MOH/S/IPK/73.20(GU)

MINISTRY OF HEALTH MALAYSIA

WORKBOOK ON LEAN HEALTHCARE TRAINING

STEP-BY-STEP ANALYSIS USING IBM SPSS FOR EMERGENCY DEPARTMENT AND MEDICAL WARD

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Institute for Health Management
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This module will not have been materialized without the teamwork and efforts of Lean core team of Institute for Health Management. The team also would like to express gratitude to the Director of Institute for Health Management, without whom the publication of this "Workbook for Lean Healthcare Training: Step-by-Step Analysis using IBM SPSS for Emergency data and Medical Ward" would not have been a success.

"Knowing is not enough; we must apply. Willing is not enough; we must do"

Johann Wolfgang von Goethe

Foreword

Assalamualaikum Warahmatullahi Wabarakatuh and Salam Sejahtera,

It is with great pleasure for me to write foreword for this "Workbook on Lean Healthcare Training: Step by Step Analysis using IBM SPSS for Emergency department and Medical ward". Through Lean Healthcare implementation, Ministry of Health (MOH) has managed to eliminate wastes in the hospital processes, thus improving the quality of care to the patients.

Since 2013, Lean Healthcare implementation expanded nationwide targeting the involvement of MOH hospitals at Emergency Department (ED) and Medical Wards (MW) in phases. As of 2017, a total of 52 MOH hospitals have been involved in implementing Lean Healthcare Initiative. Following the achievements in the Emergency department and Medical wards, MOH has expanded Lean healthcare initiatives to 10 hospitals with Orthopaedic and Ophthalmology specialist clinics in 2018 and later to other clinical disciplines in hospital. The progress of each Lean Healthcare initiative activities varies depending on many factors including leadership, strategy and teamwork of the staffs. Moving forward, implementation of services through better design and innovation in the Lean Healthcare initiative are key factors to ensure Lean Healthcare initiative sustainability.

I sincerely hope that this workbook will contribute in guiding hospitals who are involve in Lean Healthcare Initiative to work together towards a better service delivery to public. Let us all aim towards making the Malaysian Healthcare system as the best healthcare in the world.

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Foreword

Assalamualaikum Warahmatullahi Wabarakatuh and Salam Sejahtera,

Lean Healthcare Initiative was introduced in Ministry of Health since 2013 using agile approach to reduce waiting time of patients and currently 109 hospitals have implemented Lean methodology at various areas such as Emergency Department (ED), Medical Wards (MW), Outpatient Department (OPD) and specialist clinics. Institute for Health Management (IHM) has been playing an active and direct role in introducing Lean Healthcare Initiative which is applied by each and every hospital.

Apart from the contribution in terms of training, IHM is tasked for the publication aspect related to Lean Healthcare initiative. We are publishing this workbook for Lean Healthcare training in order to share the steps of data analysis using IBM SPSS software to evaluate the performances of hospital in Lean Healthcare implementation at Emergency department and Medical ward. We hope that this module will serve as a reference and guidance on monitoring, especially for the present and future hospitals which implementing Lean Healthcare. Through the findings of these data analysis, we aim for the hospitals to be able to understand and improve congestion by reducing the waiting time. IHM aspires in being part of the Lean Healthcare Implementation team and assist in expanding Lean Healthcare initiative nationwide.

Finally, I would like to congratulate everyone who had been directly and indirectly involved in the successful publication of this workbook. It is hope that this workbook will be useful as a guide in implementation and monitoring of Lean Healthcare initiative. Thank you.

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BACKGROUND OF LEAN HEALTHCARE

Lean in Ministry of Health (MOH)

Introduction of Lean healthcare to Ministry of Health public hospitals started in 2013 with Hospital Sultan Ismail (HSI), Johor as its pilot hospital. Lean methodology focused on reducing waiting time and congestion at specialist clinic i.e. Orthopaedic and Oncology specialist clinic by eliminating any non-value-added activities in the process. Following the implementation, improvement was seen with the reduction of 75% waiting time from first consultation until first treatment started at oncology clinic (1). Among the countermeasures are clearing backlog, increased machine utilisation, establish visual performance board to monitor patient flow and improve the clinic work process for better care to the patients.

As pilot project showed visible improvement within stipulated time, lean was expanded to Hospital Tengku Ampuan Rahimah (HTAR), Selangor with Emergency department (ED) and Medical Ward (MW) being the main focus as HTAR is known to be one of the busiest hospitals in Malaysia. These two departments were selected due to its congestion and longer waiting time experienced by patients. Emergency department are always at the frontline among the many services provided by the hospital. Year by year, the utilization of ED by the public has increased and this led to overcrowding. Not forgetting the Medical wards since most of the admitted patient will be under its care, MW receives around 33, 002 number of admissions in a year and average of 91 patients per day (2). With the capacity of 1100 beds in HTAR, bed occupancy rate (BOR) for Medical wards often exceeds 100%. With the introduction of lean methodology, the usual process in ED and MW was mapped using value stream mapping (VSM) and improvement was seen both in ED and MW. Average length of stay (LOS) reduced by 55% from 192 minutes to 88 minutes and medical bed occupancy rate decreased from 144.7 % to 82.2 % for female ward within 6 months of implementation (2,3)

Following its success in both HSI and HTAR, the ministry has promoted the expansion to 133 public that hospitals started with ED and MW(4). The training was done by consultants from MITEC, UniKL during the earlier implementation stage and followed by Institute for Health Management (IHM). Until now, 109 hospitals including state, major and minor specialist hospitals have been trained in lean healthcare.

Figure 1: Lean Healthcare implementation expansion to 133 Ministry of Health public hospitals

The Approach of Lean Healthcare Training in MOH

Lean healthcare training can be divided into three main stages with the implementation period involved minimum of 6 months. The stages are Stage 1; Training, Stage 2; On-site consultation and monitoring, and Stage 3; Analysis, reporting and presentation of report as seen in Figure 2. The participants were introduced to lean methodology during a three-day workshop at IHM which includes the development of current VSM and establishing the list of kaizen/improvements for their respective departments. Back in their respective hospitals, baselines data were collected and approved kaizen by the hospital Director were implemented. This will happen during Stage 2. After the implementation phase, the participants will enter Stage 3, where this stage is mostly for the confirmation of results and analysis of performance. During the early stage of implementation, the analysis is mostly done by IHM, however, as lean progresses further, there is a need in transferring the knowledge to the process owner.

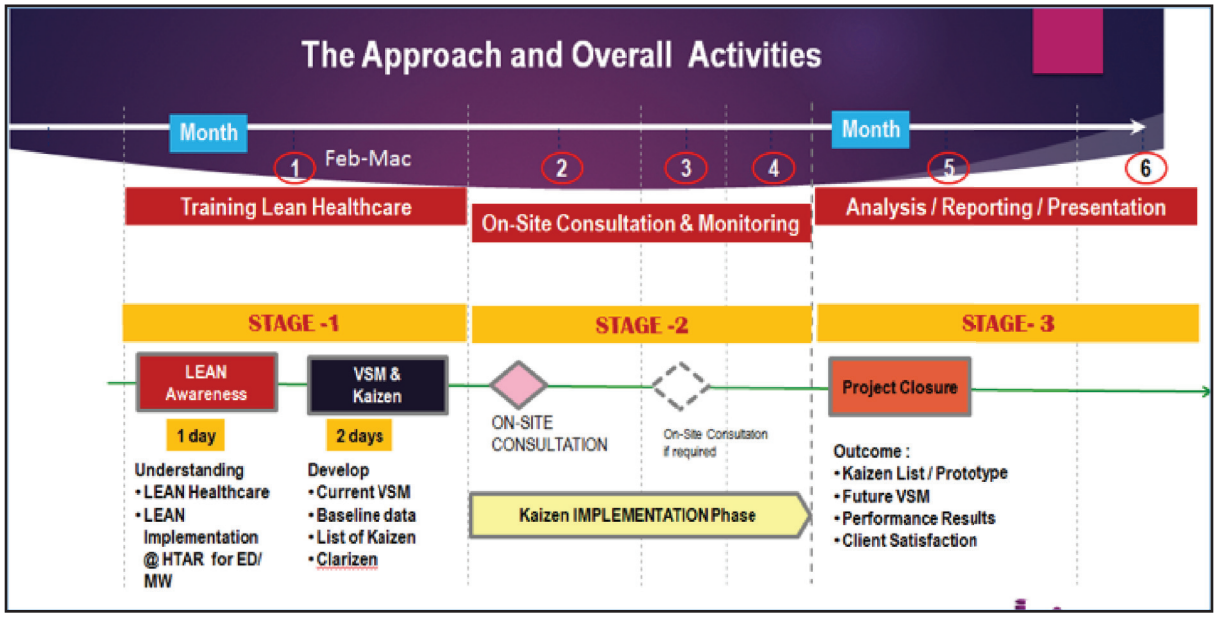


Figure 2: Overall approach of Lean healthcare training

SECTION 1:
INTRODUCTION TO IBM SPSS

1.1 Descriptive statistics

Data analysis is the process of gathering data systematically and converting it into useful information. Descriptive statistics are commonly used in analysing Lean healthcare data in SPSS because it is useful to summarise all the data by combining tables, graphs and statistical results to better understanding the analysis. Through descriptive statistic, it enables the user to describe the characteristics of the data or sample studied. Example of data includes demographic data such as age, gender, ethnicity, education, weight, height, income, education etc. Below are several components in descriptive statistics that can be used (5):

i. Frequency distributions	o Calculate the frequency distributions by adding the number of data
ii. Percentages, Proportions & Rates	o Calculate the percentage by dividing the number of selected data by the total sample and multiply by 100. o Calculate proportions by comparing the subgroup of the study to the whole. Proportions can be expresses as a ratio o Calculate rate by expressing number of observations in terms of unit of time or size of population
iii. Presentation in figures	o The use of histogram, line graph or scatter diagram to present data
iv. Measures of central tendency	o Used to describe the central position of a frequency distribution for group of data o Central tendency can only be used for numerical data o These are mean, median and mode
v. Measures of dispersion/spread	o Provides information about the variability of the data o To describe the spread, a number of statistics are available, including standard deviation, range, percentiles and variance.

1.2 Overview on IBM SPSS interface

Statistical Package for Social Sciences (SPSS) is a statistical software used in statistical analysis for analyzing and displaying information using a variety of techniques. Due to its user-friendly features, SPSS are easily accessible by all skill levels and it can help in providing better results with minimal error. In lean, IBM SPSS software can be used to analyze our data (6,7). SPSS can be divided into three windows:

Table 1: Different windows in SPSS

Windows	Suffix	Function
Data editor	.sav	• can be divided into data view and variable view. • used to visualize, analyze and manipulate data.
Output viewer	.spv	• contains the result of any statistical procedure performed in data editor
Syntax editor	.sps	• allow user to write commands that runs SPSS procedures • enables user to perform task that is repetitious or difficult to do using drop down menus

When opening SPSS, data editor and output window will be displayed by default. In data editor, there are two views; data view and variable view. The data view will display data for analysis (Figure 3). Users can also enter data manually in this data view. Variable view displays information about variables in the opened data (but not the data themselves), such as variable names, types, and labels, etc (Figure 4). Output viewer display the log of action taken in the analysis and the output. It consists of two frames; left side recorded log and right-side display result/output.

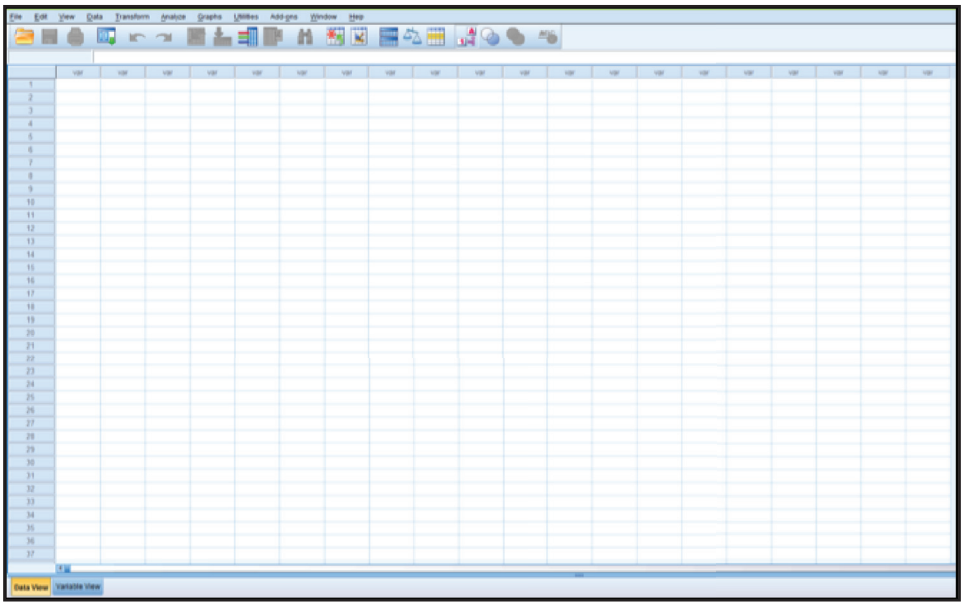


Figure 3: Data view in data editor

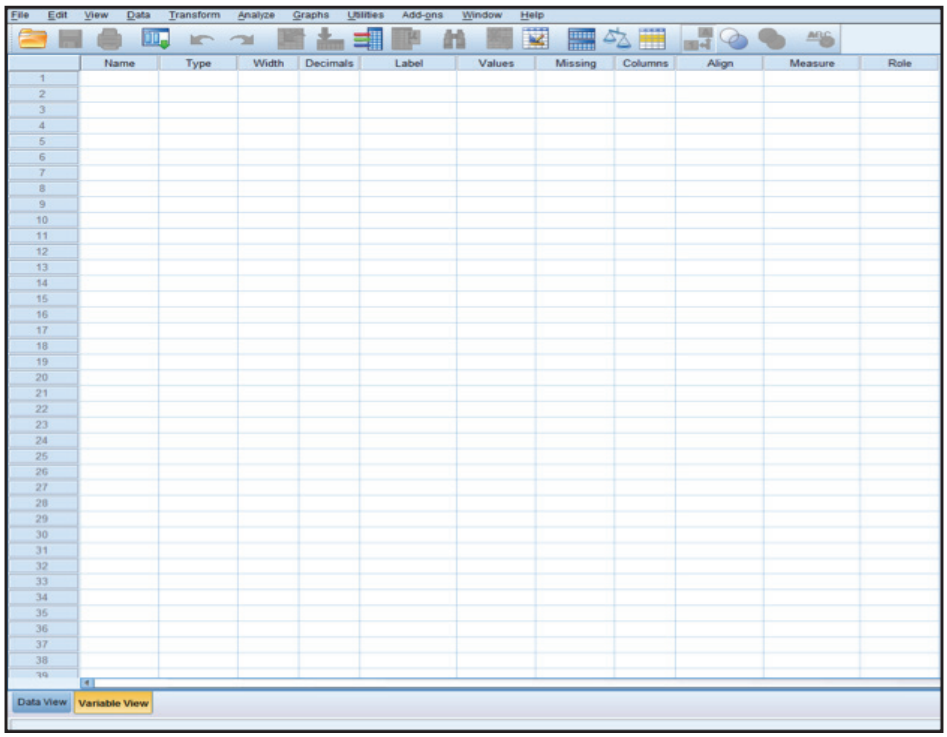


Figure 4: Variable view in data editor

1.3 Working with Data in SPSS

In this lean data analysis, we will use:
a) File
b) Transform
c) Analyze

1.3.1 File

> New

If user wants to create new data, just click **File > New > Data** and it will open new empty screen. User can then add any data into it.

