-presents. If demographic validation flags were linked to the patient's 'Unit Record Number' rather than the 'Visit Identifier'/'Episode Number', multiple flags requiring attention would be reduced. For example, if a 100 year old patient presents to the hospital and is subsequently discharged home, the validation reports will flag it as a potential error due to the age of the patient. The hospital will check the potential error against the patient record and confirm that it is not an error, and therefore un-flag the entry. If the same patient presents again, the validation report will flag it as a potential error again due to the linkage to the 'Visit Identifier'/'Episode Number'. If it were linked to the patient's 'Unit Record Number' the error would not re-flag.

4.26

¹¹ SharePoint is an intranet, content management, and document management platform.

Validation processes

- 4.2 Validation is a vital step in achieving data integrity. Validity is a measure by which data adheres to defined business rules, accepted values and accepted formats.
- 4.3 The responsibilities for validating ABF-related data are shared between the Health Directorate's Performance Information Branch and the two hospitals. Therefore, the validation process is a two level process.

Hospital validation processes

- 4.4 ABF-related data collection takes place throughout a patient's journey, from presenting to the hospital to returning home from the hospital. Once data collection is completed on a patient's discharge, hospitals commence the validation process by generating ACTPAS or EDIS reports.
- 4.5 Different areas of the hospital conduct different validation activities on patient data. The validation activities are largely consistent in both hospitals. The main difference is that Calvary Public Hospital centralises the data validation responsibilities to the Casemix and Performance Unit, whereas Canberra Hospital devolves data validation responsibilities to its respective areas.
- 4.6 Both hospitals conduct adequate validation activities for Emergency Department and Admitted Patient data. However, the non-admitted patient areas in both hospitals do not perform adequate validation activities to provide comfort as to the validity of their ABF-related data.

Canberra Hospital Emergency Department Data Validation Processes

- 4.7 In the Canberra Hospital Emergency Department, the EDIS Administrator reviews EDIS reports daily. These reports identify data errors for patients who were discharged within the previous 24 hours. The list of error reports relates to:
- *Ward Comparison* – to compare admission episode number, patient name, date and time of admission and admitting ward between EDIS and ACTPAS;
 - *Referred From Emergency Department* – to check that all patients that are referred to other wards from the Emergency Department have the correct information on the clinical screen of EDIS;
 - *Referred By* – to check that all patients that are referred to the Emergency Department have the correct information and codes entered against their presentation data;
 - *Patients Located in Emergency Medical Unit* – to ensure that all patients who are seen in the Emergency Medical Unit ward are admitted, at the correct time;

- *No Episode* – to show any records that do not have a presentation episode of care number that is generated by EDIS and sent to ACTPAS;
- *Admitting Episode* – to show all patients that have admission information on the system but have no admission episode number;
- *Bed Request and Depart Mismatch* – to show all patients that have a different bed request time to their depart ready time;
- *Depart Destination and Ward Mismatch* – to show all admitted patients with admission and EDIS clinical screen information discrepancies;
- *Deaths* – to show patients that have died in the Emergency Department, to ensure the ACTPAS record has been marked deceased and at the correct time;
- *Duplicate Sequence Number* – to show any record that has a duplicate sequence number or a sequence number of zero;
- *Did Not Wait* – to ensure that all ‘Did not wait’ patients have been discharged correctly;
- *Department of Health Error Report* – to display any records that have incomplete fields;
- *Compensable Check* – to check the compensable status and Medicare field matches where required;
- *Short Emergency Medical Unit Admissions* – to capture all Emergency Medical Unit admissions that are equal to or less than 10 minutes in duration;
- *Doctor Speciality Mismatch* – to ensure that the admitting unit matches the admitting doctor;
- *Overlapping Episodes* – to show if there are two patients registered with the same Unit Record Number at the same time;
- *Incomplete Admission Lists* – to show all patients with a disposition of ‘Incomplete Admission’;
- *Random Selection of Seen-on Time* – daily report of ten random patients with different triage categories (excluding triage one); and
- *Date and Time Mismatch* – to show date and time errors.

Calvary Public Hospital Emergency Department Data Validation Processes

4.8 In Calvary Public Hospital Emergency Department, a different suite of error reports is generated from the system to ensure the completeness and validity of data collected. The list of error reports includes:

- *Category One Daily Audit* – to check whether Triage Category One patients have been seen on time and recorded as such in EDIS;

- *Category Two Location Audit* – to check if Triage Category Two patients have been seen on time and recorded as such in EDIS;
- *Emergency Department Shift Summary* – to check if there are any outliers for the Seen-on-time metric overall;
- *EDIS Bad Dates* – to check if there are any dates in EDIS that are implausible, for example 1900;
- *EDIS Free Text Search* – to check for patients who have been flagged to be deleted;
- *Adding General Practitioners to EDIS* – to ensure that the messages between ACTPAS and EDIS flow across as expected and any new General Practitioners are added into EDIS;
- *Inactive or Mismatch General Practitioners in EDIS/ACTPAS* – to check if there is an inactive General Practitioner in EDIS who is currently active in ACTPAS;
- *Emergency Department Validation Report* – this report contains 59 different types of validation rules. The typical rules relate to missing or invalid data, mismatch data and illogical time sequence;
- *Did Not Wait Error Fixes* – to ensure all ‘Did not wait’ patients are removed from EDIS correctly;
- *Left at Own Risk Error Fixes* – to ensure all ‘Left at own risk’ patients are removed from EDIS correctly;
- *Empty/ Null Diagnosis Codes* – to ensure there is no diagnosis that is left blank for ‘Did not wait’ patients or via system errors;
- *Admission Errors and Mismatches* – to ensure EDIS and ACTPAS admission information matches; and
- *Mismatched Episode Numbers* – to ensure EDIS and ACTPAS information matches.

4.9 On generating and reviewing the reports, the EDIS Administrators from both hospitals are responsible for investigating anomalies and correcting entries in EDIS. A before-correction and after-correction report is generated to evidence and support the amendments made to the patient’s records. The EDIS-generated reports in both hospitals are sufficient to reduce the risk of invalid data to an acceptable level.

Admitted Patient Data Validation Processes

4.10 In the Canberra Hospital Admitted Patient area, the validation process is managed by each of the ward clerk managers; in the Calvary Public Hospital Admitted Patient area, the validation process is managed centrally by the Casemix and Performance Unit with the assistance of the Clinical Support Service Manager. ACTPAS-generated reports are used in the validation process. Errors are sent back to the respective clerical staff for correction. The reports are run on a weekly basis. Any uncorrected errors will be listed in the reports

until corrected. The ACTPAS-generated reports are adequate to reduce the risk of invalid data to an acceptable level.

Non-admitted Patient Data Validation Processes

4.11 Limited validation activities are conducted in the Non-admitted patient areas in both hospitals. This is due to the wide range of outpatient clinics involved, inconsistent practices and business rules in the various outpatient clinics, and inconsistent data standards. For example, Ambulatory Care at Canberra Hospital Non-admitted patient area generates only a 'Missing Information Report' to ensure the completeness of patient data fields such as arrival time, departure time, user record number and referral type.

4.12 Calvary Public Hospital has its own policies and procedures for EDIS data validation processes. Canberra Hospital commenced developing draft EDIS policies and procedures related to the validation processes in August 2014; however, they have not been finalised and published for use by hospital personnel. This is resulting in inconsistent practices and different terminology for the types of validation activities undertaken by the hospitals. A data validation policy and associated standard procedures need to be developed and implemented covering all data validation activities in the Health Directorate, Canberra Hospital and Calvary Public Hospital.

