ISSN: 0975-833X

*Available online at http://www.journalcra.com*

**INTERNATIONAL JOURNAL OF CURRENT RESEARCH**

*International Journal of Current Research*
*Vol. 13, Issue, 11, pp.19679-19683, November, 2021*

*DOI: https://doi.org/10.24941/ijcr.42646.11.2021*

## RESEARCH ARTICLE

# TO STUDY THE FACTORS CONTRIBUTING TO DELAY IN DISCHARGES OF INPATIENTS AND APPLYING LEAN INTERVENTION TO IMPROVE THE DISCHARGE PROCESS IN A TERTIARY CARE TEACHING HOSPITAL IN SOUTH INDIA

**Dr. Saba Fatima[1] Dr. M Rajiv[2] Dr. Satyanarayana, N.[3] and Dr. Rao, J.N. [4]**

[1]Junior resident of Hospital Administration, Nizam's Institute of Medical Sciences
[2]Senior residentof Hospital Administration, Nizam's Institute of Medical Sciences
[3]Professor & HOD Department of Hospital Administration, Nizam's Institute of Medical Sciences,
[4]Professor & HOD Department of Hospital Administration (Dr.VRK Medical College)

**ARTICLE INFO**

*Article History:*
Received 25th August, 2021
Received in revised form
19th September, 2021
Accepted 24th October, 2021
Published online 26th November, 2021

*Keywords*
Discharge Delay,
Ishikawa Diagram, Pareto Chart,
Lean Intervention, Inpatients.

***Corresponding author:***
***Dr. Saba Fatima***

**ABSTRACT**

**Objective:** The objective of the study is to identify the gaps, highlight those areas where delay in discharge of inpatients can be eliminated and recommend accordingly, so that the hospital discharge process can be managed smoothly. **Methods:** A prospective observational study, with data of patients admitted in medical and surgical departments was conducted in a convenient sample of 280 inpatients and the quick changeover approach, also known as the single-minute exchange of die (SMED), was selected as it aims at increasing productivity by reducing waiting times and unused human talent. The data was collected and analyzed from August 2021 to October 2021 at tertiary care teaching Hospital. **Results:** The average time taken for 32% of patients discharge is 8-10 hrs, 26 % of patients is 6-8 hrs, 20% of patients is 4-6 hrs, 16% of patients is more than 10 hrs and 6% of patients is 2-4 hrs. Using Ishikawa diagram, the possible causes of delayed discharges are illustrated. Showing Pareto chart, the reasons contributing for delay in discharge process, it highlights the credit, billing and patient factor in delay of discharge. Showing 20% of delay in vacating causes 80 % of delay in bed allotment. After the process diagnosis and data collection, the quick changeover approach is conducted before and after the implementation. **Conclusion:** The delays were mainly related to processes that could be improved by lean intervention. Orienting the hospital settings with measures to prevent causes and implement changes to decrease the effect of delayed discharge process. Thus, interventions should be developed to reduce overcrowding, for higher availability of hospital beds and to improve patient satisfaction.



***Citation: Dr. Saba Fatima, Dr. M Rajiv Dr. Satyanarayana, N. and Dr. Rao, J.N.*** *"*To Study the Factors contributing to Delay in Discharges of Inpatients and Applying Lean Intervention to improve the Discharge Process in a Tertiary care teaching hospital in South India*", 2021. International Journal of Current Research, 13, (11), 19679-19683.*

# INTRODUCTION

Discharge is "the process of activities that involves the patient and the team of individuals from various discipline working together to facilitate the transfer of patient from one environment to another."[1] The patient discharge process as "the final step of the treatment procedure during a patient's length of stay," and timely discharge as "when the patient is discharged home or transferred to an appropriate level of care as soon as they are clinically stable and fit for discharge."[2]In this study, the 'discharge time' is considered from patient being confirmed for discharge by doctor to patient leaves the hospital.