> Open data

In order to use SPSS, user has an option to open pre-existing dataset or create new data in the data view. If user need to open pre-existing data, user can use go to File and click open. User can open Excel, Stata, SAS, CSV, tab-delimited without converting to SPSS data type.

> Save and Save As data

If user wants to save new entry in the dataset, just click File > Save. If the new additional data with different file name, user can use Save As tab. Just click File > Save As and new window will prompt you to input file name and intended location.

1.3.2 Transform

> Date and time wizards

This tab simplifies data associated to date and time values. In lean, data are usually in this format. User can click Transform > Date and time wizard. There are six options to be selected (Figure 5).

a) Learn how dates and time are represented - It provides a brief overview on date and time wizard.
b) Create a date/time variable from a string containing a date or time - If you have a string variable in the form of date and time i.e. dd/mm/yyyy or hh:mm, you can change it to the exact date/time format.
c) Create a date/time variable from variables holding parts of dates or times - It allows user to create new date/time variable from the data.
d) Calculate with dates and times - This option is used when user wants to calculate, either add or substract value from date and time. For example, user can calculate time duration using this option.
e) Extract a part of a date or time variable - This option allows you to extract part of a date/time variable, such as the day of the month from a date/time variable, which is in the form of mm/dd/yyyy.
f) Assign periodicity to a dataset - this option is used to create date/time variable with sequential dates.

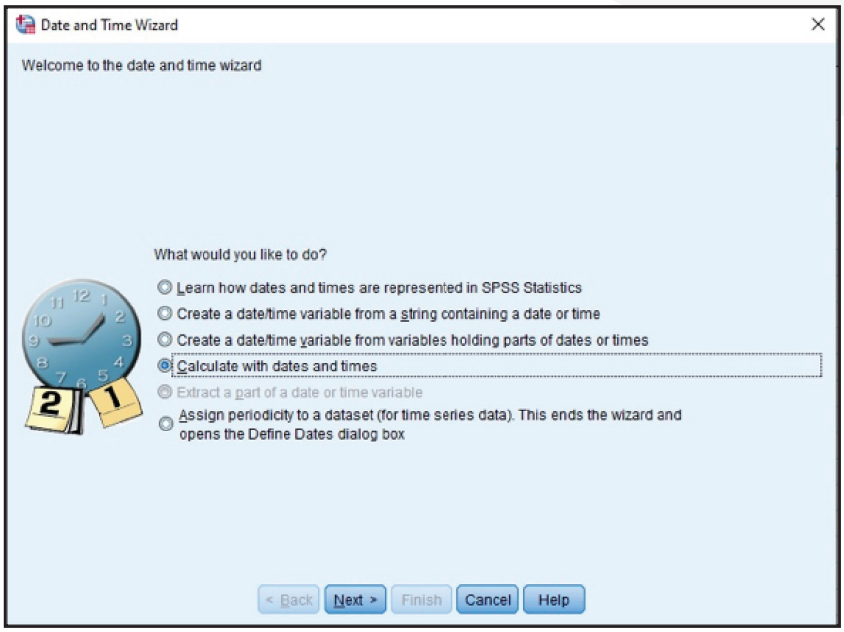


Figure 5: Date and time wizard

1.3.3 Analyze

This tab is use to analyse data for result or output. In analyse tab, we will only use *Descriptive statistics* for this lean healthcare analysis.

• Frequencies

This feature provides statistics and graphical displays useful for describing many variables. It will produce frequency table consists of frequency counts, percentage, mode, median, mean, standard deviation, variances, minimum and maximum value of intended variable. Output will be organized by variable where it has statistical table and frequency table for the variable. This can be used for both categorical and continuous variable. Frequencies can also produce histogram with or without normal distribution on the graph.

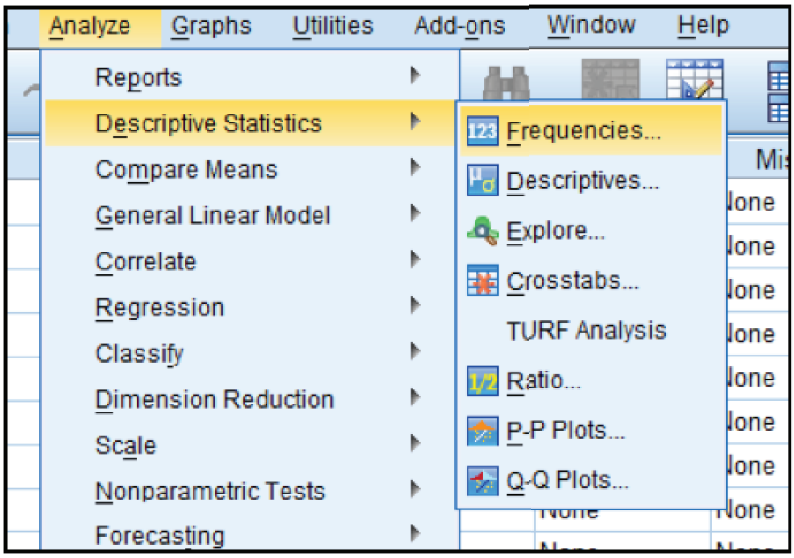


Figure 6: Frequency tab under Descriptive statistics

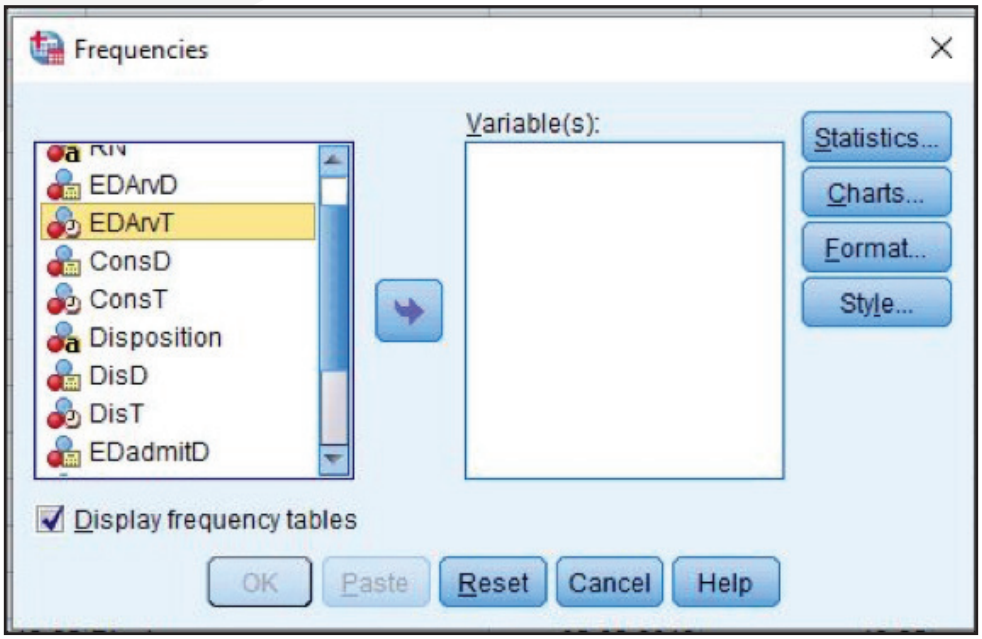


Figure 7: Frequencies window

1. Variable(s): The variables need to be analysed using Frequencies procedure. You can add several variables to this box.
2. Statistics: It contains various descriptive statistics mostly suitable for numeric variables. Most of these statistics are identical to the one in Descriptives, Compare means and Explore. The only exception is the Percentile values. It allows user to specify which percentiles to report.

• Explore

Explore is best used to deeply investigate a single numeric variable, with or without a categorical grouping variable. It can produce a large number of descriptive statistics, as well as confidence intervals, normality tests, and plots. The Explore procedure produces detailed univariate statistics and graphs for numeric scale variables for an entire sample, or for subsets of a sample. User can select this function by clicking Analyze > Descriptive Statistic > Explore. A window will pop up and user need to select the intended variable and insert into dependent list box and click OK.

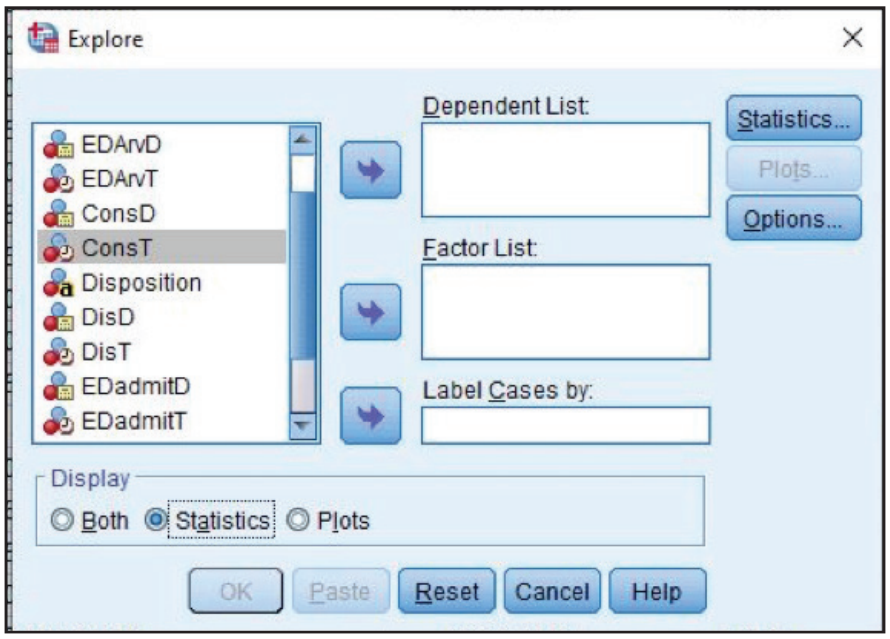


Figure 8: Explore window

1. **Dependent list:** the continuous numeric variables that user wishes to analyse.
2. **Factor list:** this will produce individual summaries of the numeric variables with respect to each category (Optional)
3. **Label cases by:** ID variable with "names" for each variable. If not specified, SPSS will use the row number to label each data (Optional)
4. **Statistics:** Choices of statistic reports. Choices are Descriptives (by default), M- estimators, Outliers and Percentiles.

1.3.4 Output

• Frequencies

Two tables will appear in the output window. **Statistics** will report the number of missing and non-missing data in the data set. **Frequency** table will contain four columns of summary measurement(8).
1. **Frequency** The cumulative number of data in each category.
2. **Percent**: The percentage of all data including both missing and non-missing data.
3. **Valid percent:** The percentage of data in the category excluding the non-missing data.
4. **Cumulative percent:** Total percentage of the data that has been accounted for up to the row. It can be computed by adding the numbers in the Valid percent column above the current row.

• Explore

Case processing summary will show how many valid data there were. The Descriptives table will have detailed descriptive statistics for each of the continuous variable, including skewness and kurtosis.

SECTION 2:
STEP BY STEP ANALYSIS OF DATA

2.1 Preparation of Data in Microsoft Excel

In Lean, data are usually collected using a prepared template for ED and MW (Appendix 1). This template was prepared during early stage of Lean implementation in 2015 with the aim to facilitate the hospitals in collecting data in a systematic manner. The data collector roles are crucial in making sure that the data collected are valid and reliable. If there is any problem with the data, data collection needs to be re-done again.

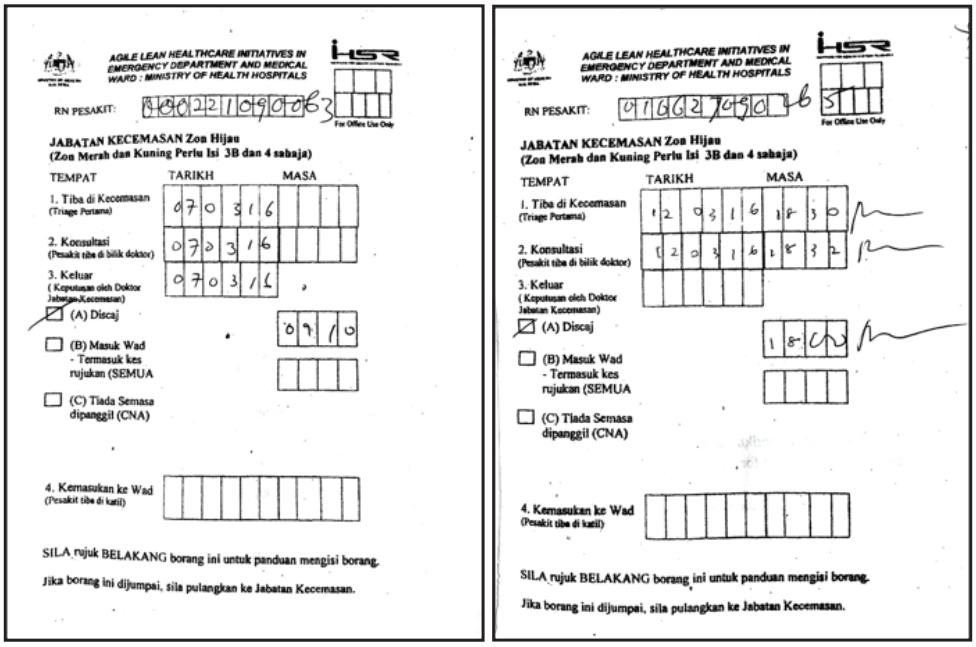


Figure 9: Examples of rejected data collection form due to incomplete and invalid data

In Lean, data are usually collected in date and time format. Next, the data need to be entered and cleaned to eliminate any duplicates or missing value in Microsoft Excel prior to analysis in SPSS. User can refer to Table 2-3 for format of each data to be entered in Microsoft Excel.