4.13 The Health Directorate advised that:

Patient-level reporting for Non-admitted services is comparatively much newer than for Admitted and Emergency services. Admitted patient care has been collected at patient level nationally since 1989, and Emergency Department care since 2003. The national collection of patient-level Non-admitted data has only been in place since 2011 and the collection has still not reached a level of data quality that has enabled it to be considered as fit to be a National Minimum Data Set (NMDS) – with it still being referred to as a 'data set specification', in recognition of issues across the nation ... the body of knowledge around appropriate validations for non-admitted data is far less mature than for its counterpart collections.

4.14 Calvary Public Hospital advised that:

Lack of consistent non admitted patient data capture is common across jurisdictions and it is recognised that there is not a fully developed recording system. Calvary Health Care believes that this [is] a project that needs immediate resources applied to it to improve the definition, capture, recording and counting of non-admitted patient data to ensure completeness of all hospital data.

RECOMMENDATION 9 VALIDATION PROCESSES

HIGH PRIORITY RECOMMENDATION

The Health Directorate should develop and implement overarching policies and procedures related to data validation processes and activities. These should provide a consistent framework that is flexible and adaptable when needed to reflect local processes and organisation structure.

Reports generated from data warehouse

- 4.15 The Health Directorate data warehouse was implemented in 2014 to provide the infrastructure and mechanisms for collaboration, collection, analyses and distribution of data between the Health Directorate and the hospitals. The system is owned and managed by the Performance Information Branch of ACT Health Directorate. It extracts data from the source systems (EDIS, ACTPAS and other health applications), then transforms and validates the data according to embedded business rules. Once validation is complete, the data is ready for viewing and reporting purposes from the data warehouse. The system is directly linked to a SharePoint front-end and a SQL database¹².
- 4.16 The data warehouse validation scripts identify EDIS and ACTPAS data that fails business rules, and flags potential errors. These potential errors are listed on the SharePoint front-end, which is accessible by users from Canberra Hospital. Calvary Public Hospital users receive the list of potential errors via email, as they are unable to access SharePoint. This involves the Information Support Unit in the Health Directorate's Performance Information Branch copying the list of potential errors from SharePoint and pasting it into weekly emails to the hospital.
- 4.17 Following is a sample list of business rules embedded in the data warehouse for Emergency Department data:
- overlapping presentations, i.e. same patient, overlapping presentations;
 - Emergency Department episode mapping, i.e. more than one Emergency Department event mapped to the same Admitted Patient care episode;
 - missing or invalid values, e.g. departure destination, visit type, triage category, primary diagnosis and arrival mode;
 - checking of dates, e.g. invalid triage date and time, event time later than actual departure time, waiting time to service is greater than 12 hours and waiting time is greater than one minute for triage category one patients;

¹² SQL (Structured Query Language) is a specialised database programming language.

- mismatches, e.g. admitted to ward but departure status/destination do not match, patient did not wait but episode time is greater than waiting time to be seen; and
- other potential errors, e.g. Medicare number missing/non-numeric and date of birth potentially incorrect.

4.18 Following is a sample list of business rules embedded in the data warehouse for Admitted Patient (acute/non-acute/sub-acute) data:

- possible duplicates of patient records, e.g. same URN¹³, but different date of birth;
- missing or invalid values, e.g. episode number, urgency of admission, care type, date and time of admission, date and time of separation and intended length of hospital stay;
- mismatching data, e.g. funding source match against insurance and Medicare status, separation mode should correspond with referral on discharge and separation date should be within collection period;
- appropriateness and completeness of diagnoses, procedures and grouping, e.g. invalid procedure codes, episode has operating room procedure reported and care type is not acute;
- newborn validations, e.g. newborn acute care days must be associated with a relevant funding source, care type is newborn and country of birth is not Australia;
- other potential errors e.g. Medicare number missing/non-numeric, date of birth is potentially incorrect; and
- more than three per cent of cases with an unknown or not stated value for insurance status, indigenous status, country of birth, patient election status and source of referral.

4.19 Following is a sample list of business rules embedded in the data warehouse for Non-admitted Patient data:

- missing or invalid values e.g. hospital clinic, 'event ID', service date and occasion of service type; and
- more than 3 per cent of cases with an unknown or not stated value for sex, indigenous status and source of referral¹⁴.

4.20 The Health Directorate expects action officers from each area of both hospitals to review and correct the list of potential errors on a weekly basis. This involves understanding the potential error, investigating the error, and amending the source system if applicable.

¹³ Unit Record Number; a unique patient identifier.

¹⁴ Note that these business rules either did not detect the errors noted at Table 6-3, or the errors were not rectified.

- 4.21 If the data warehouse flagged potential errors are deemed invalid, i.e. upon investigation it is not identified as a potential error, the action officers from the hospitals are permitted to remove the flag in SharePoint (Canberra Hospital) or email the Information Support Unit in relation to the potential error (Calvary Public Hospital). The potential error flag will then not reoccur for that particular patient visit entry.
- 4.22 There is a lack of tracking of the validation activities flagged by the data warehouse. Performance Information Branch is unable to keep track of whether potential errors have been addressed, or to identify the root cause of errors. For example, once action officers from the hospitals request to un-flag a potential error, the patient visit entry will disappear from the potential error list. An audit log could be generated from the data warehouse, which would identify who made changes to the data and when; however, this capability is not used. There is a risk that errors remain unaddressed by the incorrect unflagging of potential errors and there is no ability for the Health Directorate to identify error trends and systemic issues.

RECOMMENDATION 10 TRACKING OF VALIDATION ACTIVITIES

The Health Directorate should review the capability of its data warehouse and develop robust processes to track the validation activities performed by the hospitals. It should also define and promulgate the business rules required in correcting ABF-related data to ensure consistency across hospitals.

- 4.23 There are no KPIs in place to monitor data integrity activities undertaken at the hospitals or in the ACT Health Directorate. For example, there is no KPI for the timeliness of correcting flagged potential errors. An email reminder is sent to the hospital action officers weekly; however, the data warehouse does not provide an ageing report stating the number of outstanding days for uncorrected potential errors. The capability is available in the data warehouse but has not been used.
- 4.24 Other KPIs in relation to data integrity activities that could be implemented to improve the integrity of ABF-related data include:
- the completeness of data;
 - accuracy of ABF-related data items that affect funding; and
 - re-occurring potential errors.

RECOMMENDATION 11 KEY PERFORMANCE INDICATORS

HIGH PRIORITY RECOMMENDATION

The Health Directorate should develop KPIs for the validation of data that can be supported by information from the data warehouse.

- 4.25 Validation Reports from the data warehouse are generally communicated, via either SharePoint¹⁵ or emails, with the hospital action officers on a weekly basis. However, this does not always occur. Ambulatory Care staff at Canberra Hospital (a Non-admitted Patient area) indicated that they had never received any validation reports from SharePoint. Additionally, the Calvary Public Hospital's Emergency Department and Casemix and Performance Unit staff indicated that they had not received any validation reports via email for the Emergency Department or Non-admitted Patients area since August 2014. The Health Directorate advised that validation reports to Calvary have been intentionally suspended until Calvary completes work to update its classification system version. The Health Directorate further advised that validation reports for the Non-admitted Patients area were not being generated into SharePoint due to the migration of data into the data warehouse in 2014 and the implementation of new business rules. The Health Directorate is also still in the process of agreeing the new business rules. Emergency Department validation reports have been ceased due to consideration of standardising the Emergency Department validation method between the two hospitals in the data warehouse. In these circumstances, unacceptable risks to the integrity of ABF-related data remain. Many potential errors in Emergency Department and Non-admitted Patient data in both hospitals are not being examined or corrected.

RECOMMENDATION 12 DISTRIBUTION OF VALIDATION REPORTS

HIGH PRIORITY RECOMMENDATION

The Health Directorate should finalise its new business rules for data validation and incorporate these in its data warehouse, then re-commence the distribution of validation reports for the Non-admitted Patient areas at Canberra Hospital and Calvary Public Hospital and for the Calvary Public Hospital Emergency Department.