There are clinical, legal, and administrative aspects involved in addition to record keeping while discharging a patient from the hospital. This includes settlement of hospital bills, procurement of drugs, arranging transportation, and so on. Nowadays, there is an increasing demand for healthcare services that creates challenges for hospitals in terms of cost and efficiency. Thus, healthcare professionals in many countries around the world are struggling to provide competent and safe care while being pushed to optimize the use of resources.[3] Delayed discharges are very prominent worldwide. For example, in the United Kingdom the marked increase in Micallef et al 2 International Journal of Health Policy and Management, 2020, x(x), 1–9 delayed discharges is of significant concern, especially after being linked with increased mortality rates.[4]

The reasons for delay also vary with regions as well as type of hospitals. A study in Esfahan, Iran, in 2004 showed that the average time for patients to complete the discharge process was 4.93 hours, with the main factors affecting average waiting time being patients' financial problems and distance between different wards.3 A similar study in a tertiary care teaching hospital of Bengaluru found that the time taken for billing completion contributed the most to the total time taken for discharge followed by time taken for discharge summary writing.[5] In order to reduce the turnaround time for the discharge process, the time taken for the whole discharge process beginning from discharge order till the patient leaves the hospital needs to be studied. This is important to identify the bottlenecks and their root causes.

One of the common approaches to reach hospital efficiency and provide better quality of care has been Lean Thinking. This is because Lean can change how hospitals conduct their operations as it allows one to improve the quality of care, reduce errors and waiting times, support employees, and eliminate departmental barriers.[3] Delayed discharge process is one of the most common problem in hospital that needs to be addressed to reduce the long waiting time and to increase the occupancy of bed. Long waiting time of patients causes frustration which reflects on patients' dissatisfaction. Through this study factors affecting the discharge and causes are identified and suggestions were given which aims at quality of care, patient satisfaction and increase reputation of hospital. The aim of the study is to find out the causes of delay for cash and insurance patients. Discharge is one of the quality indicators that needs improvement and time taken is compared with NABH standards.[6]

### Aims and Objectives

**Aim:** The aim of the study is to identify the causes of delay in inpatient discharge and to recommend measures in a tertiary teaching hospital.

### Objectives

- To study the discharge process of patients.
- To calculate the total discharge time and to identify theroot cause for delay in inpatient discharge process.
- To implement measuresfor eliminating avoidable discharge time delays and improving healthcare delivery as well as patient flow processes.

# MATERIALS AND METHODS

**Study Setting:** A prospective observational study, with data of patients admitted in medical and surgical departments was conducted in a convenient sample of 280 inpatients. The data was collected and analyzed from September 2021 to November 2021 at tertiary care teaching Hospitalwith 1400 bedded. Sample included inpatient of paying and credit categories in all wards, Intensive care units and private rooms of the hospital.

**Study Design:** This prospective observational study sought to implement Lean to reduce the time required to discharge patients from the tertiary care teaching hospital in South India.

**Sample size:** Sampling population 1029 In-patient, the sample size is calculated to be 280 obtained from Rao soft Inc. (sample size calculator). The margin of error allowed is 5% with a 95% confidence interval with 50% response rate. This prospective observational study sought to implement Lean to reduce the time required to discharge patients from the tertiary care teaching hospital.

This process has been identified as one of the lengthy processes in the hospital. The general approach is presented throughout three stages:

- Discharge process diagnosis,
- Time studies and data collection through Ishikawa diagram[cause-effect diagram] and pareto chart showing the reasons contributing for delay in discharge process, and
- Implementing the Lean approach known as quick changeover.

After the intervention, the discharge time was measured again to compare the results and validate a statistical improvement through a two-sample hypothesis testing. Samples related to discharge times (before and after the intervention) were collected first-hand using a chronometer in September 2021 to November 2021. These times were documented in hours.

**Studytools and approach:** The quick changeover approach, also known as the single-minute exchange of die (SMED), was selected as it aims at increasing productivity by reducing waiting times and unused human talent, e.g., surgeons waiting for the next patient in the operating room.[7] In a healthcare process, three types of activities are identified when using the quick changeover approach [8]:

- Value-added external activities that can take place anytime but should occur before or after the process;
- Value-added internal activities that occur during the process and should be made external when possible;
- Non-value-added or waste activities that should be eliminated (or at least reduced).

After the process diagnosis and data collection, the quick changeover approach is conducted through the following conceptual stages represented in Figure 1 [9]:

- Identifying and separating internal, external, and wasteful activities.
- Eliminating wasteful activities.
- Converting internal to external activities.
- Streamlining all aspects of the process.

The project, including the time study, value-added vs. non-value-added analysis, and quick changeover implementation, was carried out. With respect to the statistical validation of results, a parametric or non-parametric test was performed to compare both samples of times, before and after the intervention.