Below is an example of data entry in Microsoft Excel according to the given format (Figure 10).

RN	EDArvD	EDArvT	ConsD	ConsT	Disposition	DisD	DisT	EDAdmitD	EDAdmitT	ArvBedD	ArvBedT
887478	13/7/17	22:25:00	14/7/17	2:27:00	CNA		CNA				
87759	13/7/17	23:03:00	14/7/17	3:23:00	CNA		CNA				
670388	13/7/17	23:44:00	14/7/17	3:27:00	CNA		CNA				
887490	14/7/17	0:18:00	14/7/17	3:29:00	CNA		CNA				
134328	14/7/17	0:28:00	14/7/17	3:47:00	CNA		CNA				
887494	14/7/17	0:51:00	14/7/17	3:53:00	CNA		CNA				
887492	14/7/17	0:34:00	14/7/17	3:49:00	CNA		CNA				
16393	14/7/17	1:05:00	14/7/17	3:15:00	CNA	14/7/17	3:15:00				
792899	13/7/17	22:18:00	14/7/17	2:00:00	CNA						
468174	14/7/17	3:20:00	14/7/17	5:00:00	CNA	14/7/17	5:00:00				
887726	15/7/17	16:16:00	15/7/17	16:36:00	CNA	15/7/17					
884182	15/7/17	10:31:00	15/7/17	11:52:00	DISCHARGE	15/7/17	12:09:00				
814855	15/7/17	11:41:00	15/7/17	12:19:00	DISCHARGE	15/7/17	13:05:00				
823168	15/7/17	11:41:00	15/7/17	12:31:00	DISCHARGE	15/7/17	13:15:00				
282525	15/7/17	9:43:00	15/7/17	10:30:00	DISCHARGE	15/7/17	10:40:00				
409912	15/7/17	11:48:00	15/7/17	12:45:00	DISCHARGE	15/7/17	13:00:00				
192271	15/7/17	15:15:00	15/7/17	17:20:00	DISCHARGE	15/7/17	17:40:00				
222391	15/7/17	17:23:00	15/7/17	17:45:00	DISCHARGE	17/7/17	18:15:00				
887970	16/7/17	21:01:00	16/7/17	22:45:00	DISCHARGE	16/7/17	23:00:00				
337115	16/7/17	23:46:00	17/7/16	1:50:00	DISCHARGE	17/7/16	4:22:00				
887992	17/7/17	0:20:00	17/7/16	2:29:00	DISCHARGE	17/7/16	4:54:00				
887989	17/7/16	0:09:00	17/7/16	2:25:00	DISCHARGE	17/7/16	3:01:00				
887983	16/7/17	23:19:00	17/7/16	1:04:00	DISCHARGE	17/7/16	1:12:00				
885665								10/7/17	10:22:00	11/7/17	0:18:00
139015								10/7/17	12:45:00	10/7/17	19:30:00
479691								10/7/17	18:30:00	11/7/17	22:30:00
574818								10/7/17	18:48:00	10/7/17	23:10:00
267569								10/7/17	20:20:00	10/7/17	23:30:00
87347								10/7/17	22:05:00	11/7/17	3:50:00
607318								10/7/17	22:00:00	11/7/17	10:00:00
518542								10/7/17	12:07:00	10/7/17	20:15:00

Figure 10: Example of data entry in Microsoft Excel

Microsoft Excel is a good tool to enter any data and its format is compatible with SPSS. User can open any Microsoft Excel (.xls) file just by selecting the type of file from file type in SPSS. In Microsoft Excel, the data should be organised in one sheet, the first row should be the variable name i.e EDArvD, ConsT, Disposition and ArvBedD. Kindly make sure that the variable name can be easily read and contain no spaces. Underscore character can be used as a replacement for space. In this analysis, we will use the variables as shown in the table below (Table 2-3).

2.1.1 Emergency Department (ED) Variables

Table 2: Emergency department (ED) variables

No	Variables (Excel/SPSS)	Format (Excel)	Format/Type (SPSS)	Label (SPSS)	Value (SPSS)
1.	HospitalID		String	Hospital ID Code	
2.	RN		String	Patient Registration no	
3.	EDArvD		Date (dd. mm.yyyy)	Date patient arrive at ED	
4.	EDArvT	hh:mm:ss	Date (hh:mm:ss)	Time patient arrive at ED	
5.	ConsD		Date (dd. mm.yyyy)	Date patient receive consultation	
6.	ConsT	hh:mm:ss	Date (hh:mm:ss)	Time patient receive consultation	
7.	DisD		Date (dd. mm.yyyy)	Date patient discharge from ED	
8.	DisT	hh:mm:ss	Date (hh:mm:ss)	Time patient discharge from ED	
9.	Disposition		Ordinal	After patient seen by doctor at ED	1: discharge 2: warded 3: CNA
10.	EDAdmitD		Date (dd. mm.yyyy)	Date ED doctor decides to admit	
11.	EDAdmitT	hh:mm:ss	Date (hh:mm:ss)	Time ED doctor decide to admit	
12.	ArvBedD		Date (dd. mm.yyyy)	Date patient arrive on bed in ward	
13.	ArvBedT	hh:mm:ss	Date (hh:mm:ss)	Time patient arrive on bed in ward	
	New Variables Created (Emergency Department)				
14.	ATC		Date (hh:mm:ss)	Arrival to Consultation - – **USE SYNTAX / COMMAND**	
15.	LOS		Date (hh:mm:ss)	Length of Stay – **USE SYNTAX / COMMAND**	
16.	BWT		Date (hh:mm:ss)	If BWT within 24 hours – **USE SYNTAX / COMMAND**	
17.	oneday		ordinal	variable to see if waiting time more than 24 hours– **KEY IN MANUALLY ON DATA VIEW AS 24:00**	
18.	ATCnew		Date (hh:mm)	Arrival to Consultation new – **USE SYNTAX / COMMAND**	
19.	LOSnew		Date (hh:mm)	Length of Stay new - **USE SYNTAX / COMMAND**	

20.	BWTnew		Date (hh:mm:ss)	BWTNew created if waited more than 24 hours.	
21.	ATCdatediff		numeric	Arrival to consultation date different for more than 24 hrs	0-Within 24 hours 1-After 24 hours 2-After 48 hours
22.	LOSdatediff		numeric	Length of Stay date different for more than 24 hrs	0-Within 24 hours 1-After 24 hours 2-After 48 hours
23.	BWTdatediff		numeric	Bed Waiting Time date different for more than 24 hrs	0-Within 24 hours 1-After 24 hours 2-After 48 hours

2.1.2 Medical Ward (MW) Variables

Table 3: Medical ward (MW) variables

No	Variables (Excel/SPSS)	Format (Excel/ SPSS)	Type (SPSS)	Labels (SPSS)	Value (SPSS)
1.	HospitalID		String	Hospital ID Code	
2.	RN		String	Patient Registration no.	
3.	DecDcD	dd/mm/ yyyy	Date (dd.mm.yyyy)	Date decision to discharge made by doctor	
4.	DecDcT	hh:mm:ss	Date (hh:mm)	Time decision to discharge made by doctor	
5.	LeaveBedD	dd/mm/ yyyy	Date (dd.mm.yyyy)	Date patient leave bed	
6.	LeaveBedT	hh:mm:ss	Date (hh:mm)	Time patient leave bed	
7.	BedCleanD	dd/mm/ yyyy	Date (dd.mm.yyyy)	Date bed cleaned & ready for next patient	
8.	BedCleanT	hh:mm	Date (hh:mm)	Time bed cleaned & ready for next patient	
	New Variables Created (Medical Ward)				
9	DT		Date (hh:mm)	Patient discharge from Medical Ward (within 24 hours) - – **USE SYNTAX / COMMAND**	
10	oneday		Date (hh:mm)	Patient Discharged after 24 Hours	
11	DTDateDiff		ordinal	Patient Discharge same day or different day/s - USE SYNTAX / COMMAND	0 – within 24 hours 1 - > 24 hours 2 - > 48 hours
12	DTnew		Date (hh:mm)	Patient discharge from medical ward within 24 hours or more than 24 hours -– **USE SYNTAX / COMMAND**	
13	BTT		Date (hh:mm)	Bed turnaround time within 24 hours – **USE SYNTAX / COMMAND**	

14	BTTDateDiff		ordinal	Bed Turnaround time on within 24 hours or after 24 hours **USE SYN-TAX / COMMAND**	0 – within 24 hours 1 - > 24 hours 2 - > 48 hours
15	BTTnew		Date (hh:mm:ss)	Final data for BTT- **USE SYNTAX / COMMAND**	

2.2: Importing data from Microsoft Excel to SPSS

There are several methods to import data from Microsoft Excel to SPSS. Here, two options are provided for you to import your data to SPSS.

2.2.1 Microsoft Excel to SPSS

Data can be import directly provided if the format is correct and cleaned properly from any duplicates and error. If the data is not yet formatted, user need to follow few steps before importing the data.

Open the Microsoft Excel file (*.xls) and **rename all the variables** according to the variable name as in Table 2 and 3.

	HospitalID	RN	EDArvD	EDArvT	ConsD	ConsT	Disposition	DisD	DisT	EDAdmitD	EDAdmitT	ArvBedD	ArvBedT
2	ED201601	75009	13/8/2015	8:31:00	13/8/2015	9:05:00	Admit to ward (including referral)			13/8/2015	14:50:00		
3	ED201601	75500	13/8/2015	8:56:00	13/8/2015	9:06:00	Discharge	13/8/2015	12:20:00				
4	ED201601	45018	13/8/2015	8:58:00	13/8/2015	9:00:00	Discharge	13/8/2015	9:15:00				
5	ED201601	75223	13/8/2015	10:04:00	13/8/2015	10:15:00	Discharge	13/8/2015	13:00:00				
6	ED201601	75359	13/8/2015	10:02:00	13/8/2015	10:20:00	Admit to ward (including referral)			13/8/2015	13:40:00		
7	ED201601	135297	13/8/2015	10:07:00	13/8/2015	12:00:00	Discharge	13/8/2015	14:45:00				
8	ED201601	75399	13/8/2015	10:14:00	13/8/2015	12:00:00	Discharge	13/8/2015	14:35:00				
9	ED201601	75477	13/8/2015	10:12:00	13/8/2015	12:15:00	Discharge	13/8/2015	17:40:00				
10	ED201601	75209	13/8/2015	10:18:00	13/8/2015	12:30:00	Discharge	13/8/2015	12:40:00				

Figure 11: Example of excel data after rename variable

Then, proceed with highlighting all the column containing time value and right click to change the cell format to **24 hours (hh:mm:ss). This applies to all columns with TIME format** (Figure 12).

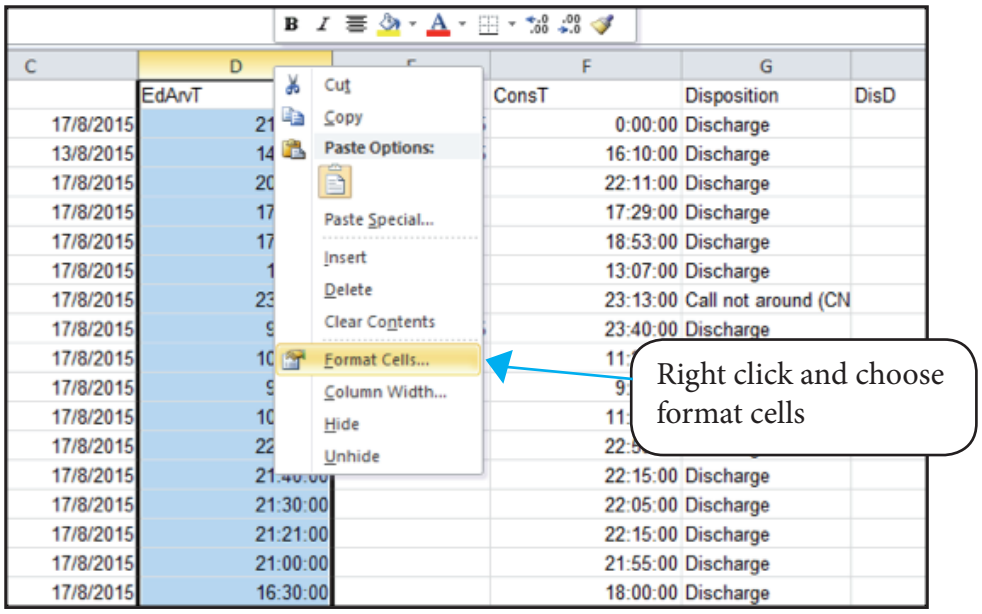


Figure 12: Format cells for column with time value

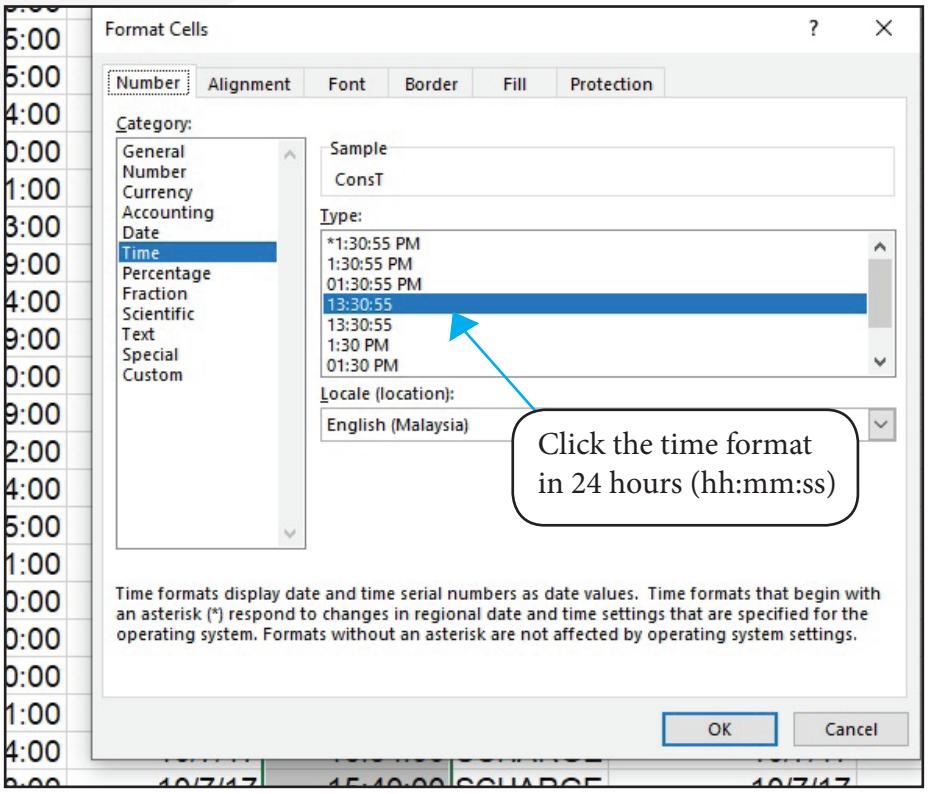


Figure 13: Selection of the correct time format

After finish formatting, user need to close the Excel file first before opening it in SPSS. Step for importing data directly from Excel is as below:
In SPSS, click **Open > File > Select the location of file > Select files of type to "Excel (.xls) > Select file > Open**.