- 4.26 During the audit, the Audit Office identified a process improvement opportunity in the validation process. Validation reports are linked to the 'Visit Identifier'/'Episode Number' for all flagged potential errors. Errors related to a patient's demographics will therefore re-flag each time the patient re-presents. If demographic validation flags were linked to the patient's 'Unit Record Number' rather than the 'Visit Identifier'/'Episode Number', multiple flags requiring attention would be reduced. For example, if a 100 year old patient presents to the hospital and is subsequently discharged home, the validation reports will flag it as a potential error due to the age of the patient. The hospital will check the potential error against the patient record and confirm that it is not an error, and therefore un-flag the entry. If the same patient presents again, the validation report will flag it as a potential error again due to the linkage to the 'Visit Identifier'/'Episode Number'. If it were linked to the patient's 'Unit Record Number' the error would not re-flag.

¹⁵ SharePoint is an intranet, content management, and document management platform.

5 REPORTING OF ABF DATA

- 5.1 This chapter considers the reporting of Activity Based Funding (ABF) activity and costing data to the Independent Hospital Pricing Authority (IHPA). It provides an assessment on the effectiveness of the management of ABF reporting. It is primarily based on walkthroughs of the process with Business Intelligence Unit and Information Support Unit staff in the Performance Information Branch of the ACT Health Directorate.

Summary

Conclusions

The ACT Health Directorate's internal controls for the reporting of ABF data are inadequate for both the ABF six monthly and annual costing data submissions, in addressing the relevant data integrity risks.

The informality of procedures adversely affects the integrity of the reporting process and places a heavy reliance on a few key individuals. The lack of analytical review of the ABF six monthly data submission, and limited validation activities for the ABF costing submission, need to be addressed.

Key findings

The six monthly ABF data submission by the Health Directorate to the Independent Hospital Pricing Authority is largely prepared by one staff member from the Information Support Unit. There is no formal review of the accuracy or completeness of the data before submission, despite the fact that this data is published externally and is used to determine funding of health services in the ACT. IHPA's submission error reporting process, and validation processes undertaken on data in the data warehouse, examine data validity (i.e. conformance with business rules). However, these controls do not provide assurance as to the reasonableness of the data submission. For example, errors may occur during the process to extract ABF-related data from the data warehouse, and/or in the process to modify the raw data to meet the relevant ABF reporting requirement, that will not be detected without an appropriate level of review.

Paragraph

5.9

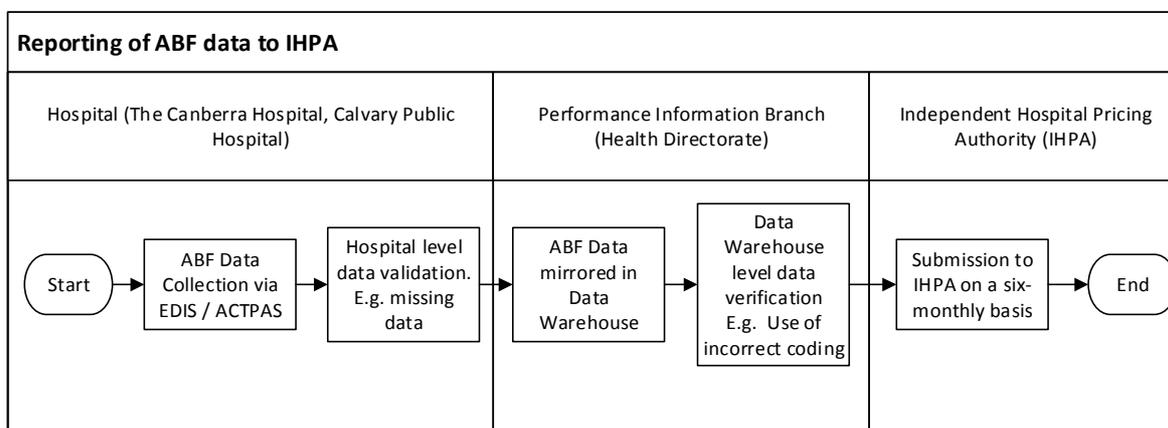
The allocation of roles and responsibilities between the Health Directorate and hospitals in the review of costing data are unclear to both the hospitals and the Business Intelligence Unit.

5.20

Reporting of ABF activity data

- 5.2 For the Financial Year 2014/15, Health Directorate is required to submit ABF patient level activity data to IHPA on a six monthly basis. Data is to be submitted three months after the end of December and June; i.e. the December submission included all patient activity from 1 July 2014 to 31 December 2014 and was due on 31 March 2015. The submission includes three different datasets: Admitted Patient Care (includes Acute, Mental Health and Sub-acute), Emergency Care and Non-admitted Patients.
- 5.3 IHPA publishes an ABF data request specification for each dataset every year in an Excel workbook. It includes the scope statement for the data to be included in the submission, as well as the edit rules for each of the data items contained in the submission.

Figure 5-1 Reporting of ABF data



Source: Prepared by Protiviti on behalf of the ACT Audit Office

- 5.4 The Information Support Unit, in the Health Directorate’s Performance Information Branch, is responsible for extracting the six monthly data from the Health Directorate data warehouse , mapping the appropriate data items from the data warehouse to the data request specification from IHPA and formatting the submitted data according to the provided specification.
- 5.5 Prior to the submission due date, trial submissions to IHPA are allowed. An error report will be generated subsequent to the trial submission to indicate the required additional actions that need to be addressed before the final submission.
- 5.6 The datasets are uploaded to the IHPA data submission portal on submission date.
- 5.7 The creation of the datasets requires the extraction of patient level data from the data warehouse (which has in turn extracted the patient level data from the source systems - ACTPAS and EDIS) and the transformation of it into the requested data specification in text file format.

- 5.8 Currently, there are adequate controls surrounding the consistency and timeliness of the reporting. However, there are inadequate controls to address the integrity of the reporting process.
- 5.9 The six monthly ABF data submission by the Health Directorate to the Independent Hospital Pricing Authority is largely prepared by one staff member from the Information Support Unit. There is no formal review of the accuracy or completeness of the data before submission, despite the fact that this data is published externally and is used to determine funding of health services in the ACT. IHPA's submission error reporting process, and validation processes undertaken on data in the data warehouse, examine data validity (i.e. conformance with business rules). However, these controls do not provide assurance as to the reasonableness of the data submission. For example, errors may occur during the process to extract ABF-related data from the data warehouse, and/or in the process to modify the raw data to meet the relevant ABF reporting requirement, that will not be detected without an appropriate level of review.

RECOMMENDATION 13 ANALYTICAL REVIEW OF REPORTING

HIGH PRIORITY RECOMMENDATION

The Health Directorate should perform an analytical review to quality assure the six-monthly ABF data submission before it is sent to IHPA.

- 5.10 The Health Directorate's Performance Information Branch is responsible for submitting ABF costing data to IHPA on an annual basis. This is referred to as the National Hospital Cost Data Collection.
- 5.11 Collecting hospital patient costing data is the process of identifying the care provided by the hospital and matching these to the cost of providing this care. The main areas of care are Admitted Patient care, Non-admitted Patient care and Emergency Department care.
- 5.12 The patient level costing data is collected at the hospitals throughout the financial year. The data is submitted to the Business Intelligence Unit in Performance Information Branch, which validates it and submits it to IHPA.
- 5.13 The hospital costing data is refined based on the Australian Hospital Patient Costing Standards published by IHPA. This document sets out 37 standards, focussed on costing patient 'products'. The standards address how to define and allocate costs; however, adherence to the standards will not in itself ensure that all required data verification and validation checks are performed prior to submission, or that the data is consistent across both hospitals.
- 5.14 Hospital costing data is collected at the hospitals from different hospital source systems, including general ledger files from the financial systems. Once the costing data is extracted from the source systems, it is put into PowerPerformance Manager, software that assists

the hospitals to allocate activity overhead costs to various cost centres. Reclassification rules according to the Australian Hospital Patient Costing Standards, established by IHPA, are embedded in this software.

