Text Data Mining of Risk Management Process for Human Resource Management from the Aged Care Quality Reports

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Abstract—This study aimed to compare and test two different research methods for study Australian Aged Care Quality reports to identify risk factors for human resource management. The original 2,876 Aged Care Quality reports were released from March 8, 2015 to December 31, 2018, and they were extracted and loaded into a designed PostgreSQL database. Two typical research methods ('Pdf(word) advanced search' and 'Pdf(word)-text-mining' based on python) were tested and compared for identifying risk factors from human resource management. Qualitative data analysis was further conducted on these accreditation reports to understand why an RAC home failed in human resource management. There was no significant difference in using different two methods for identify failed Aged Care Quality reports in accuracy. 'Pdf(word)-text-mining' has advantages in efficiently analysing structured data and special term in aged care. We found 62 aged care quality reports that recorded failure of at human resource management by 'Pdf(word)-text-mining'. There were significant positive advantages for using 'Pdf(word)-text-mining' to deal with big size data in Aged Care Quality research. The findings suggested that 'Pdf(word)-text-mining' method can solve a lots of issues for studying Aged Care Quality reports with efficiency and accuracy. 'Pdf(word) advanced search' is also suitable for small size of data and has disadvantages in efficiency. The future research can further validate the better research method for Aged Care Quality research.

Keywords - Risk factors, Human resource management, Aged Care Quality reports.

1 INTRODUCTION

Residential aged care (RAC) is a research hotspot in the field of risk management, because the elderly living in RAC families suffer from a variety of chronic diseases, such as diabetes, dementia and cardiovascular diseases, and they need nursing staff to provide continuous medical care health care [1]. Research on risk management for the elderly is important for the care delivery and continuity of care throughout the health care service. Nursing staff work in three

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shifts a day to provide care for the elderly in the RAC house [2]. Therefore, accurate and adequate information exchange is also vital to the continuity of care for the nursing team [2]. Having an effective monitoring system to identify deficiencies in employee skills and practice is one of the requirements of Australian aged care accreditation [3]. Despite its importance, previous studies have found that some monitoring systems in the RAC homes do not have an effective monitoring system to identify deficiencies in employee skills and practice [1, 2, 4, 5].

1.1 Accreditation

Accreditation is a mandatory mechanism for risk management implemented by the government to ensure industry safety and minimum service standards. The accreditation assessment process is used by many countries to assess the quality of care [6-9]. The agency determined whether the aged care services provided by an RAC home met the relevant safety standards. The Australian government has taken over the function of the agency and has directly implemented its accreditation system through a section of the government called Aged Care Quality Agency since 2014 [6]. Therefore, this study refers to the aged care quality reports released from March 8, 2015 to December 31 [3]. ACQR have 44 expected outcomes across the four Standards and provide a reasonably comprehensive and authoritative report of the performance of an RAC home in meeting the safety and quality of life standards established by the Australian government [3, 4]. In order to meet the accreditation standards, the RAC family must always comply with all these standards.

1.2 Accreditation processing

The process of accreditation in Australia includes self-assessment, a desk audit, a site audit, and the decision whether or not to accredit the service and the publication of the accreditation report [6]. Self-assessment is conducted by aged care providers as part of the application for accreditation. Desk audit is a review of the results of self-assessment and supporting documents including certification status, prudential arrangements, the ratio of confessional residents and complaint matters [10]. Site audit consists of interviews with residents, their families, staff and management [10]. Based on the assessment team's findings, any submission from the approved provider and any other relevant information, the accreditation agency must make decisions on whether or not to accredit the service. If a home meets all the requirements of accreditation, they are normally accredited for a period of three years. The accreditation report, including the agency’s decisions, is published in each of 44 outcomes on the quality agency's website [4]. RAC home must complete accreditation before the expiration date of the current accreditation period.