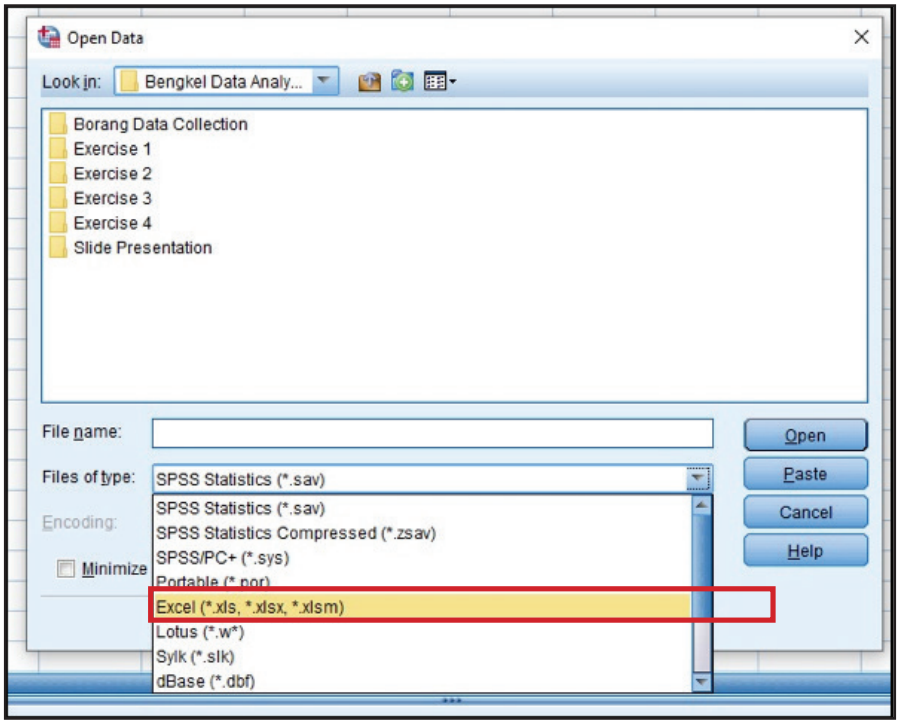
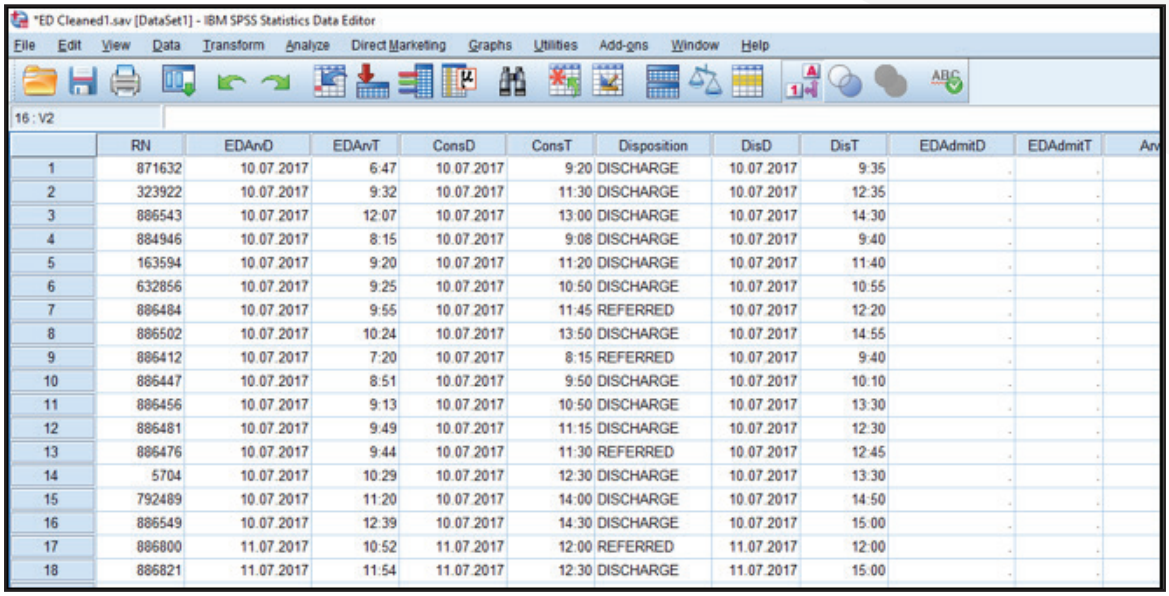


Figure 14: Selection of type of files



	RN	EDArvD	EDArvT	ConsD	ConsT	Disposition	DisD	DisT	EDAdmitD	EDAdmitT	Arv
1	871632	10.07.2017	6:47	10.07.2017	9:20	DISCHARGE	10.07.2017	9:35			
2	323922	10.07.2017	9:32	10.07.2017	11:30	DISCHARGE	10.07.2017	12:35			
3	886543	10.07.2017	12:07	10.07.2017	13:00	DISCHARGE	10.07.2017	14:30			
4	884946	10.07.2017	8:15	10.07.2017	9:08	DISCHARGE	10.07.2017	9:40			
5	163594	10.07.2017	9:20	10.07.2017	11:20	DISCHARGE	10.07.2017	11:40			
6	632856	10.07.2017	9:25	10.07.2017	10:50	DISCHARGE	10.07.2017	10:55			
7	886484	10.07.2017	9:55	10.07.2017	11:45	REFERRED	10.07.2017	12:20			
8	886502	10.07.2017	10:24	10.07.2017	13:50	DISCHARGE	10.07.2017	14:55			
9	886412	10.07.2017	7:20	10.07.2017	8:15	REFERRED	10.07.2017	9:40			
10	886447	10.07.2017	8:51	10.07.2017	9:50	DISCHARGE	10.07.2017	10:10			
11	886456	10.07.2017	9:13	10.07.2017	10:50	DISCHARGE	10.07.2017	13:30			
12	886481	10.07.2017	9:49	10.07.2017	11:15	DISCHARGE	10.07.2017	12:30			
13	886476	10.07.2017	9:44	10.07.2017	11:30	REFERRED	10.07.2017	12:45			
14	5704	10.07.2017	10:29	10.07.2017	12:30	DISCHARGE	10.07.2017	13:30			
15	792489	10.07.2017	11:20	10.07.2017	14:00	DISCHARGE	10.07.2017	14:50			
16	886549	10.07.2017	12:39	10.07.2017	14:30	DISCHARGE	10.07.2017	15:00			
17	886800	11.07.2017	10:52	11.07.2017	12:00	REFERRED	11.07.2017	12:00			
18	886821	11.07.2017	11:54	11.07.2017	12:30	DISCHARGE	11.07.2017	15:00			

Figure 15: Example of file open directly from Microsoft Excel

2.2.2 Comma Separated Value (CSV) files to SPSS

Comma Separator Value is a delimited text file that uses comma to separate values. Data stored in (.csv). Files with the extension .csv are called *comma-delimited* files; in this type of file, the observations are separated (*or delimited*) by a comma. CSV file stores tabular data (number and text) in plain text. CSV file are commonly used because many programs support the variations on CSV for data import. Alternatively, user can store data in CSV and open it using SPSS software (9).

Steps to import data using Comma Separated value (.csv) files type:

Open your file in Excel format. Save file in new files of type Save as > Save as type CSV- (MS-DOS). For Macbook user, save as CSV (Macintosh). After you have saved the file in *.csv format, close to Excel file (Figure 16).

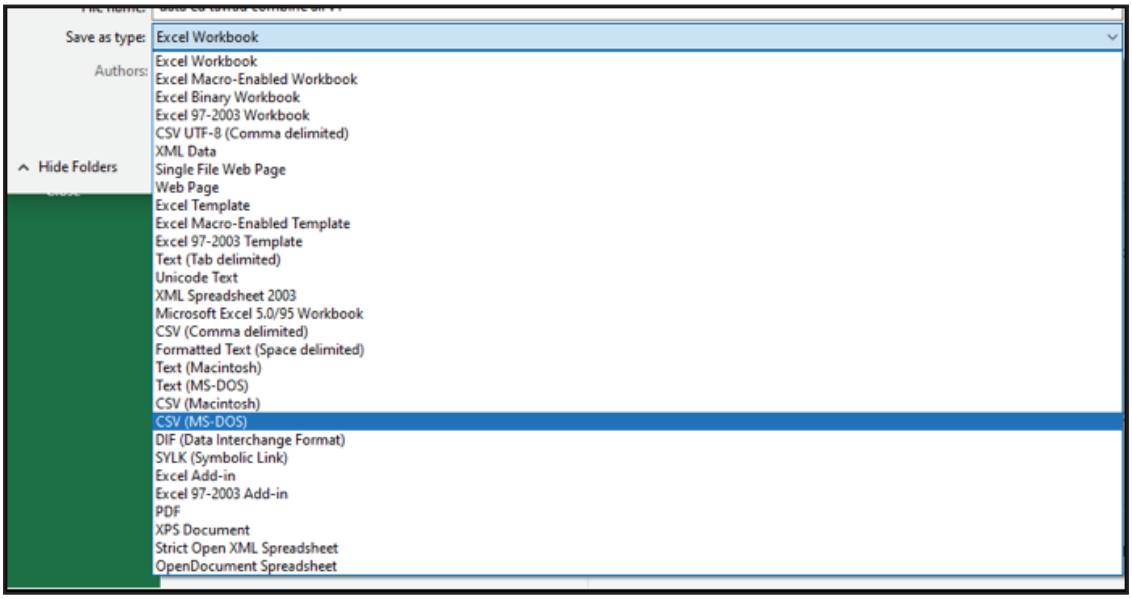


Figure 16: Save as CSV (.csv) file type

Start by clicking File > Open> Data to open *.csv files in SPSS. The Open Data window will appear. In the Files of type list, the option "Text (*.txt, *.dat, *.csv)" is selected by default. Locate your file and click on it to select it, then click OK (Figure 17).

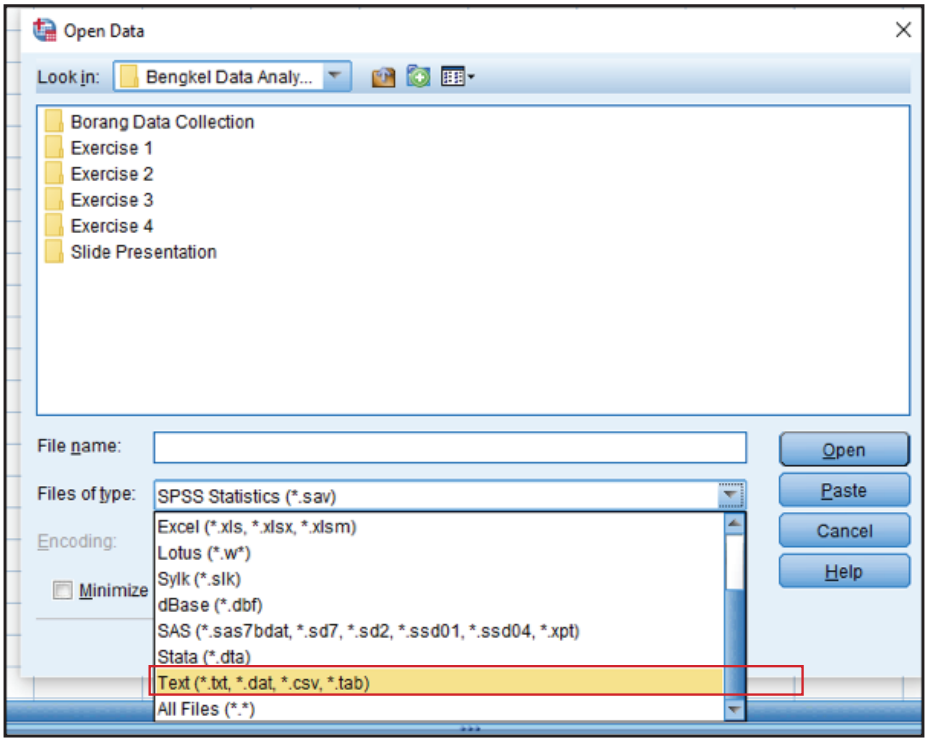


Figure 17: Open CSV file (.csv) type in SPSS

New window will pop-up showing Text Import Wizard. This window provides a preview of the data in your *.csv file. The next step is to indicate whether the data matches a predefined format, which would be a format saved from a previous *.csv file imported with the Text Import Wizard. In most cases there will not be a predefined format. Follow these steps in the Text Import Wizard to import the text data (Figure 18).