- 5.15 Each year, the Health Directorate announces a costing data specification to support the upcoming submission. This information is communicated to the finance and costing personnel at each hospital.
- 5.16 The hospitals generally begin collating costing data for the National Health Costing Data Collection submission after clinical coding has been completed for the previous financial year, the financial statements have been signed off and the audit process has been finalised. The Finance, Coding, Performance Reporting, and Costing teams in the hospitals are responsible for reviewing and refining the data..
- 5.17 Once the hospitals complete a review of the costing data, it is then sent to the Health Directorate's Business Intelligence Unit, which reviews and validates the hospital costing submission. This is to ensure the integrity of the costing data, including the consistency and validity of the reclassification rules used.
- 5.18 Once all review and validation activities are completed by the Business Intelligence Unit, the datasets are submitted to IHPA. All final datasets are required to be submitted to IHPA by 31 May each year.
- 5.19 The timeframes involved in preparing the costing data were not met by the hospitals during the submission period for 2013-14 and the error validation and correction activities undertaken by the hospitals were unclear. As the Health Directorate's Business Intelligence Unit performs review and validation activities after the two hospitals finalise their costing data, if there are delays due to the hospitals submitting their costing data this potentially reduces the review and validation time available, potentially affecting the integrity of costing data.
- 5.20 The allocation of roles and responsibilities between the Health Directorate and hospitals in the review of costing data are unclear to both the hospitals and the Business Intelligence Unit.

RECOMMENDATION 14 REPORTING OF ABF COSTING DATA**HIGH PRIORITY RECOMMENDATION**

The Health Directorate should develop and publish a costing framework which:

- a) allocates roles and responsibilities between the Health Directorate and hospitals;
- b) specifies a firm schedule for hospitals to submit costings;
- c) incorporates a costing data specification;
- d) outlines a costing review and validation process; and
- e) includes an urgent issue escalation process.

6 TESTING OF ABF DATA

- 6.1 This chapter considers Audit Office testing completed on the ABF data submission (31 December 2014¹⁶), including data analytics conducted on Independent Hospital Pricing Authority (IHPA) submission data and testing conducted on hospital records. The testing covered data from the Emergency Department areas, the Non-admitted Patients areas, and the Admitted Patients (Acute and Non-acute/Sub-acute) areas at Canberra Hospital and Calvary Public Hospital.

Summary

Conclusions

The Admitted Patient and Emergency Department ABF data reported to IHPA has an adequate level of data integrity. Testing identified coding errors, largely associated with front-end data entry, in the Admitted Patient and Emergency Department data; however the error rate was low. The clinical coding error rate was around seven per cent, which is reasonable. There is a low risk that the Admitted Patient and Emergency Department data reported to the Independent Hospital Pricing Authority is materially incorrect.

The quality of the Non-admitted Patient ABF data reported to IHPA requires urgent attention at both hospitals and at the Health Directorate level. The Audit Office's high level review of the data identified a high number of errors. These appear to have been due to the variety of clinics and systems that feed into the Non-admitted Patient data, the lack of standardised methods and systems across the various outpatient facilities in the two hospitals, and the lack of data assurance conducted by the hospitals and the Health Directorate. The high number of errors means that the ACT could forego Commonwealth funding (because of records with an unknown funding source).

Further, the Health Directorate does not have accurate information to plan, manage and report on Non-admitted hospital services.

¹⁶ Covering the period July-December 2014.

Key findings

| | Paragraph |
|---|-----------|
| <p>A high level review conducted by the Audit Office of the half-yearly IHPA submission for the July to December 2014 period revealed significant errors and omissions associated with Non-admitted Patient data. Of the 525,608 records in the dataset:</p> <ul style="list-style-type: none"> • 189,272 (36 per cent) contained funding source '98' (Not known) • 310,089 (59 per cent) contained the default postcode, 9999. <p>These errors and omissions are concerning, for two reasons. First, they demonstrate that the integrity of Non-admitted data in the submission is low, confirming the results of the Audit Office's substantive testing of a sample of records. Second, they indicate a risk that the ACT might not be claiming its correct funding levels; Australian Government funding is not paid for services where the funding source, as reported in the IHPA submission, contains the value '98' (Not known).</p> | 6.4 |
| <p>The Health Directorate advised that:</p> <p>Of the 189,272 records noted by the Audit Report that do not have a funding source:</p> <p>155,030 records (or 82 percent of the records) related to community mental health services. While these do not have a 'funding source' within the system in which they are captured, they do have a national funding source of 'block funded'. The absence of the 'funding source' field in the data set does not impact on the level of funding from the Commonwealth for these services.</p> <p>A further 15,370 records (8 percent) relate to services which are not covered by Commonwealth funding arrangements (including breast screening, primary health care and aged care assessment services).</p> <p>The remaining 10 percent of cases without a valid funding source code equate to 3.9 per cent of total non-admitted services and less than one per cent of total in-scope public hospital services. ACT Health is working to address these outstanding items prior to the final submission of data to the IHPA in September 2014.</p> | 6.5 |

Also, in determining the state of residence of a patient or health care consumer, the 'state of residence' field is used instead of post codes. While the correct data should be provided, this error [310,089 records containing the default postcode, 9999] did not impact on funding streams to the ACT. This error has been amended and the final submission to the Commonwealth will incorporate correct postcode information.

These claims by Health were not audited.

The Health Directorate estimates that for the last six months the errors in Non-admitted patient data, detected by the Audit Office, could have resulted in 'around \$2 million to \$3 million' being underclaimed, out of an estimated total of \$304 million for 2014-15 in Australian Government funding for hospital and health services. Health has an opportunity to correct this data before its next submission, which is due in September 2015. Health needs to continue to identify the root causes and take corrective action, as noted in Recommendation 17. 6.7

The targeted sampling detected errors for Admitted Patients length of stay, Admitted Patients overlapping admissions and Emergency Department type of visit. However, the errors detected are unlikely to have a material impact on overall ABF payments. 6.18

The substantive testing identified several data fields with extremely high error rates. These require urgent investigation. The highest error rates were associated with Non-admitted patient data, particularly for the indigenous status, postcode and funding source fields. There were also a high proportion of patient notes missing for Non-admitted patient services. The results of the substantive testing indicate that there are systemic issues associated with the integrity of Non-admitted patient data. 6.22

The Health Directorate advised that the postcode error rate was related to the new IHPA submission process for the data warehouse and has subsequently been rectified, and that a new submission to IHPA with corrected postcode data has been provided and accepted by that organisation. 6.23

The two hospitals had similar clinical coding critical error rates (errors that may have an impact on ABF payments, or do not capture the episode of care correctly). The critical error rate (around seven per cent) is reasonable¹⁷. 6.26

¹⁷ As a comparison, a 2014 clinical coding audit program across 50 National Health Service hospitals in the United Kingdom detected an average error rate of 7%. See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/364476/The_quality_of_clinical_coding_in_the_NHS.pdf. Published results of Australian clinical coding audits include Cheng, Gilchrist, Robinson and Paul (2009): 16% error rate; Reid, Allen and McIntosh (2005): 15% error rate; and MacIntyre et al. (1997): 22% error rate.