### Observation and Results

**Diagnostic:** The Discharge process starts in the morning when a consultant gives a verbal order to residents and nursing staff that a patient is fit for discharge and ends when this patient leaves the hospital.A process flow through the following sequence:

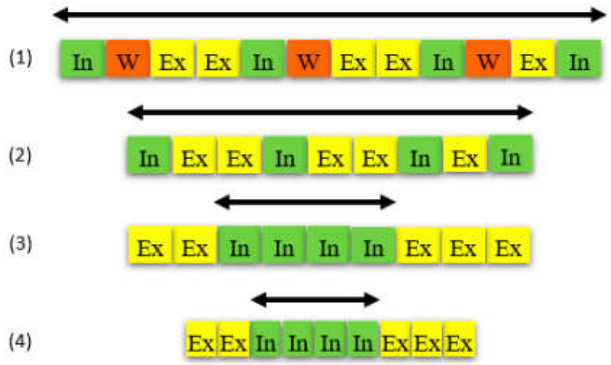


**Figure 1. Quick changeover application sequence**

- Decision of Consultant including residents to discharge.
- Nursing.
- Pharmacy.
- Case sheet sent to billing.
- Billing department / Credit unit who check the coverage according to the public medical insurance/credit.
- Financial support (if needed).
- Cash desk.
- Transport support (if needed).
- Security.

The manpower at the billing department has imposed constraints related to working hours and schedules that limit the intervention from introducing changes in this regard and strenuous to explain the detail bill or updating it to patient.

## Analysis

**Improvement:** The proposed implementation of the quick changeover found to be suitable for this research. The "as-is" process is presented on the left side of Figure 5. The sequential process is described through the four steps (Methods) presented in Figure 2:

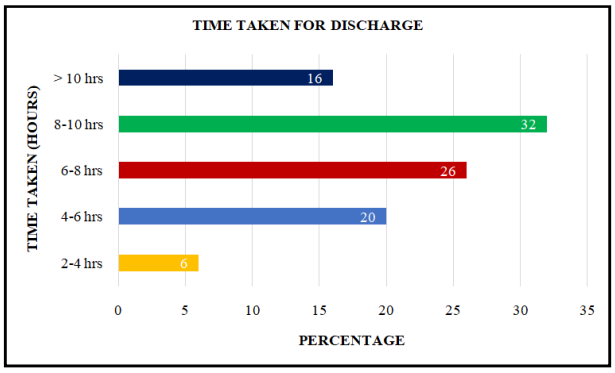


**Figure 2. The above chart shows that 32% of patients discharge in 8-10 hrs, 26 % of patients in 6-8 hrs, 20% of patients in 4-6 hrs, 16% of patients in more than 10 hrs and 6% of patients in 2-4 hrs**

- Identifying and separating internal, external, and wasteful activities: While Figure 2 showed wasteful activities across the process, these are summarized as red boxes in Figure 5. Additionally, each block of consecutive activities is classified as internal or external activities (green boxes).
- Eliminating wasteful activities: The main wastes are associated with the credit department throughout the entire process. While the main concerns are the large number of errors found in credit and billing department, waiting for TPA approval/ for CMRF letter and long waiting times for the billing as up to date uploads were not uploaded on the system, these also have an impact on the other sources of waste in systemic way. These are reduced in the following step.
- Converting internal to external activities: Three key activities that are carried out during the process(internal) should occur before (external): writing a predischarge order, prior verification/follow up of credit/CMRF (CM Relief fund) by APROs (Assistant Public Relations Officer) and to follow-up uploading case sheet up to date on regular basis in billing by Management students.
- Streamlining all aspects of the process: prior verification/follow up at billing and credit department. This and the previous changes(step 3) eliminate network and reduce waiting times, given that for resident, CMRF letter and vacating are still around during morning, and the cash desk is reached during the first working shift.