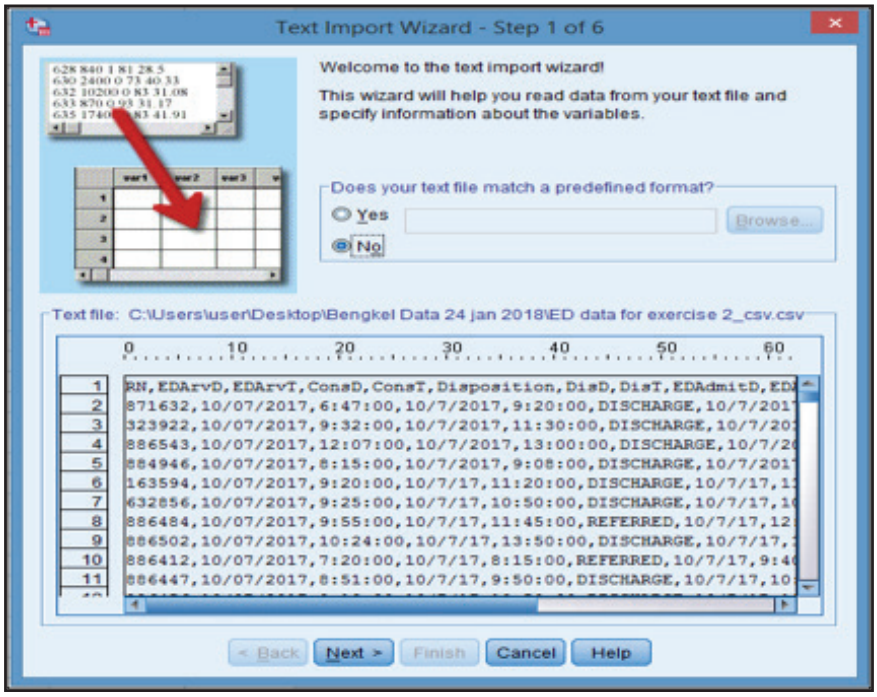


Figure 18: Text import wizard for CSV file – Step 1

If your data match a predefined format, click Yes and then browse for and upload the file that defines the format. (This would be the case if you had already imported a text data file into SPSS in the past that was formatted exactly the same way, and had chosen to save the import format during the last step of the Text Import Wizard.)

If your data do not match a predefined format, click **No**, then click **Next**.

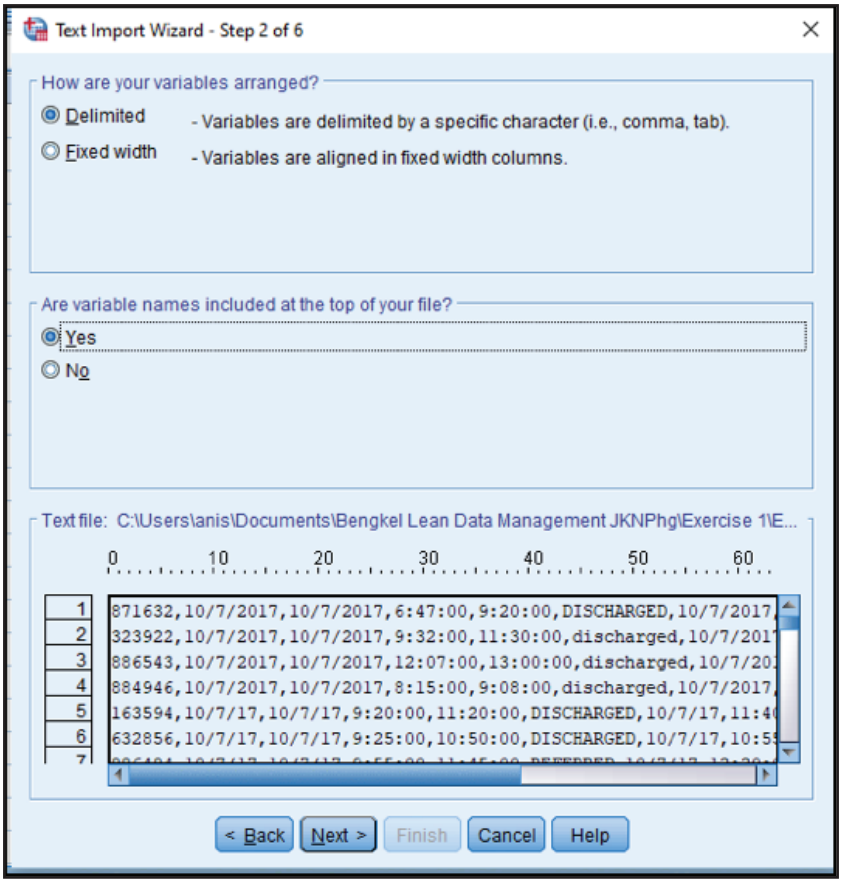


Figure 19: Text import wizard – Step 2

If your data did not match a predefined format, you will need to tell SPSS how your data is formatted. In the "How are your variables arranged" area, click the button that matches your data's format: **Delimited: Variable values are delimited (or separated) in the file by a special character, such as a comma or a tab.** Fixed width: Variables are aligned in fixed width columns. In the "Are variable names included at the top of your file" area, click Yes, then click Next (Figure 19).

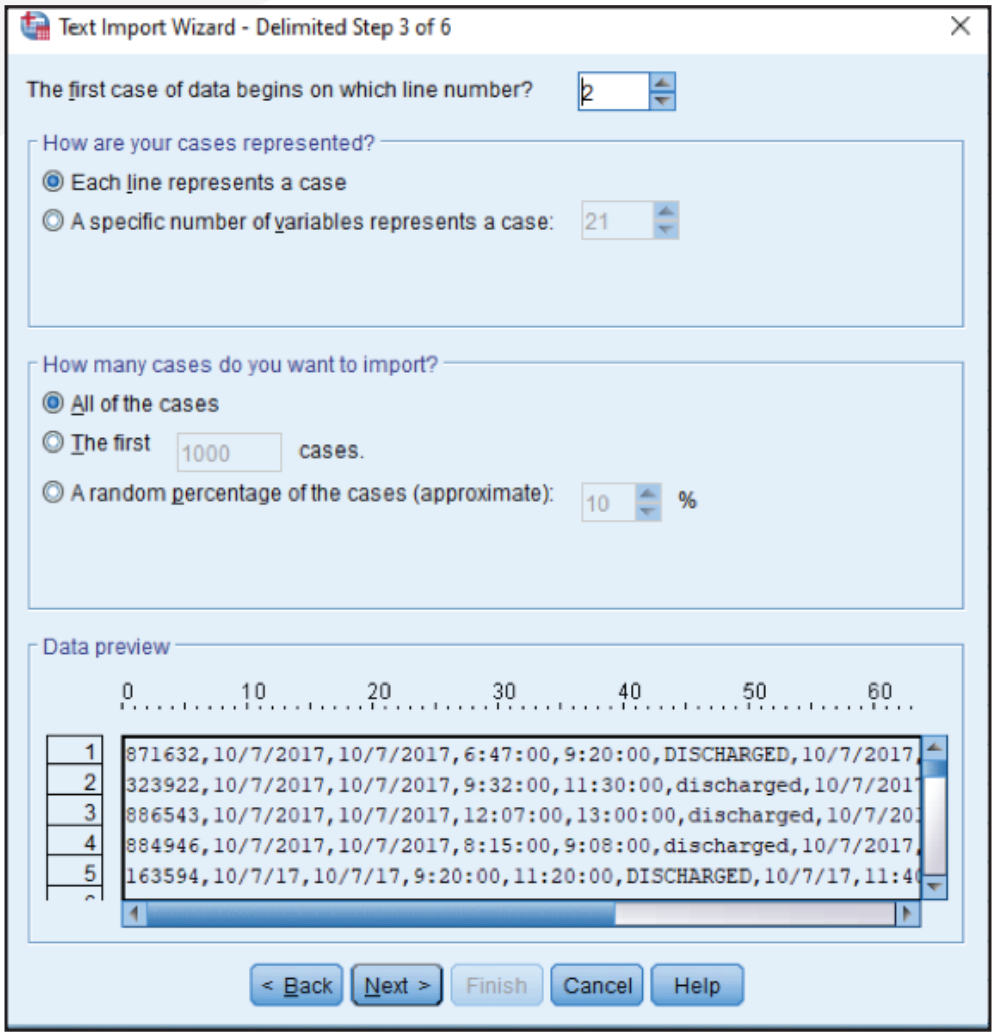


Figure 20: Text import wizard – Step 3

Click the buttons, and as necessary the values, that best describe your data for each of the following headings. If your dataset starts with a variable at first row/line 1, your data should begin at line 2. Click Next when you are finished (Figure 20).

In the "Which delimiters appear between variables" area, select the check box that reflects the delimiter used in your data. The delimiter is what is used **to separate values from each other within the data**. The options include Tab, Space, Comma, Semicolon, Other. If the text file is a **.csv file**, then the **delimiter is a comma** (Figure 21).

If you do not know which delimiter is used in the text file, refer to document that is associated with your data or the data owner.

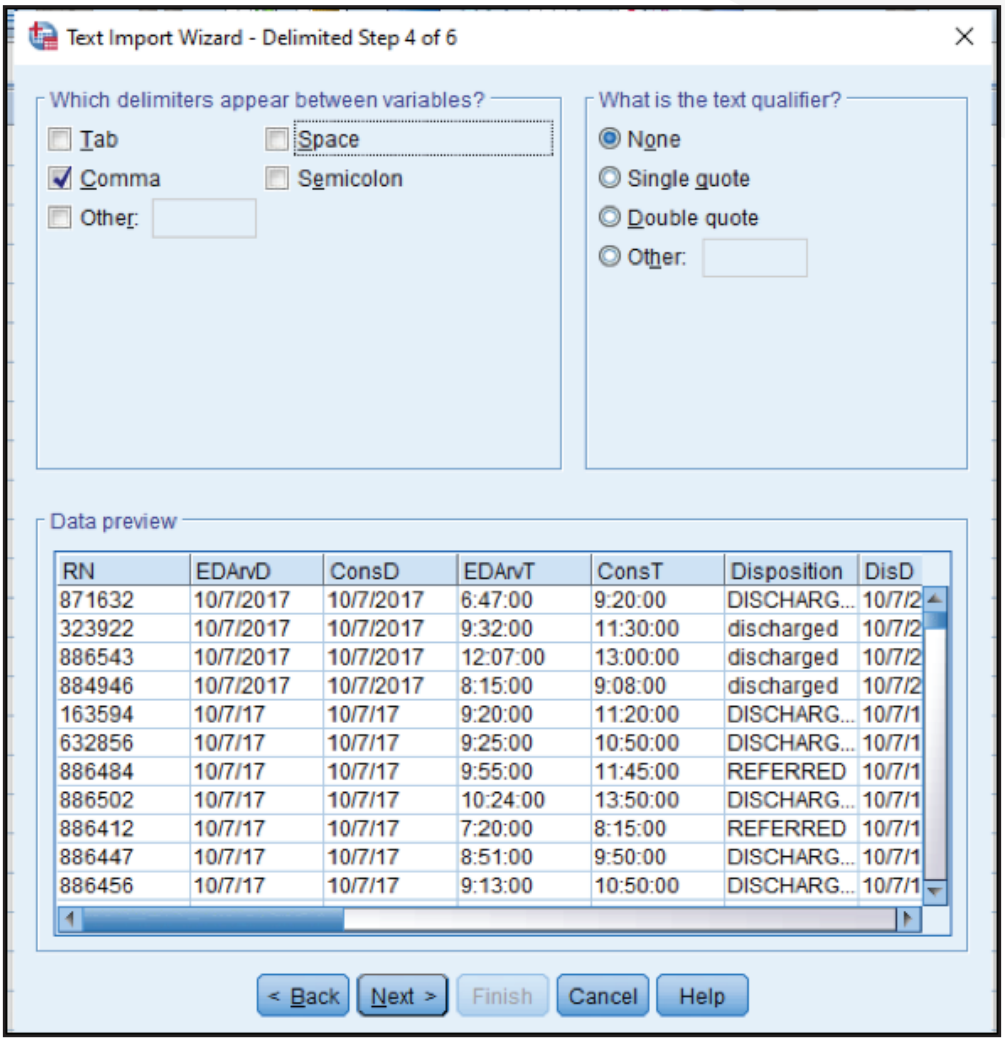


Figure 21: Text import wizard – Step 4

This step in Figure 22 allows you to specify the format for each variable in the data file. In the "Specifications for variable(s) selected in the data preview" area, SPSS explains that the default format selected for each variable.

In the Data Preview area, SPSS displays a preview of how your data will appear in SPSS once the import is complete. You can select any of the variable names (columns) in order to alter the data format. Here, you can change the format of your dataset according to the intended format (Figure 22).