Testing processes

6.2 There were five main components of the Audit Office's testing:

- **High level review:** The half-yearly IHPA submission for the July to December 2014 period was examined to identify reporting that appeared unreasonable.
- **Data analytics:** A high-level review of ABF data integrity was undertaken by examining the half-yearly IHPA submission for the July to December 2014 period and the inputs that feed into the submission. This aimed to identify inconsistencies and verify whether there were errors by comparing the data in the IHPA submission to the patient records in the source systems. The data analytics also provided a high-level view of ABF data integrity. The data analytics addressed the completeness, validity, and consistency of ABF data.
- **Substantive testing:** The accuracy of the data collection process was tested by examining the data in the patient records and verifying whether the data matched the information reported to IHPA. The substantive testing provided an indication of the robustness of the data collection process, determining the adequacy of data integrity controls in the front-end process at the initial point of data entry. The substantive testing addressed the consistency and accuracy of ABF data.
- **Clinical coding audit:** The accuracy of clinical codes assigned to patients admitted to Canberra Hospital and Calvary Public Hospital was audited by reviewing patient records and verifying whether the information supported the clinical codes assigned to the patient record. The clinical coding audit component addressed the accuracy of ABF data.
- **Monthly reconciliation:** The number of activity entries provided to the National Health Funding Body on a monthly basis was assessed reconciling the number of activity entries in the six monthly IHPA submission to the monthly submissions to the National Health Funding Body. This addressed the completeness of ABF data.

6.3 The testing covered the three hospital areas that require submission of data to IHPA:

- Emergency Department;
- Admitted Patients (Acute and Non-acute / Sub-acute); and
- Non-admitted Patients.

High level review

6.4 A high level review conducted by the Audit Office of the half-yearly IHPA submission for the July to December 2014 period revealed significant errors and omissions associated with Non-admitted Patient data. Of the 525,608 records in the dataset:

- 189,272 (36 per cent) contained funding source '98' (Not known)
- 310,089 (59 per cent) contained the default postcode, 9999.

- 189,272 (36 per cent) contained funding source '98' (Not known)
- 310,089 (59 per cent) contained the default postcode, 9999.

These errors and omissions are concerning, for two reasons. First, they demonstrate that the integrity of Non-admitted data in the submission is low, confirming the results of the Audit Office's substantive testing of a sample of records. Second, they indicate a risk that the ACT might not be claiming its correct funding levels; Australian Government funding is not paid for services where the funding source, as reported in the IHPA submission, contains the value '98' (Not known).

6.5 The Health Directorate advised that:

Of the 189,272 records noted by the Audit Report that do not have a funding source: 155,030 records (or 82 percent of the records) related to community mental health services. While these do not have a 'funding source' within the system in which they are captured, they do have a national funding source of 'block funded'. The absence of the 'funding source' field in the data set does not impact on the level of funding from the Commonwealth for these services.

A further 15,370 records (8 percent) relate to services which are not covered by Commonwealth funding arrangements (including breast screening, primary health care and aged care assessment services).

The remaining 10 percent of cases without a valid funding source code equate to 3.9 per cent of total non-admitted services and less than one per cent of total in-scope public hospital services. ACT Health is working to address these outstanding items prior to the final submission of data to the IHPA in September 2014.

Also, in determining the state of residence of a patient or health care consumer, the 'state of residence' field is used instead of post codes. While the correct data should be provided, this error [310,089 records containing the default postcode, 9999] did not impact on funding streams to the ACT. This error has been amended and the final submission to the Commonwealth will incorporate correct postcode information.

These claims by Health were not audited.

6.6 The Health Directorate advised that:

Health has investigated the root causes of missing data fields, which has enabled the Directorate to increase estimated non-admitted activity for 2014-15 from the initial estimate of 10,272 national weighted activity units (NWAU) to 17,410 NWAU. ACT Health is developing non-admitted data standards to minimise future issues with missing data fields, so that these issues can be addressed at the source rather than during data collection and consolidation stages.

6.7 The Health Directorate estimates that for the last six months the errors in Non-admitted patient data, detected by the Audit Office, could have resulted in 'around \$2 million to \$3 million' being underclaimed, out of an estimated total of \$304 million for 2014-15 in Australian Government funding for hospital and health services. Health has an opportunity to correct this data before its next submission, which is due in September 2015. Health

to correct this data before its next submission, which is due in September 2015. Health needs to continue to identify the root causes and take corrective action, as noted in Recommendation 17.

6.8 The Health Directorate's reporting of 525,608 Non-admitted services (in the six month period July to December 2014) to IHPA is at odds with its *2013-14 Annual Report*, which states that 'ACT public hospitals provided 563,666 outpatient Non-admitted occasions of service' (in the 12 month period July 2013 to June 2014).

6.9 The Health Directorate advised that:

... the counting of non-admitted services for IHPA is different to total outpatient occasions of service reported in the ACT Health annual report: Community Mental Health Services are in-scope for IHPA reporting but are not generally considered outpatient services. Additionally, to maintain time series consistency in the annual report, this data excludes group-session occasions of services, off-campus occasions of service and occasions of service delivered by telephone, all of which are in-scope for IHPA reporting.

Data analytics

6.10 Data analytics were used to identify patterns, inconsistencies, anomalies and other useful information in the IHPA submission. There were two core components in the data analysis:

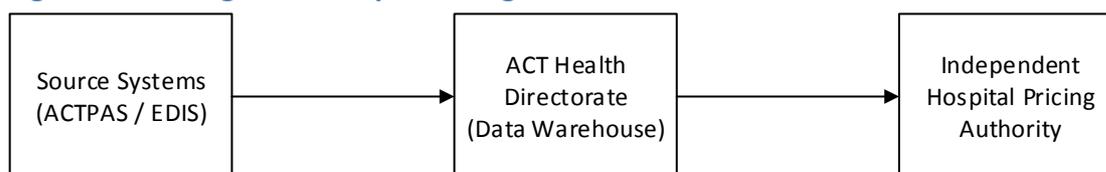
- data matching; and
- targeted sampling.

6.11 The IHPA submission for the July to December 2014 period consisted of the following sections:

- Admitted Patients (53,532 activity entries);
- Emergency Department Patients (65,617 activity entries); and
- Non-admitted Patients (525,608 activity entries).

Data matching

6.12 Data matching focussed on the investigation of hospital data as it moved from the source systems at both hospitals to the ACT Health Directorate data warehouse, to the IHPA data submission. The purpose of data matching was to determine if there were any data inconsistencies across the three stages of processing. The stages of data processes are illustrated in Figure 6-1.

Figure 6-1 Stages of data processing of ABF data

Source: Prepared by Protiviti on behalf of the ACT Audit Office

6.13 Entries in the IHPA submission were traced back to verify whether they existed at both the Health Directorate and the hospitals' source system level. The results are outlined below:

- **Admitted Patients:** 133 (0.25) per cent of the 53,532 Admitted Patients entries in IHPA submission could not be traced back to the ACTPAS system.
- **Emergency Department:** All 65,617 of the Emergency Department entries in the IHPA submission could be traced back to the EDIS system.
- **Non-admitted Patients:** As the IHPA submission does not differentiate between the source systems of each entry, these entries were traced from the data warehouse back to the ACTPAS system only. All 525,608 of the Non-admitted Patient entries in the data warehouse extract could be traced back to the source system extract.