1.3 Monitoring systems

An effective monitoring system can support the provision of multidisciplinary aged care and multiple organizational purposes, including the quality of care, funding, communication and continuity [1]. However, there is a lack of empirical evidence to support this claim in RAC setting. As accreditation only ensures safety and minimum standards of RAC services, no difference in quality of aged care services can be inferred in the aged care accreditation reports once a RAC home met all accreditation standards [2, 5]. Therefore, this study aimed to test different two methods for study Australian Aged Care Quality reports for identifying risk factors in human resource management.

1.4 Staff skills and practices

By the end of 2018, only 2.2% (62 of 2876) of the accredited RAC homes in Australia did not have a effective monitoring system in place to identify flaws in employee skills and practices [11]. Although human resource management is the primary challenge to support the provision of aged care services and customer safety risk management in RAC homes, according to our analysis of Aged Care accreditation reports, the failure rate seems to be low since 2018. [11]. The research described here aims to study the effectiveness of finding shortcomings in the skills and practices of human resource managers. In order to answer the above questions, we need to solve the following research questions:

• Effectively using aged care quality reports for identifying risk factors for improving human resource management.

• Advantages and disadvantages for two typical research methods('Pdf(word) advanced search' and 'Pdf(word)-text-mining').

2 METHODS

We followed a four-step process to extract and analyze data from these reports: (1) data sourcing and processing, (2) development, test and usage of a computer program for data extraction, (3) data labeling, and (4) data analysis (Figure 1).

2.1 Data sourcing and processing

Data were sourced from the website of the Australian Aged Care Quality Agency (www.aacqa.gov.au). 2,876 copies of ACQR reports published in the period of between March 8, 2015 and December 31, 2018 were downloaded, all in PDF format and each is about 24 pages long.

These reports were converted from PDF to text files. Errors generated during conversion such as miss-spellings, broken lines and unnecessary symbols were fixed. The first author manually compared the converted text files with the original PDF documents, finding that the incorrect character encoding was concentrated on list characters like '•' in PDF format. These characters were converted to '?' or '????' in the text format. Otherwise, the errors did not influence reading the content.

2,876 records were transfer into text format by name of homes. Information about state name, assessment date, the name of an RAC home and location, and comments and recommendations on the 44 expected outcomes was extracted and loaded into a designed PostgreSQL database for storage and further analysis.

2.2 Development, test and usage of a program for data extraction

In order to better extract the two types of information from the accreditation reports, we have developed an automatic extraction program based on python. For the first type of information, the identifying keywords were 'human resource management'. For the second type of information, the identifying keywords were 'not met'. The computer program was tested with a

set of 100 records randomly selected records. We first verify the effectiveness of the extraction program, and then use it to extract two types of information from 2876 records.

We also randomly selected a set of 100 records to compare advantages and disadvantages for two typical research methods of 'Pdf(word) advanced search' and 'Pdf(word)-text-mining' for identifying risk factors from human resource management. For the 'Pdf(word) advanced search', we search and collect information around key words 'human resource management'. For 'Pdf(word)-text-mining', we automatically collect the information between '1.6 human resource management' and '1.7'.

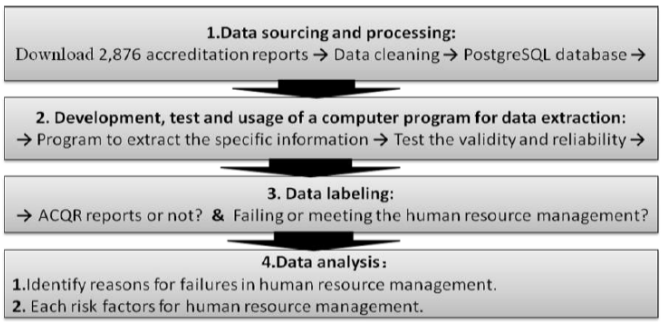


Figure.1 Four steps to extract and analyse data.

2.3 Data labelling

Reports with one or more failures are selected for further analysis. The grouping standard is: 1. whether they were valid ACQR reports, 2. whether or not they met the expected outcome in human resource management.