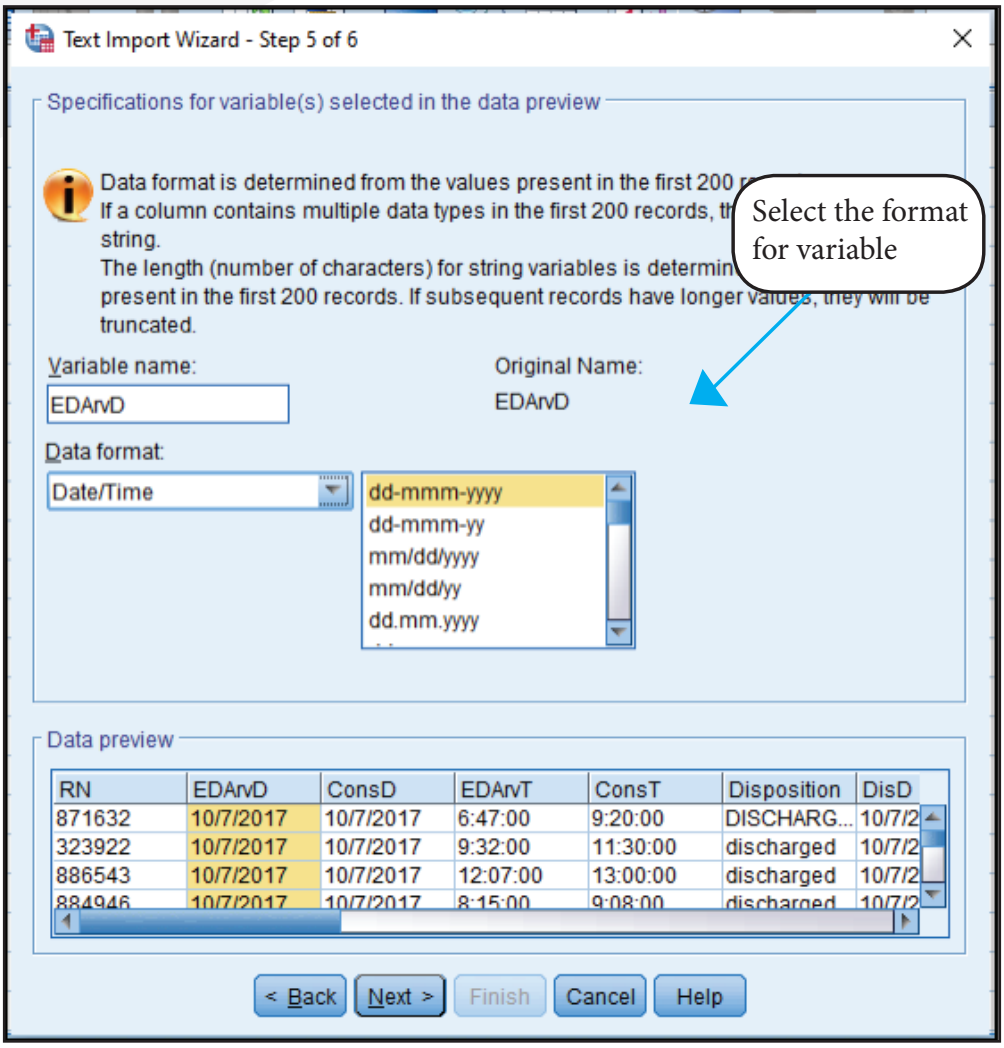


Figure 22: Text import wizard – Step 5

Finally, you can choose to save the file format that you just defined for the current data file in case you need to use it for future file importations. This file is known as **predefined file**.

A preview of your data appears at the bottom of the dialog box. If you are satisfied with the way the preview looks, click Finish to finalise the import (Figure 23).

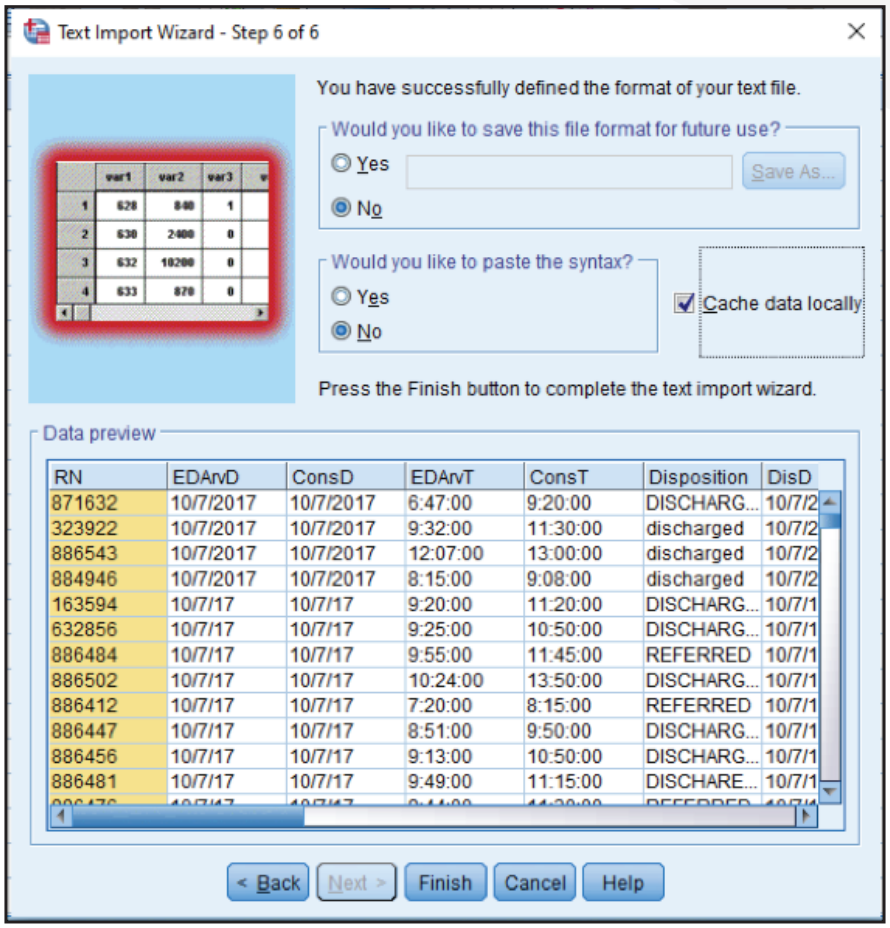


Figure 23: Text import wizard – Step 6

The modified file will appear in SPSS data view.

2.3 Data transformation and Analysis in SPSS

Data transformation is the process of converting data from one format to another; typically, from the format of a source to the required format. Before we can proceed with the analysis, we need to transform and create new variable for the original data set. The steps for data transformation are as below:

Select your file. Make sure the file type is in excel, otherwise the software will not be able to detect your file. Click **Open > Variable view**.

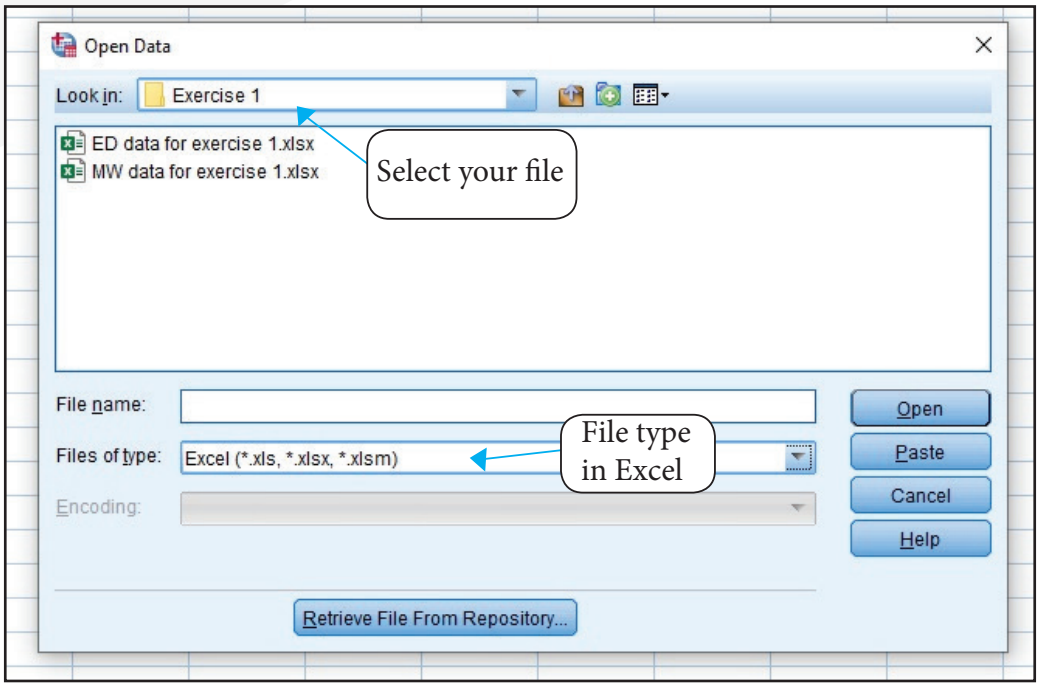


Figure 24: Opening Excel file in SPSS

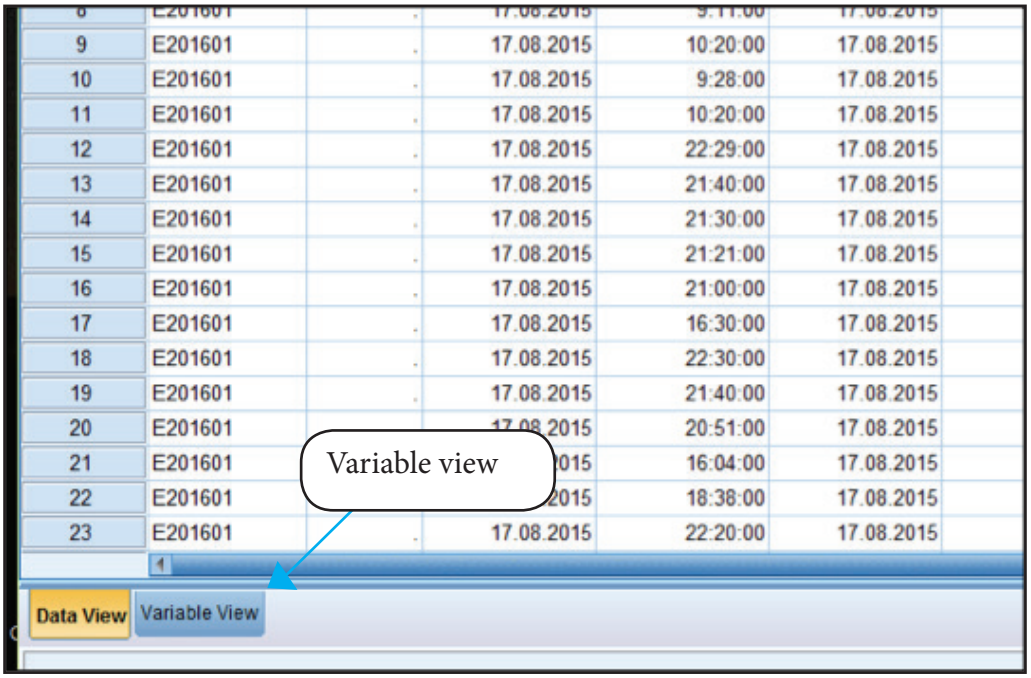


Figure 25: Variable view in SPSS

In case the date is not displayed properly in the SPSS, copy and paste the data to the column in SPSS. In variable view, you can **change the type to date format (dd.mm.yyyy) and time variables to date format (hh:mm:ss)**.

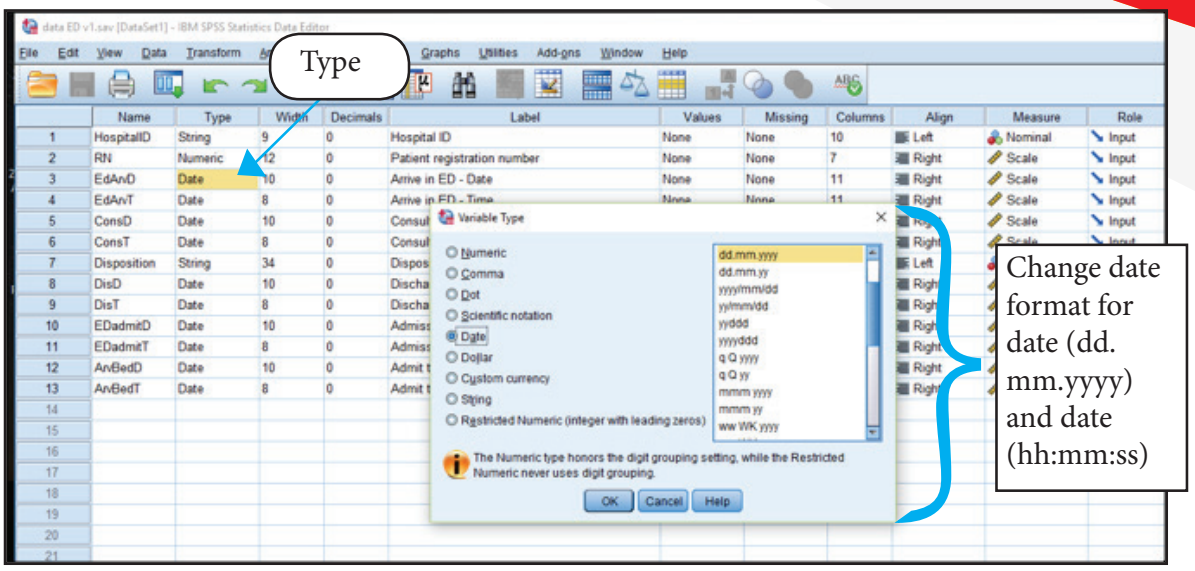


Figure 26: Change the type and format of data in variable view

The following instructions show a step-by-step example to transform data or variables for Emergency department and Medical ward. We need to create new variables before analysing from the original data set.

2.3.1 Emergency department

2.3.1.1 Transformation data

Example:

Create New variable → Arrival to Consultation (ATC): duration of time from patient arrival until patient enters doctor's room for consultation

Before analysis, ATC need to be created in the dataset since it is a new variable. By using the Transform tab, select Date and Time Wizard (Figure 27). A new window will appear as shown in Figure 28.