6.14 The specific ABF data fields that influence funding were investigated and traced from the data items in the IHPA submission to those in both the ACT Directorate data warehouse and the source systems. The results of the investigation were:

- **Emergency Departments (65,617 activity entries):**
 - *Episode End Status:*
There were no mismatches for episode end status.
 - *Type of Visit to Emergency Department:*
Six hundred and seven (0.93 per cent) of the type of visit data fields did not match (EDIS – IHPA submission). All mismatches were for Canberra Hospital Emergency Department patients:
 - All patients (a total of 607) with the type of visit recorded as 'Review' in the source system (EDIS) were recorded as having the type of visit as 'Emergency Presentation' in the IHPA submission. The 'Review' type of visit recorded in EDIS should correspond to a 'Returned visit, planned' in the IHPA submission.
 - *Triage Category:* There were no mismatches for triage category.
 - *Emergency Department Principal Diagnosis:*
Seven hundred and sixty-nine (1.17 per cent) of the principal diagnosis data fields did not match (EDIS – IHPA submission). All mismatches were for Calvary Hospital Emergency Department patients:
 - All patients with the principal diagnosis 'A09.9' (Gastroenteritis and colitis of unspecified origin) in the source system were recorded as having principal diagnosis 'A09' (Other gastroenteritis and colitis of infectious and unspecified origin) in the IHPA submission;

- All patients with the principal diagnosis 'R69' (Unknown and unspecified causes of morbidity) in the source system were recorded as having principal diagnosis 'R99' (Other ill-defined and unspecified causes of mortality) in the IHPA submission; and
 - Two (50 per cent) of the four patients with the principal diagnosis 'R19.8' (Other specified symptoms and signs involving the digestive system and abdomen) in the source system were recorded as having principal diagnosis 'R99' (Other ill-defined and unspecified causes of mortality) in the IHPA submission.
- *Compensable Status:*
There were no mismatches for compensable status.
- *Indigenous Status:*
Fifteen (0.02 per cent) of the indigenous status data fields did not match (EDIS – IHPA submission).
- *Postcode:*
1,233 (1.88 per cent) of the postcode data fields did not match (EDIS – IHPA submission).
- **Admitted Patients (53,532 activity entries):**
 - *Age / Date of Birth:*
There were no mismatches for the date of birth.
 - *Procedure Code:*
Eleven (0.02 per cent) of the procedure code data fields did not match (ACTPAS – IHPA submission).
 - *Diagnosis Code:*
Thirty (0.06 per cent) of the diagnosis code data fields did not match (ACTPAS – IHPA submission).
 - *Admission Date:*
There were no mismatches for the admission date.
 - *Separation Date:*
There were no mismatches for the separation date.
 - *Care Type:*
One (0.002 per cent) of the care type data fields did not match (ACTPAS – IHPA submission).
 - *Funding Source:*
There were no mismatches for the funding source.
 - *Indigenous Status:*
Nine (0.02 per cent) of the indigenous status data fields did not match (ACTPAS – IHPA submission).
 - *Postcode:*
Three hundred and six (0.57 per cent) of the postcode data fields did not match (ACTPAS – IHPA submission).

- **Non-admitted Patients (525,608 activity entries):**
 - *Outpatient Clinic Type Tier 2:*
23,489 (4.47 per cent) of the outpatient tier 2 code data fields did not match (ACTPAS – IHPA Submission). The error rate for Non-admitted Patients is attributed to the lack of governance around Non-admitted Patient data. In addition, data is collected from multiple systems and outpatient clinics with limited consistency in the way data fields are coded.

RECOMMENDATION 15 RISK BASED APPROACH TO INVESTIGATIONS

HIGH PRIORITY RECOMMENDATION

- a) The Health Directorate should undertake further investigation into the inconsistencies and anomalies identified by the data analytics, taking a risk-based approach to the investigation and focussing on the areas that have the potential to materially affect ABF data and funding.
- b) As a priority, the Health Directorate should review the mapping processes used to extract data from EDIS to the data warehouse , and ensure that Admitted Patient principal diagnosis and Emergency Department type of visit are mapped appropriately.

Targeted sampling

- 6.15 We conducted targeted sampling, in order to investigate areas with a higher potential for error as well as areas with larger incentives for manipulation. Targeted sample records were filtered from the full population of activity entries in IHPA submission data for investigation, and a sample of these records analysed in detail.
- 6.16 The patient records for the targeted samples selected were reviewed at both Canberra Hospital and Calvary Public Hospital to determine the reason behind the anomalies/inconsistencies identified in the data analytics, as well as whether errors existed in the front-end data entry.
- 6.17 The criteria for the targeted samples that were investigated, as well as the results of the investigation are outlined below:
 - **Admitted Patients**
 - *Care Type Changes:*
A selection of patient records that had a change in care type during an admission were investigated to determine whether the change in care type was correctly recorded and supported by appropriate documentation. This was investigated as different care types correspond to different funding. For example, patients in acute care receive higher funding than patients in maintenance care.

All care type changes for patients investigated were supported by sufficient documentation to validate that a care type change was appropriate.

– *Duplicate Admission Dates:*

A selection of patient records that had multiple admissions on the same date were investigated to determine whether the multiple admissions were valid and supported by appropriate documentation.

The duplicate admission dates were appropriate for all patient records investigated, as all patients reviewed had valid presentations to the hospital for separate admissions on the same day.

– *Extended Length of Stay:*

A selection of patient records that had the longest length of stay at both hospitals were investigated to determine whether admission details were valid and supported by appropriate documentation. This was investigated as length of stay affects funding. For example, an inpatient with an overnight stay will receive higher funding than an inpatient with a day only admission.

4 per cent of the patient records investigated had errors regarding the length of stay, due to multiple identification sheets with conflicting information concerning the date that patient moved out of rehabilitation care, and conflicting discharge date information between the patient discharge/transfer documentation.

– *Overlapping Admissions:*

A selection of patient records that had overlapping admission periods were investigated to determine why the admission periods overlapped and whether each admission was supported by appropriate documentation. This was investigated as it should not be possible for a patient to have any overlapping admissions.

All of the patient records investigated with overlapping admission periods were confirmed to be errors from Calvary Public Hospital. The separation date per the patient records (ED Referral / Discharge) did not reflect the date recorded in the IHPA submission. However, admitted patients with overlapping admission periods accounted for only 0.004 per cent of entries in the IHPA submission.

• **Emergency Departments**

– *Type of visit:*

A selection of records of patients who re-presented to the Emergency Departments within a 48 hour timeframe were investigated to determine whether the re-presentation was appropriately classified as an 'emergency presentation', 'planned return visit', 'pre-arranged admission', 'patient in transit' or 'dead on arrival'. The re-presentation was also investigated to determine whether it was supported by appropriate documentation. This was investigated

as the type of visit affects funding. For example, a patient presenting as an emergency presentation will receive higher funding than a patient presenting for a planned return visit.

6.9 per cent of patient records investigated included the incorrect type of visit.

– *Triage 1 Patients:*

A selection of patients that presented to the Emergency Departments and were allocated with a triage category of '1' (resuscitation) were investigated to determine whether the triage category was correct and supported by appropriate documentation. This was investigated as the triage category affects funding. For example, a patient who has triage category assigned as '1' (resuscitation) by the Triage Nurse will attract higher funding than a patient with a triage category '5' (non-urgent).

Triage category was appropriately labelled as '1' (resuscitation) for all patient records investigated.

– Episode End Status 1 Patients:

A selection of patients who had an episode end status of '1' (admitted to the hospital) were investigated to determine whether the episode end status was correct and supported by appropriate documentation. This was investigated as the episode end status affects the weighting on a patient's funding.

Episode end status was appropriately labelled as '1' (admitted to the hospital) for all patient records investigated.

– *Dead on Arrival Patients:*

A selection of patients that had a dead on arrival status were investigated to determine whether the status was correct and supported by appropriate documentation.

Investigation of the patient records investigated confirmed that the dead on arrival status was appropriate for these patients.

- 6.18 The targeted sampling detected errors for Admitted Patients length of stay, Admitted Patients overlapping admissions and Emergency Department type of visit. However, the errors detected are unlikely to have a material impact on overall ABF payments.

RECOMMENDATION 16 LENGTH OF STAY, OVERLAPPING ADMISSIONS AND TYPE OF VISIT

- a) Canberra Hospital and Calvary Public Hospital should review patient records on a random and weekly basis with a focus on the fields that are included in ABF reporting.
- b) Canberra Hospital and Calvary Public Hospital should conduct refresher training for Emergency Department clerical staff on how to appropriately classify the 'type of visit' for patients presenting to the Emergency Department.