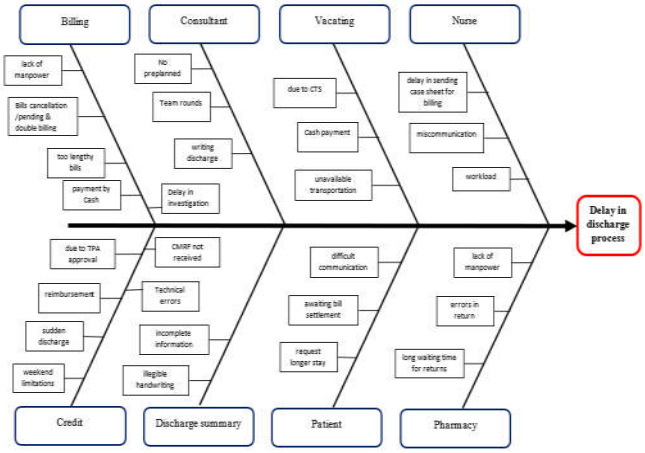


**Figure 3. Ishikawa diagram illustrating the possible causes for the delayed discharge**

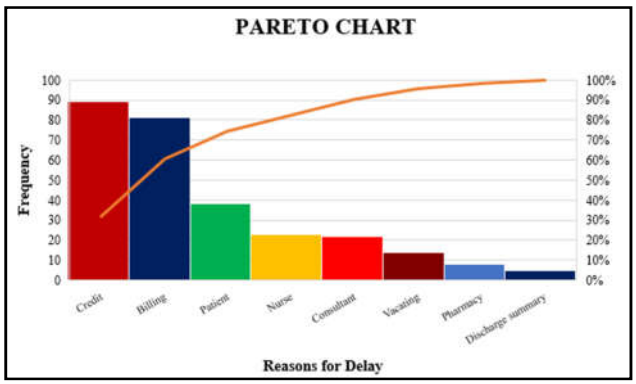


**Figure 4. Pareto chart showing the reasons contributing for delay in discharge process. It highlights the credit and billing role in delay of discharge**

The improved process is shown on the right side of Figure 5. Cause and effect were conducted again to collect data after implementation, and the average time to discharge patients found to be 3 hours. The second sample did not follow a normal distribution, and thus two sample Mann-Whitney test was performed to show the new average discharge time is statistically smaller ($p$-value-0.005)