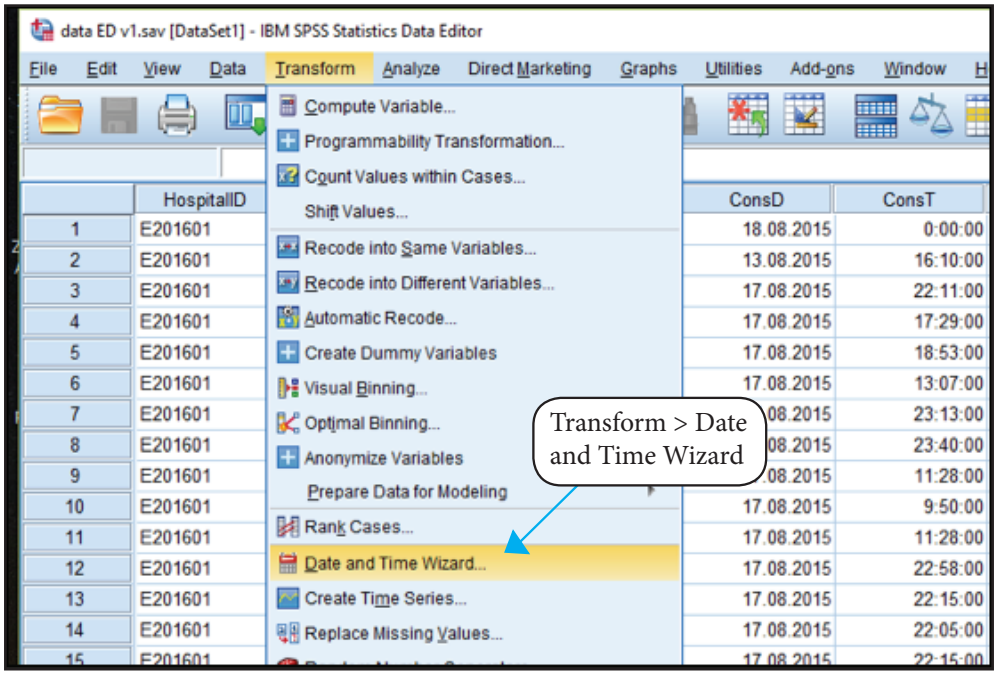


Figure 27:Choose Date and Time wizard under Transform tab.

First, select Option 4 to calculate with dates and times and click Next.

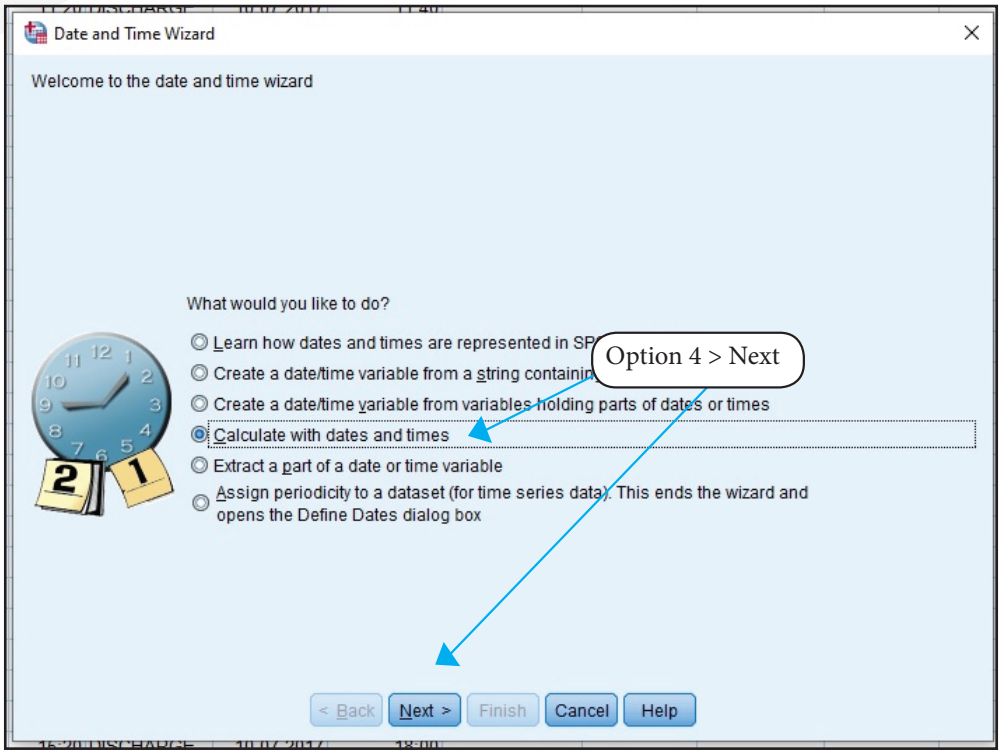


Figure 28: Date and Time wizard window

After selecting Option 4, proceed by selecting Option 3 to subtract two durations and click Next in step 1 of 3 Date and Time wizard.

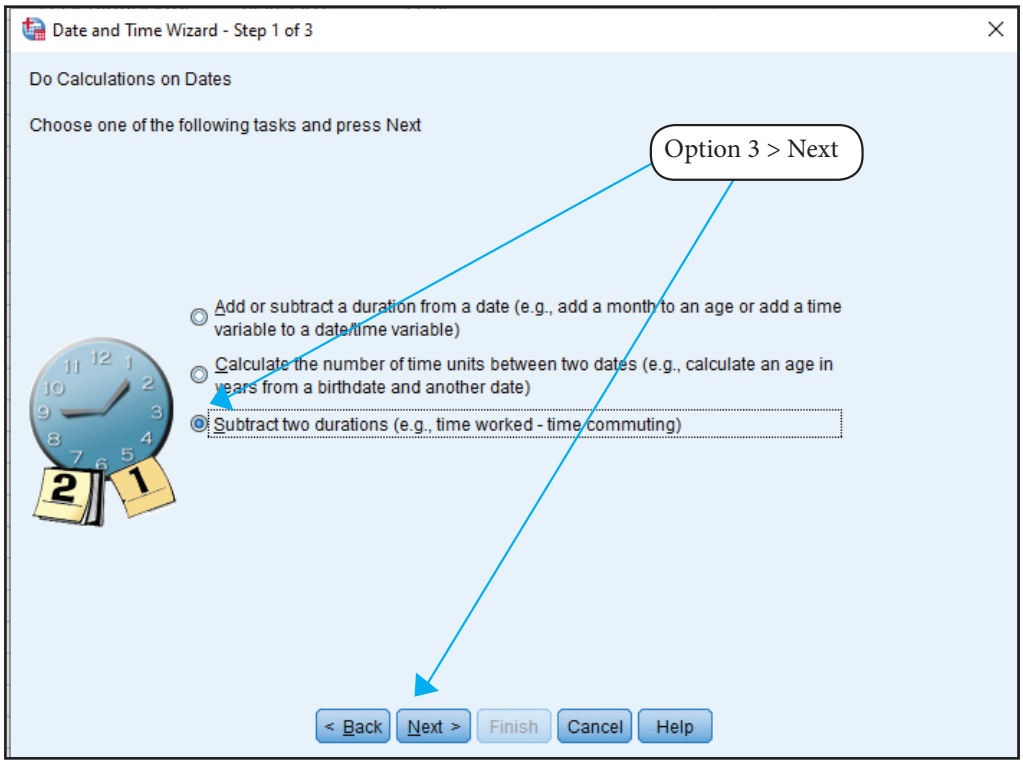


Figure 29: Calculation on dates

In order to calculate the difference between two durations e.g ATC, we need to select the required variables from our data. As shown in Figure 30, select Consultation date for Duration 1 and Arrival in ED date for Duration 2. Following that, click Next.

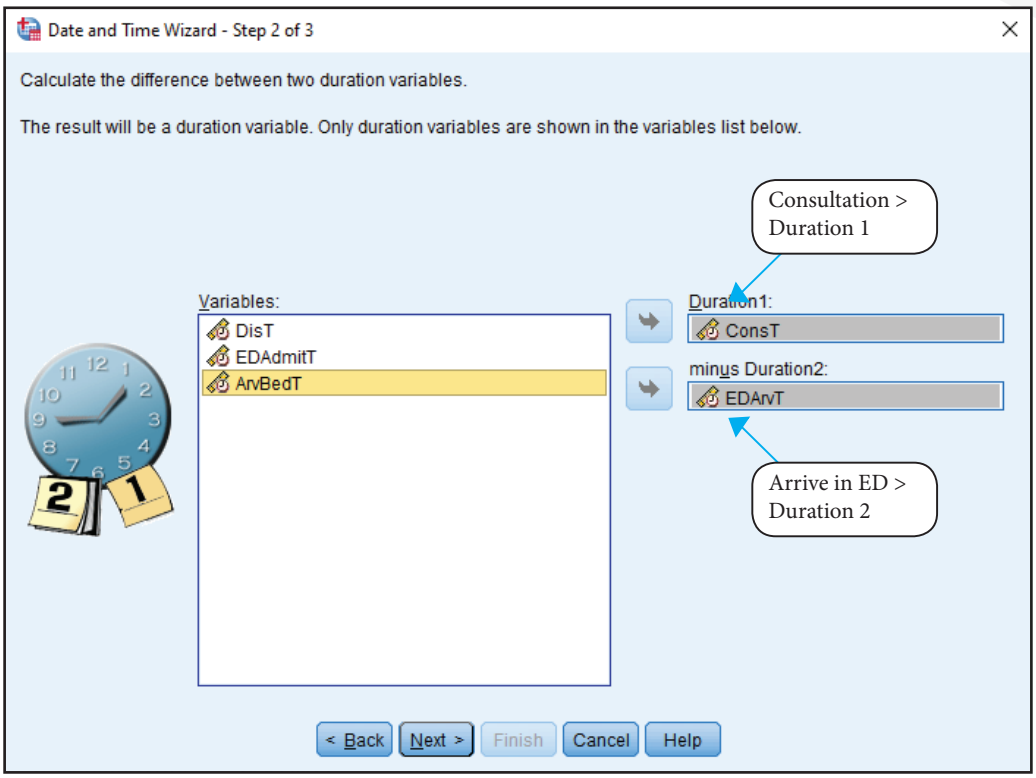


Figure 30: Selection of variable for calculation of differences in date

Rename the result variable to ATC and variable label to Arrival to Consultation. Make sure the output format is in hh:mm. Then, select paste the syntax and click Finish.

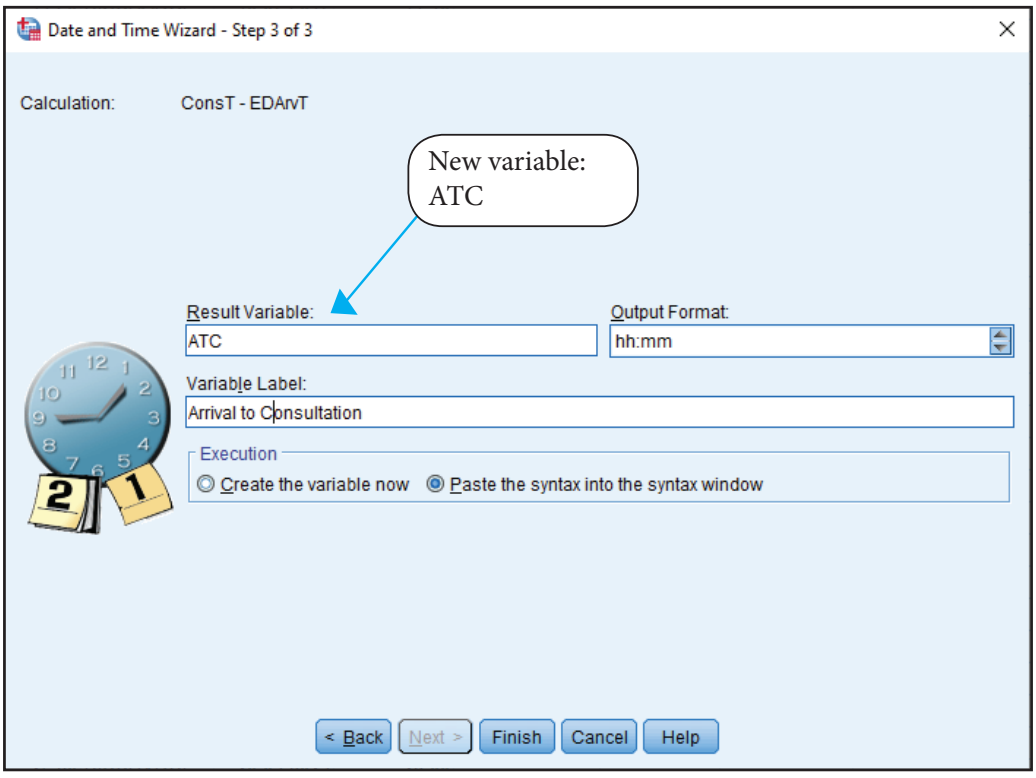


Figure 31: Rename new variable as Arrival to Consultation

Syntax window containing the command will appear. Highlight the command and click run selection. Your new variable, ATC will appear in the data view (Figure 32 and 33).