Substantive testing

- 6.19 The substantive testing component focused on the investigation of patient records at both hospitals. The purpose of the substantive testing was to determine whether there were errors or data manipulation in the front-end of the collection process for ABF data.
- 6.20 A statistically significant sample size was determined by the ACT Audit Office for substantive testing. The samples were selected for both Canberra Hospital and Calvary Public Hospital for the following four areas:
- Acute admitted patients;
 - Sub-acute / Non-acute admitted patients;
 - Non-admitted patients; and
 - Emergency Department patients.
- 6.21 The patient records were drawn from both hospitals, and the data fields in the patient record were compared against data fields in the IHPA submission. The results of the substantive testing completed at both Canberra Hospital and Calvary Public Hospital are outlined in Tables 6-1, 6-2, 6-3 and 6-4.

Table 6-1 Acute admitted patients

| | Calvary Public Hospital (149 records) | Canberra Hospital (149 records) |
|--|---|---|
| Admission date error | 0% | 0% |
| Separation date error | 2.01% (3) | 0.67% (1) |
| Indigenous status error | 0% | 2.01% (3) |
| Postcode error | 4.03% (6) | 1.34%(2) |
| Funding source error | 0% | 0% |
| Missing patient notes to support service | 0.67% (1) | 0.67% (1) |

Source: Prepared by Protiviti on behalf of the ACT Audit Office

Table 6-2 Sub-acute / Non-acute admitted patients

| | Calvary Public Hospital (149 records) | Canberra Hospital (150 records) |
|--|---|---|
| Care type error | 1.34% (2) | 0.67% (1) |
| Admission date error | 0% | 0% |
| Separation date error | 2.01% (3) | 2.00% (3) |
| Indigenous status error | 0.67% (1) | 0% |
| Postcode error | 5.37% (8) | 4.00% (6) |
| Funding source error | 1.34% (2) | 1.33% (2) |
| Missing patient notes to support service | 0.67% (1) | 0% |

Source: Prepared by Protiviti on behalf of the ACT Audit Office

Table 6-3 Non-admitted patients (Outpatients)¹⁸

| | Calvary Public Hospital | Canberra Hospital |
|--|-----------------------------|-----------------------------|
| Service delivery setting error | 6.25% (6 of 96 records) | 8.62% (5 of 58 records) |
| Service delivery mode error | 15.63% (15 of 96 records) | 17.24% (10 of 58 records) |
| Outpatient clinic type error | 2.08% (2 of 96 records) | 8.62% (5 of 58 records) |
| Tier 2 clinic type error | 0% (0 of 96 records) | 1.72% (1 of 58 records) |
| Indigenous status error | 22.92% (22 of 96 records) | 25.86% (15 of 58 records) |
| Postcode error | 98.00% (147 of 150 records) | 99.33% (149 of 150 records) |
| Funding source error | 52.67% (79 of 150 records) | 72.67% (109 of 150 records) |
| Missing patient notes to support service ¹⁹ | 36.00% (54 of 150 records) | 61.33% (92 of 150 records) |

Source: Prepared by Protiviti on behalf of the ACT Audit Office

¹⁸ The requested sample size was 150; however, where the hospitals did not produce hard-copy evidence, the number of instances where specific data items (e.g. postcode) could be tested was reduced.

¹⁹ The Health Directorate subsequently advised that not all non-admitted clinical records are stored in the electronic clinical records system. Calvary Public Hospital subsequently advised that the retrieval of medical records at short notice resulted in some records presented with incomplete filing or notes that were electronically stored elsewhere and were as a result not available to the Audit Office.

Table 6-4 Emergency Department patients

| | Calvary Public Hospital (147 records) | Canberra Hospital (150 records) |
|--|---|---|
| Type of Visit to ED error | 0% | 1.33% (2) |
| Triage Code error | 0.68% (1) | 0% |
| Episode End status error | 0.68% (1) | 0% |
| ED Principal Diagnosis error | 2.04% (3) | 0% |
| Indigenous status error | 0.68% (1) | 0.67% (1) |
| Postcode error | 0.68% (1) | 0% |
| Funding source error | 0.68% (1) | 0% |
| Missing patient notes to support service | 2.00% (3 of 150 records) | 0% |

Source: Prepared by Protiviti on behalf of the ACT Audit Office

Key:

- Green: the percentage of errors is very low/errors do not exist (less than or equal to 1 per cent)
- Yellow: the percentage of errors is low (greater than 1 per cent, but less than or equal to 2 per cent)
- Orange: the percentage of errors is medium (greater than 2 per cent, but less than or equal to 5 per cent)
- Red: the percentage of errors is high (greater than 5 per cent).

These severity ratings have been adopted on the basis of the sampling method used and auditing guidance on materiality, *ASA 320 Materiality in Planning and Performing an Audit*. The sampling method used for controls testing allows for one or two exceptions in the sample sizes used, equating to a 2 per cent or less exception rate and indicated by a green or yellow coloured severity level. Financial Audit practice generally associates greater than 5 per cent as being potentially material; hence the 5 per cent (red) severity level indicated.

6.22 The substantive testing identified several data fields with extremely high error rates. These require urgent investigation. The highest error rates were associated with Non-admitted patient data, particularly for the indigenous status, postcode and funding source fields. There were also a high proportion of patient notes missing for Non-admitted patient services. The results of the substantive testing indicate that there are systemic issues associated with the integrity of Non-admitted patient data.

6.23 The Health Directorate advised that the postcode error rate was related to the new IHPA submission process for the data warehouse and has subsequently been rectified, and that a new submission to IHPA with corrected postcode data has been provided and accepted by that organisation.

6.24 The Health Directorate also advised as follows:

While ACT Health notes the difficulty faced by the Audit Office in doing a comprehensive audit of all systems in the time available, placing the Data Warehouse in-scope with some of the source systems out of scope of the audit is problematic for assessing data integrity. For example, most of the 'funding source' issue stems from within the MHAGIC source system, which is out of scope of the audit, yet flows

through to the data warehouse which is in scope of the audit yet does not affect funding as it is out of scope of ABF. In total, 39.81 per cent of non-admitted records in the IHPA submission originated in systems outside the scope of the audit.

RECOMMENDATION 17 NON-ADMITTED PATIENT DATA AND SYSTEMS

HIGH PRIORITY RECOMMENDATION

- a) The Health Directorate and Calvary Public Hospital should investigate the root causes of errors in Non-admitted patient data, including errors in the indigenous status, postcode and funding source fields in the source data and the IHPA submission and develop and implement policies and procedures for improvement.
- b) The Health Directorate should implement a single patient management system, and standardise data management policies and procedures, across all public outpatient clinics.

Clinical coding audit

- 6.25 The Audit Office engaged a clinical coding auditor to analyse Admitted Patient records and assess whether the information in each patient record supports the clinical codes assigned and subsequently included in the ABF data submission. One hundred and ninety-eight records were sampled at Canberra Hospital; 197 records were sampled at Calvary Public Hospital.
- 6.26 The two hospitals had similar clinical coding critical error rates (errors that may have an impact on ABF payments, or do not capture the episode of care correctly). The critical error rate (around seven per cent) is reasonable²⁰.
- 6.27 The majority of the episodes with incorrect coding were under-coded (missed codes). Coding errors could be attributed to factors including human error, misinterpretation of documentation and completion of coding before discharge summary availability. Where coding is completed before the availability of the discharge summary, good practice is to make note of this in the medical record (by means, for example, of a stamp). There was no evidence of this practice in the sample at either hospital.
- 6.28 Errors could also be attributed to conflicting documentation in the medical record, specifically conflict between the discharge summary and the treatment recorded elsewhere in the record.