2.4 Data analysis

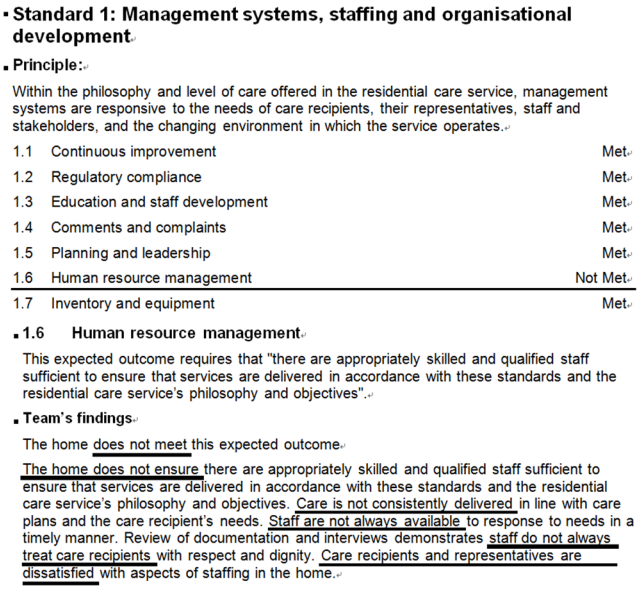
We use qualitative data analysis on the accreditation report to understand why RAC homes fails in human resource management. In order to identify the cause of the failure, special emphasis will be placed on the content to describe the cause of the RAC homes failed in human resource management. First, we read carefully the reviews of each RAC house by the accreditation agency to understand the overall situation. Then we read each sentence carefully to understand why the RAC homepage failed in the human resource management results, and we recorded the reason for the failure. After the identified reasons are marked, they are continuously compared to classify them. Finally, we calculated the number of houses for each risk factor of human resource management.

3 RESULT

3.1 'Pdf advanced search' and 'Pdf-text-mining' for identifying risk factors from human resource management.

We found 'Pdf-text-mining' has advantages in efficiently analysing structured data and special term in aged care. We found the name of 62 aged care quality reports that recorded failure of at

human resource management can be each found by 'Pdf(word)-text-mining'. According to a set of 100 records randomly to test and compare advantages and disadvantages for two typical research methods, there were significant positive advantages for use 'Pdf(word)-text-mining' to deal with big size data in Aged Care Quality research. Our findings also suggested that 'Pdf(word)-text-mining' method can solve a lots of issues for study Aged Care Quality reports with efficiency and accurate (Figure2). 'Pdf(word) advanced search' is also suitable for small size of data, but has disadvantages in efficiency.



- **Standard 1: Management systems, staffing and organisational development**
- **Principle:**

Within the philosophy and level of care offered in the residential care service, management systems are responsive to the needs of care recipients, their representatives, staff and stakeholders, and the changing environment in which the service operates.

1.1	Continuous improvement	Met
1.2	Regulatory compliance	Met
1.3	Education and staff development	Met
1.4	Comments and complaints	Met
1.5	Planning and leadership	Met
1.6	Human resource management	Not Met
1.7	Inventory and equipment	Met

- **1.6 Human resource management**

This expected outcome requires that "there are appropriately skilled and qualified staff sufficient to ensure that services are delivered in accordance with these standards and the residential care service's philosophy and objectives".

- **Team's findings**

The home does not meet this expected outcome.

The home does not ensure there are appropriately skilled and qualified staff sufficient to ensure that services are delivered in accordance with these standards and the residential care service's philosophy and objectives. Care is not consistently delivered in line with care plans and the care recipient's needs. Staff are not always available to response to needs in a timely manner. Review of documentation and interviews demonstrates staff do not always treat care recipients with respect and dignity. Care recipients and representatives are dissatisfied with aspects of staffing in the home.

Figure.2 Risk factors for 1.6 human resource management.

3.2 Reasons for the RAC homes not meeting did not meet human resource management

We found 62 aged care quality reports that recorded failure of at human resource management. We also found daily allocation sheets, roster, professional staff registrations, police check system, the appraisal schedule necessary for site audits and desk audits. Homes do not ensure that there are enough skilled and qualified personnel to ensure that services are delivered in accordance with these standards, and the philosophy and objectives of residential care services are the cause of this failure.