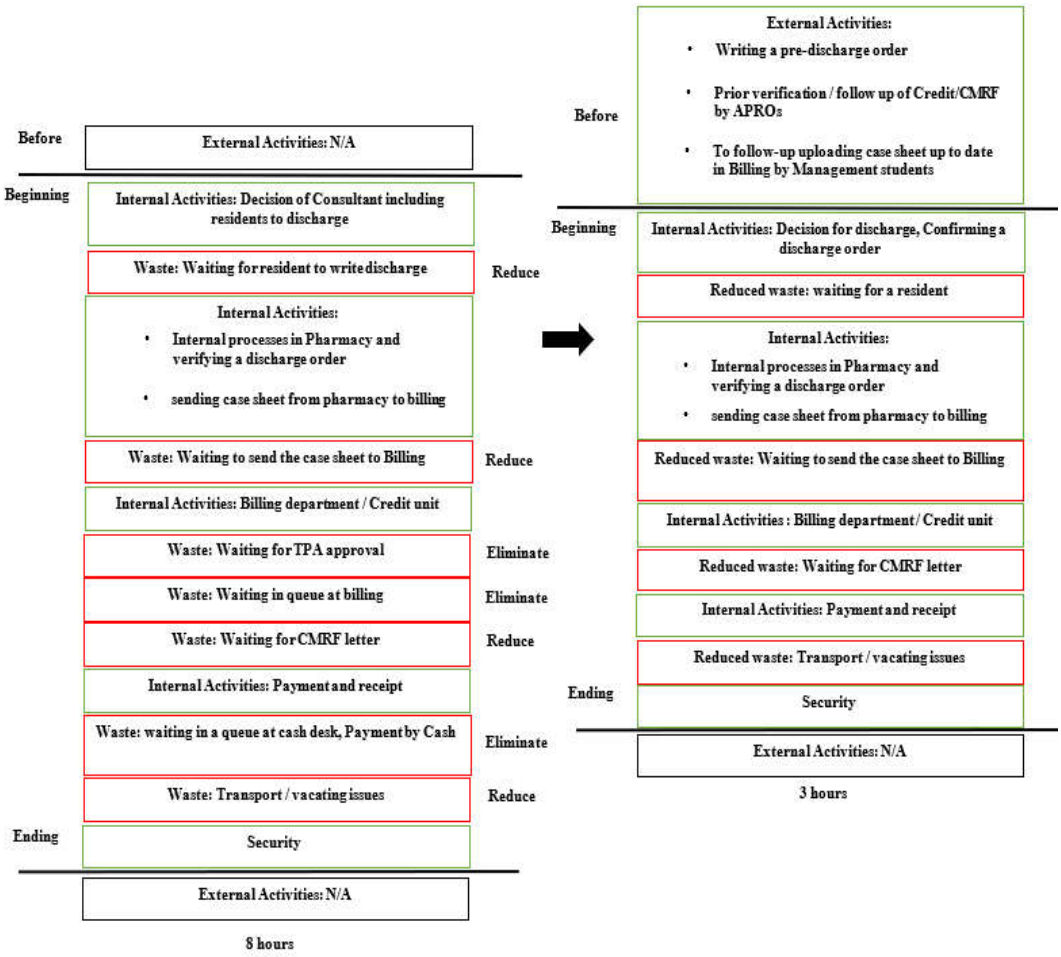


**Figure 5. Quickchangeover analysis before and after the implementation**

# DISCUSSION

Patient discharge is a very lengthy process where delays increase the overall cost for the hospital and the patient's exposure to acquiring new infections.[10] Shobitha Sunil et al.,time taken for the completion of discharge process is an important indicator of quality of care. As per NABH, the time taken for completion of the discharge process should not exceed 180 minutes. Discharge process is the last stage of the patient journey in the hospital and is more likely to be remembered by the patient. So delay in the discharge process can be depressing to the patients and also increases the pressure on hospital beds. The present study was conducted to analyze the break up time taken for discharge and evaluate the level of patient satisfaction for the discharge process.[11] Dr.Niloy Sarkar et al., the main objective of the study is to identify the gaps, highlight those areas where delay can be eliminated and recommend accordingly, so that the hospital discharge process can be managed smoothly. This paper has explained the hospital discharge process in a simple way and has tried to find out the cause-effect for the delay in discharge process.[12] Changes in the discharge timing are arguably one of the least disruptive ways to improve efficiency.[13] Such was the case presented in this article, where the time required to discharge patients was found to be around 6 h and later reduced without creating interruptions. Similar to what has been reported before in a general ward in Boston.[14] Some authors have stated that the morning hours are unsuitable for the kind of processes and, ideally, this preparation should occur the day before discharge, when the patient has been identified (tentatively) as ready to leave the next day.[13,15]

The 39% reduction, from approx. 4 to 2.5 h, in a hospital in India[16] ;this study resulted in one of the most significant improvements regarding the discharge of patients, with a reduction of almost 3 h (179 min), which represents 37% of the total time prior to the intervention. Although people understand and appreciate the benefits of using Lean and the quick changeover approach for process improvement, it has been noted that staff members require time and training to make significant improvements, in a way that prevents them from wanting to retreat to an earlier period, when they did not have any domain of responsibility to improve existing processes.[13] Rodrigo E. Peimbert-García et al., presented a successful implementation of the quick changeover approach to the healthcare context. The intervention resulted in the reduction of the discharge time from 6 to 3 h,[3]This study intervention resulted in reduction of 8 to 3 hours of the discharge process

## Conclusion

Discharge of patients is one of the important areas that needs improvement in hospital. In order to reduce the delay in discharge,the hospital needs proper cooperation and coordination of other department staffs. The main factors were found in credit and billing department, including waiting for TPA approval or for getting a CMRF letter and long waiting times for the billing as up to date uploads were not uploaded on the billing system. To reduce the discharge process time, Lean implementation have been done with a reduction of almost 3 h (179 min), which represents 37% of the total time prior to the intervention. Continuous monitoring and regular feedback were the most effective intervention in achieving and sustaining the

improvement result.Further research should focus on analyzing and understanding the factors that prevent Lean to be successfully implemented, taking into consideration the specific leadership, work environment, and organizational culture. Ultimately, the goal in Lean healthcare is not just about the efficiency but also the quality of care and, consequently, the quality of life.