²⁰ As a comparison, a 2014 clinical coding audit program across 50 National Health Service hospitals in the United Kingdom detected an average error rate of 7%. See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/364476/The_quality_of_clinical_coding_in_the_NHS.pdf Published results of Australian clinical coding audits include Cheng, Gilchrist, Robinson and Paul (2009): 16% error rate; Reid, Allen and McIntosh (2005): 15% error rate; and MacIntyre et al. (1997): 22% error rate.

RECOMMENDATION 18 CLINICAL CODING

Canberra Hospital and Calvary Public Hospital should improve their clinical coding with the following process changes.

- a) Where coding is completed before the availability of the discharge summary, the medical record should be flagged, to facilitate subsequent identification of potentially incorrectly coded episodes.
- b) Where the discharge summary directly conflicts with information in the record, a query should be forwarded to the treating clinician for clarification. These queries should be followed-up and documented for future reference.

6.29 Further suggestions for the review of local coding procedures have been communicated directly to the medical records areas of the two hospitals (see Appendix B).

APPENDIX A: ABBREVIATIONS

| | |
|--------|--|
| ABF | Activity Based Funding |
| ACT | Australian Capital Territory |
| ACTPAS | ACT Patient Admission System |
| COSO | Committee of Sponsoring Organizations of the Treadway Commission |
| EDIS | Emergency Department Information Solution |
| ICT | Information and Communications Technology |
| IM | Information Management |
| IT | Information Technology |
| IPHA | Independent Hospital Pricing Authority |
| KPI | Key Performance Indicator |

APPENDIX B: CLINICAL CODING FEEDBACK

The following feedback from the Clinical Coding Audit was provided to the hospitals.

- Patient seen by pharmacist, see end of progress notes (16/10)
- ASA score of 2 on anaesthetic assessment (should be 92514-29)
- ACS2113. These codes would be better applicable
- Pathology report mentions ?aspirin as cause of gastritis. Results do not conclude this is the case, and there is no suggestion of aspirin being the cause
- Discharge summary states ulcerative proctitis, and this was the cause of the FOBt. NB. This may be likely due to the record being coded without a discharge summary. Could not verify this as there were no dates stamped on the summary or 'coded without discharge summary' stamp
- Discharge summary states abdominal pain as primary diagnosis, also mentioned in progress notes as reason for presentation as opposed to constipation
- No mention of respiratory tract infection (discharge summary states non-infective)
- Physiotherapy in progress notes
- Patient developed post operative fever, no organism identified
- Maternal exhaustion code missed
- Missing procedure codes?
- Missed social work codes at back of record
- Insertion of mirena performed, bulky uterus noted in operation report
- Discharge summary states treatment commenced for hypertension also. Patient lives alone, elderly with LOS 7 days
- Discharge summary states initially managed as UTI, but later revealed to be diverticulitis
- ACS2111: Code Z12.1, also noted abdominal pain on operation report
- Discharge summary specifies patient hit head on kerb, was assessed for internal head injury
- Code gastrointestinal haemorrhage (rectal bleeding) as indication for surgery as Pdx
- Discharge summary states repeated falls as the Pdx. Possibly coded prior to discharge summary?
- Op report and discharge summary state surveillance Z12.1 as the indication (family and personal history)
- Diagnosed with infective pericarditis (see also Doctors referral letter in back of record), was also treated as pericarditis case (see medication chart)
- No need to code the biopsy, just code to the highest level (polypectomy)
- No need to code the biopsy, just code to the highest level (polypectomy). Anal tags noted on summary, possibly coded without summary?
- Indications include family history. Noted on op report: haemorrhoids, anal tags, diverticulosis
- ASA score of 3, not 2

- Patient acquired post-op urinary retention -> IDC inserted and trial of void performed (ACS0002). This was not coded
- Discharge summary specifies harmful use syndrome, not dependence, so code F10.1 instead of F10.2.
- Detoxification procedure not coded
- Mention of GBS positive status in delivery summary, not coded
- Gastritis coded to infectious/viral. No mention of infectious origin in discharge summary or record (possible gluten contamination, patient has coeliac disease)
- Discharge summary states 'likely Strep infection', code to A49.1 as opposed to B35.9 as per ACS0012
- Emergency status not circled on anaesthetic report, anaesthesia code = 92514-39
- Pathology states Hydronephrosis N13.3 (N13.5 code is stricture without hydronephrosis)
- Further specific codes to specify follow-up care were not coded (hand wound, external cause codes). Ex-smoker code (Anaesthesia sheet)
- Codes reflect hypertension episode, record reflects post-op bleeding episode? Likely incorrect episode coded
- Discharge summary states headache as the diagnosis, which was associated with gastro symptoms. Code Vomiting and non-infectious diarrhoea as additional diagnoses as these were a primary focus of treatment (IVF rehydration)
- Discharge summary states alcohol use disorder, not alcohol dependence
- ARM induction with medical IOL, epidural anaesthesia administered
- Discharge summary states this admission is for follow-up of abdominal pain/vomiting. Study inconclusive of symptoms, so the symptoms should be the Pdx. (this was also mentioned on Primary discharge diagnosis)
- Cyst of Corpus luteum noted on ultrasound not coded
- Physiotherapy, last page of ED notes, T2DM noted in Triage form
- Patient has known history of renal carcinoma, this was investigated during the admission as a possible cause of pain
- Incorrect ASA score. Social work procedure code missed, advice given regarding patient's transport due to living alone, so z60.2 (living alone status code) could also be applicable here
- Speech pathology in progress notes
- Gastroenteritis should be coded to non-infectious origin (K52.9)
- Physiotherapy care provided, page 10 of ED notes
- No mention of alcohol dependence, should not be coded
- Physiotherapy in progress notes
- Order of coding should be J18.9, J90, D69.6 THEN D46.2/M99833.

Audit reports

| Reports Published in 2014-15 | |
|-------------------------------------|---|
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| Report No. 03 – 2015 | Restoration of the Lower Cotter Catchment |
| Report No. 02 – 2015 | The rehabilitation of male detainees at the Alexander Maconochie Centre |
| Report No. 01 – 2015 | Debt Management |
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| Report No. 04 – 2014 | Gastroenterology & Hepatology Unit, Canberra Hospital |
| Report No. 03 – 2014 | Single Dwelling Development Assessments |
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| Report No. 08 – 2013 | Management of Funding for Community Services |
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| Report No. 06 – 2013 | ACT Auditor-General's Office Annual Report 2012-13 |
| Report No. 05 – 2013 | Bushfire Preparedness |
| Reports Published in 2012-13 | |
| Report No. 04 – 2013 | National Partnership Agreement on Homelessness |
| Report No. 03 – 2013 | ACT Government Parking Operations |
| Report No. 02 – 2013 | Executive Remuneration Disclosed in ACTEW Corporation Limited's (ACTEW) 2010-11 Financial Statements and Annual Report 2011 |
| Report No. 01 – 2013 | Care and Protection System |
| Report No. 10 – 2012 | 2011-12 Financial Audits |
| Report No. 09 – 2012 | Grants of Legal Assistance |
| Report No. 08 – 2012 | Australian Capital Territory Public Service Recruitment Practices |
| Report No. 07 – 2012 | Annual Report 2011-12 |
| Report No. 06 – 2012 | Emergency Department Performance Information |
| Reports Published in 2011-12 | |
| Report No. 05 – 2012 | Management of Recycling Estates and E-Waste |
| Report No. 04 – 2012 | Development Application and Approval System for High Density Residential and Commercial Developments |
| Report No. 03 – 2012 | Early Childhood Schooling |
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| Report No. 05 – 2011 | 2010-11 Financial Audits |
| Report No. 04 – 2011 | Annual Report 2010-11 |

These and earlier reports can be obtained from the ACT Audit Office website at <http://www.audit.act.gov.au>.