The typical risk factors for human resource management are:

Care is not always provided in accordance with the care plan and the needs of the care recipient (Care plans and care recipient's needs failed). Staff are not always available to response to needs in a timely manner. Review of documentation and interviews demonstrates staff do not always treat care recipients with respect and dignity(Staff are not always available).Care recipients and representatives are dissatisfied with aspects of staffing in the home(dissatisfied with aspects of staffing).Staff do not have the skills to ensure service delivery(skills failed). Compulsory training has not been monitored to ensure staff have appropriate skills(Compulsory training failed). Some staff told us they are not able to complete their work in the allocated time(not able

to complete their work). There was some negative feedback about staff availability to support care recipients and staff knowledge to carry out their work in a professional manner(knowledge to carry out their work failed).

TABLE 1 TOP SIX REASONS FOR RAC HOMES DID NOT MEET 1.6 HUMAN RESOURCE MANAGEMENT.

No.	Failures in 1.6 human resource management
1	Care plans and care recipient's needs failed.
2	Staff are not always available.
3	Dissatisfied with aspects of staffing.
4	Compulsory training failed.
5	Not able to complete their work.
6	knowledge to carry out their work failed.

If one home failed in human resource management, their reasons will be recorded as a risk factor in our risk management system. In order to identify the cause of the failure, special emphasis will be placed on the content to describe the cause of the RAC homes' failure in each failed human resource management outcome. 'Pdf(word)-text-mining' have advantages to deal with keywords, but have disadvantages to gain a sense of the whole. Although the reasons for failure have been carefully read and understood why RAC homes failed in human resource management outcome can help us to label risk factors and continually compare them to categorize them, this process is at a disadvantage in terms of efficiency.

4 DISCUSSION

To date, there is little empirical evidence to compare two typical research methods('Pdf(word) advanced search' and 'Pdf(word)-text-mining') for identifying risk factors from aged care quality reports. It developed and applied 'Pdf(word)-text-mining' to extract insights from the aged care accreditation reports about why some RAC homes were not successful in meeting aged care accreditation standards. As meeting the accreditation outcome for 'human resource management' requires the effective monitoring mechanisms, this result may support about the logic connection between the associations point to areas that could be promising for future research.

The reasons why the RAC homes failed in 1.6 included: failure in care plans and care recipient's needs, staff are not always available, dissatisfied with aspects of staffing, failure in compulsory training, not able to complete their work, failure in knowledge to carry out their work. These reasons provided support for a positive contribution of improving human resource management. 'Pdf(word)-text-mining' have advantages to deal with keywords, but have disadvantages to gain a whole sense.

In fact the criteria used by the Aged Care Quality Agency to decide that an RAC home did not meet an accreditation outcome in human resource management appeared, to a large extent, to

be attributed to poor aspects of staffing. Even if residents have received proper care from caregivers, but the entire process is not recorded, RAC residences will not be able to prove that their residents have received proper care. The risk management of this article is obtained from every sentence that the author has read carefully. The purpose of this research is to understand why the RAC family failed and the reasons for the failure in the human resource management results.

5 LIMITATIONS

One of the flaws of this study is that the findings come from the analysis of the accreditation report, and the nature of this secondary study also has its limitations. As only 62 RAC homes failed in human resources management outcomes, evidence might be limited. In addition, the causal relationship between the failure of human resource management and the effective monitoring system explained by the author is subjective. Future research may consider conducting interviews with Aged care facilities to determine the direct causes of human resource management failures.

6 CONCLUSION

We found 62 aged care quality reports that recorded failure of at human resource management. There were significant positive advantages for use 'Pdf(word)-text-mining' to deal with big size data in Aged Care Quality research for data collection. The findings suggested that 'Pdf(word)-text-mining' method can solve a lots of issues for study Aged Care Quality reports with efficiency and accurate for keywords. 'Pdf(word) advanced search' is also suitable for small size of data, but has disadvantages in efficiency. As only 62 RAC homes failed in human resources management outcomes, relevant evidence may be underrepresented. The future research can further validate the better research method for Aged Care Quality research and Aged Care risk management.

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