**Financial support and sponsorship**: Nil.

**Conflicts of interest**: There is no conflicts of interest.

**Recommendations**

- For reducing the delay of discharge process time, measures need to be applied which includes writing a predischarge order, prior verification /follow up of credit / CMRF (CM Relief fund) by APROs (Assistant Public Relations Officer) and tofollow-up uploading case sheet up to date on regular basis in billing by Management students.
- Lean Intervention: to be successfully implemented to reduce the delay in discharge process and improves patient satisfaction provided the specific leadership, work environment and organizational culture to be considered.
- Electronic Medical record (EMR): Updating the inpatient case sheet on a regular basis will secure that the complete information from the time patient is admitted is recorded, allowing faster discharge billing updating. One way to robotize this step is to maintain central electronic patient charts and adopt an efficient EMR system.
- Efficient billing system: Having a centralized billing system between the various departments and provision will permit easy real-time billing, making this process much easier.

# REFERENCES

1. Sakharkar BM. Principles of Hospital Administration and Planning. 2nd ed. New Delhi: Jaypee Brother; 2009
2. Nagaraju D. Improvement of hospital discharge process by value stream mapping. In: Proceeding of 17th Annual Society for Health Systems conference. Dallas; 2005.
3. Peimbert-García, R.E.; Gutiérrez-Mendoza, L.M.; García-Reyes, H. Applying Lean Healthcare to Improve the Discharge Process in a Mexican Academic Medical Center. *Sustainability* **2021**, *13*, 10911. https://doi.org/10.3390/su131910911
4. Green MA, Dorling D, Minton J, Pickett KE. Could the rise in mortality rates since 2015 be explained by changes in the number of delayed discharges of NHS patients? J Epidemiol Community Health. 2017;71(11):1068-1071.
5. Mundodan JM, Sarala KS, Narendranath V. A Study to Assess the Factors Contributing to Delay in Discharge Process in a Teaching Hospital. Int J Res Foundation Hosp Healthc Adm 2019;7(2):63–66.
6. Ms. S. Arthi, S.Divya, editor. A STUDY ON CAUSES OF DELAY IN DISCHARGE PROCESS IN ONE OF THE PROMINENT HOSPITALS IN TAMILNADU [Internet]. Vol. 8. IJCRT; 2020. Available from: https://www.ijcrt.org/papers/IJCRT2004012.pdf
7. Gabow, P.A.; Goodman, P.L. The Lean Prescription: Powerful Medicine for Our Ailing Healthcare System; CRC Press: New York, NY, USA, 2014.
8. Womack, J.P.; Jones, D.T. Lean Thinking: Banish Waste and Create Wealth in Your Corporation, 2nd ed.; Free Press: New York, NY, USA, 2003.
9. Dillon, A.P.; Shingo, S. A Revolution in Manufacturing: The SMED System; CRC Press: New York, NY, USA, 1985.
10. Hamid, S.; Jan, F.A.; Rashid, H.; Jalali, S. Study of hospital discharge process viz a viz prescribed NABH standards. Int. J. Contemp. Med. Res. 2018, 5, H1–H4.
11. Shobitha Sunil, Sarala K.S, R G Shilpa OCT (2016). "Analysis Of Time Taken For The Discharge Process In A Selected Tertiary Care Hospital" published in International Journal of Management and Applied Science ISSN :2394-7926.
12. Dr. Niloy Sarkar ,Ms. Tatini Nath August (2016). "Analysis Of Patient Waiting Time For Hospital Admission And Discharge Process" published in the International Journal Of Medical Research ISSN: 2320-5407.
13. Molla, M.; Warren, D.S.; Stewart, S.L.; Stocking, J.; Johl, H.; Sinigayan, V. A Lean Six Sigma Quality Improvement Project Improves Timeliness of Discharge from the Hospital. Jt. Comm. J. Qual. Patient Saf. 2018, 44, 401–412.].
14. Chen, L.M.; Freitag, M.H.; Franco, M.; Sullivan, C.D.; Dickson, C.; Brancati, F.L. Natural history of late discharges from a general medical ward. J. Hosp. Med. 2009, 4, 226–233.
15. McDermott, C.M.; Venditti, F.J. Implementing lean in knowledge work: Implications from a study of the hospital discharge planning process. Oper. Manag. Res. 2015, 8, 118–130.
16. Vijay, S.A. Reducing and Optimizing the Cycle Time of Patients Discharge Process in a Hospital Using Six Sigma DMAIC Approach. Int. J. Qual. Res. 2014, 8, 169–182.

*******