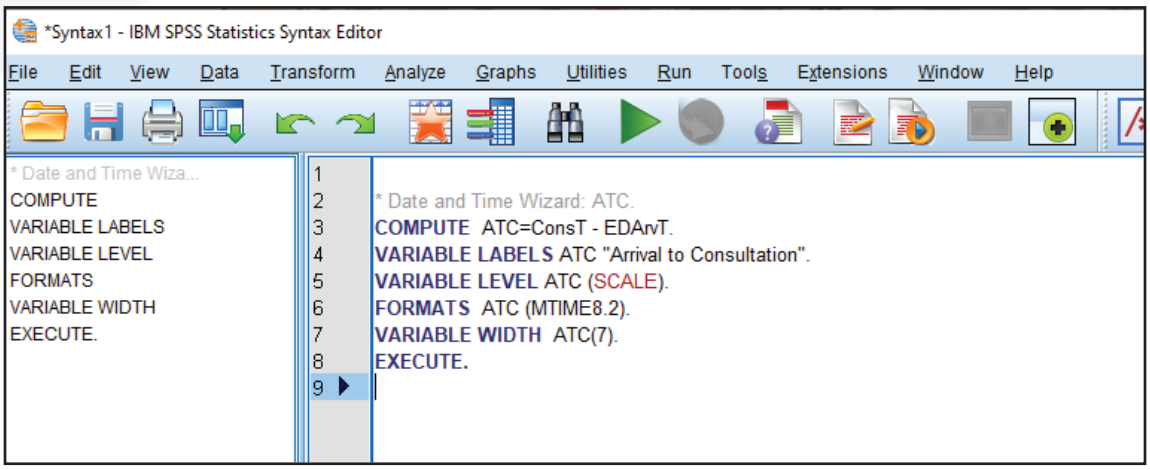


Figure 32: Syntax window with command for calculating date and time difference

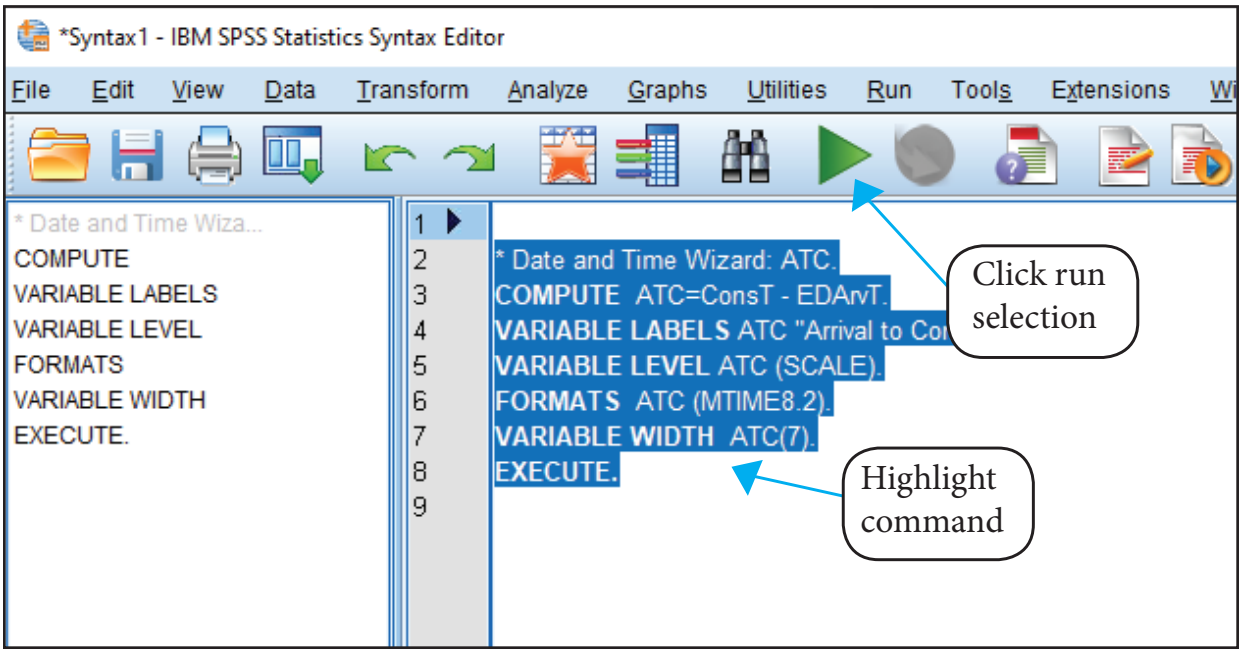


Figure 33: Highlight the command and click Run

Right click at the ATC column and sort descending to view the outlier's data. If there is a negative value, data owner **MUST** decide whether to remove or delete the data or check for any error in data entry (Figure 34). If there is an error in data entry, correction must be made by counterchecking from original data sheet. Once finished, proceed with the next step.

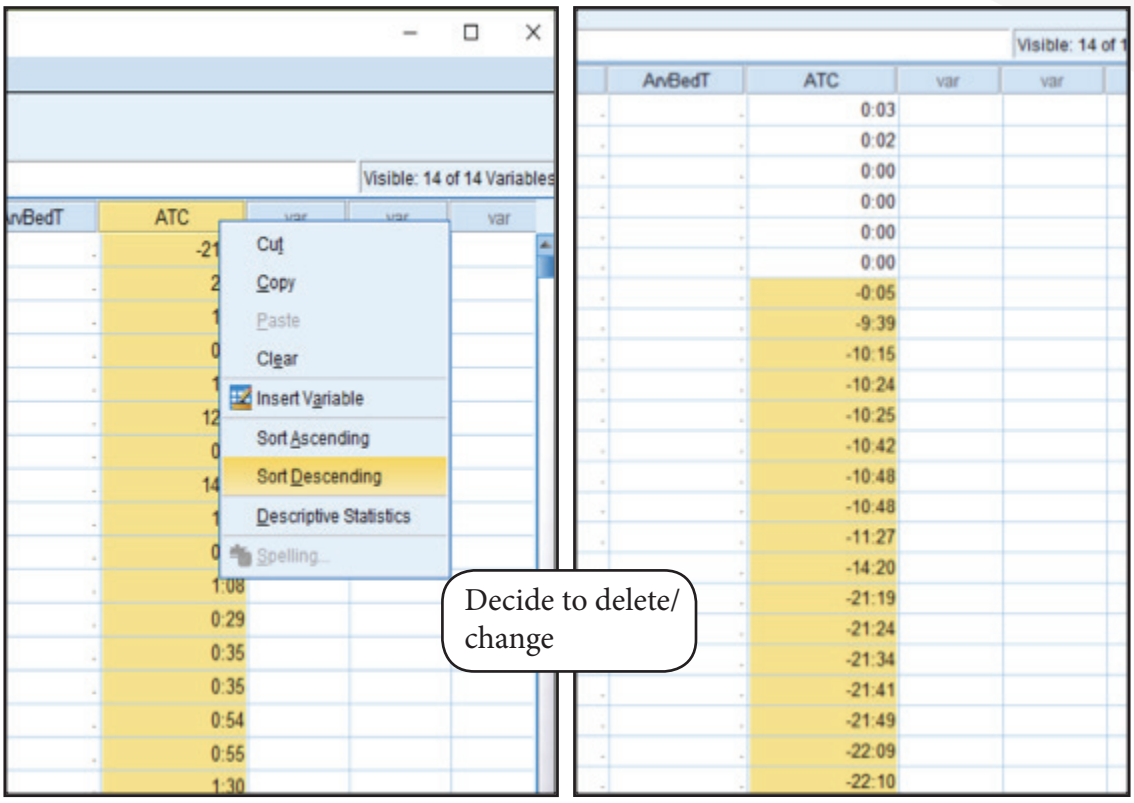


Figure 34: Sorting the data to find any outliers data.

In variable view, right click at the empty row and choose insert variable. Named the variable oneday and change type to date with format hh:mm. Click OK.

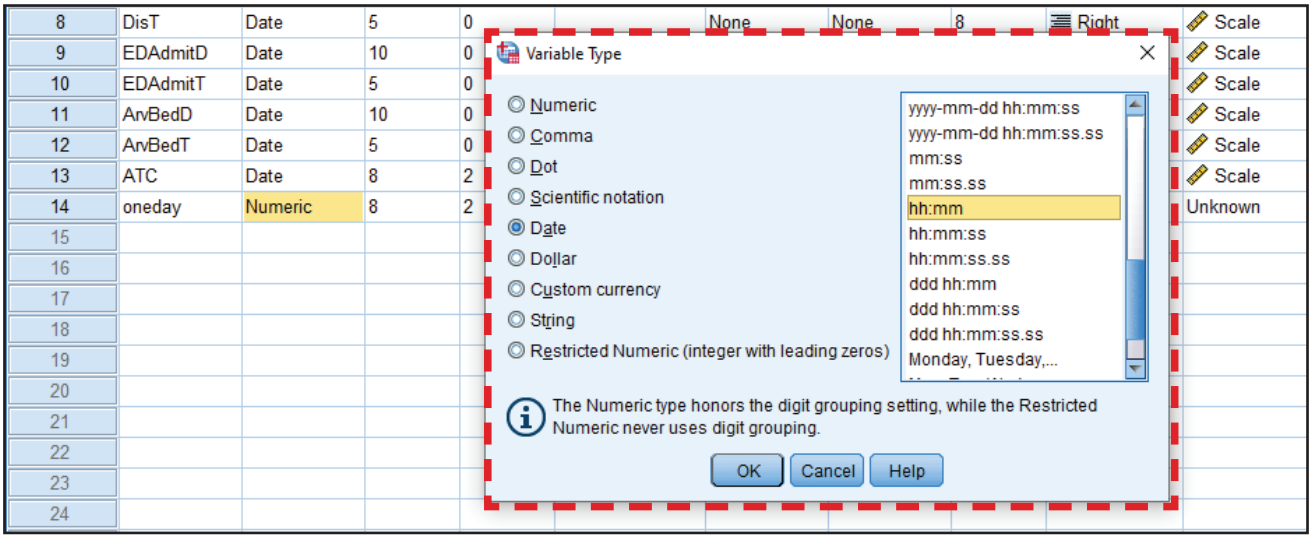


Figure 35: Insertion of new variable – Oneday in the data set

In Data View, type 24:00 in the first line in column oneday. Then, copy and paste until the end of the row with data. Variable oneday is created to assist in the analysis process later and it refers to one day time duration which is 24 hours.

EDAdmitT	ArvBedD	ArvBedT	ATC	oneday	var	var
.	.	.	12:27	24:00		
.	13.08.2015	9:45:00.00	4:13	24:00		
.	.	.	3:31	24:00		
.	.	.	3:18	24:00		
.	.	.	2:57	24:00		
.	.	.	2:55	24:00		
.	.	.	2:38	24:00		
.	.	.	2:31	24:00		
.	.	.	2:28	24:00		
19:15:00.00	.	.	2:26	24:00		
.	.	.	2:26	24:00		
.	.	.	2:22	24:00		
21:50:00.00	.	.	2:17	24:00		

Figure 36: Column oneday with 24:00 as time format

After finish creating new variable oneday, proceed with next step. Click Transform and choose Date and Time Wizard. Click Option 3 to calculate with dates and times and click Next.

Figure 37: Date and time wizard to calculate date and time

Then, in Step 1 of 3, click Option 2 to calculate the number of time units between two dates and click Next (Figure 38).

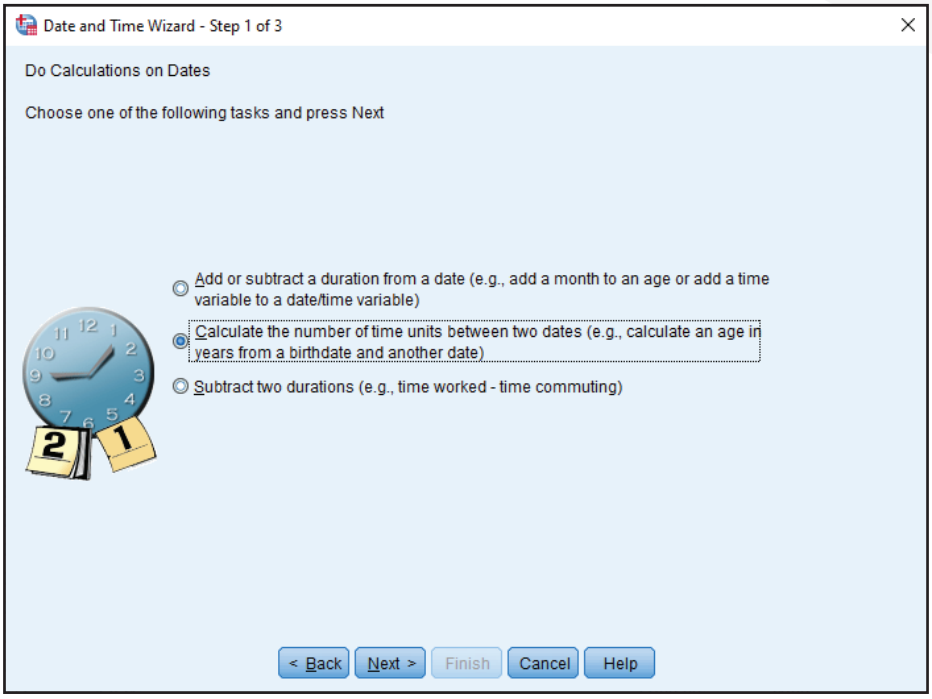


Figure 38: Calculation the number of time units between two dates

Select Consultation Date for Date 1 and Arrival Date for Date 2. **MAKE SURE** the unit is **DAYS** and choose option 1 (truncate to integer) for result treatment. Click Next.

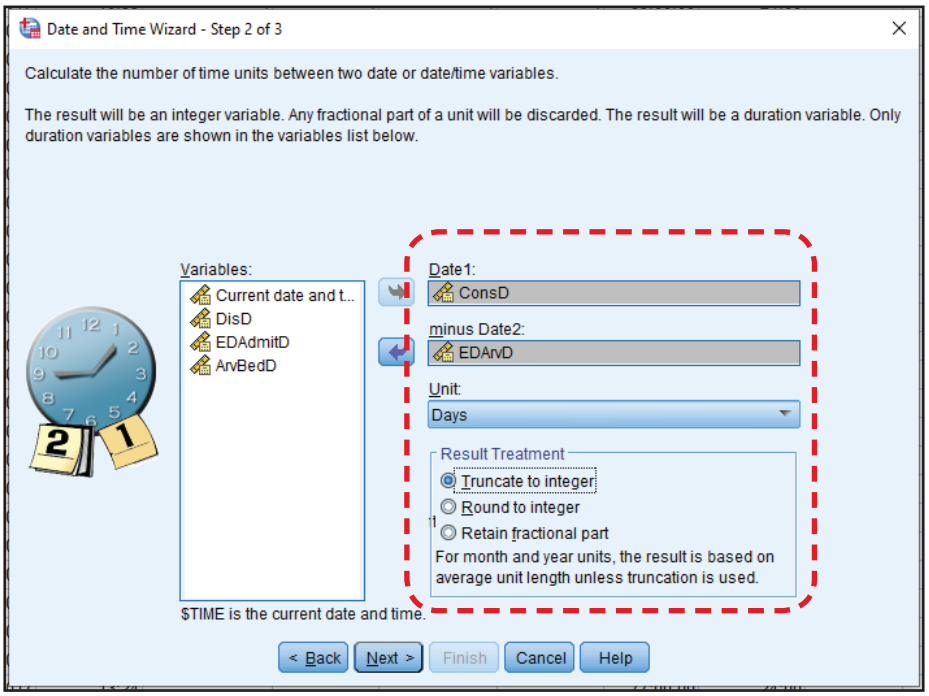


Figure 39: Selection of variable to calculate difference between time

Rename the result variable to ATCdatediff and variable label ATCdatedifference. Select option 2 to paste the syntax into the syntax window. Click Finish.

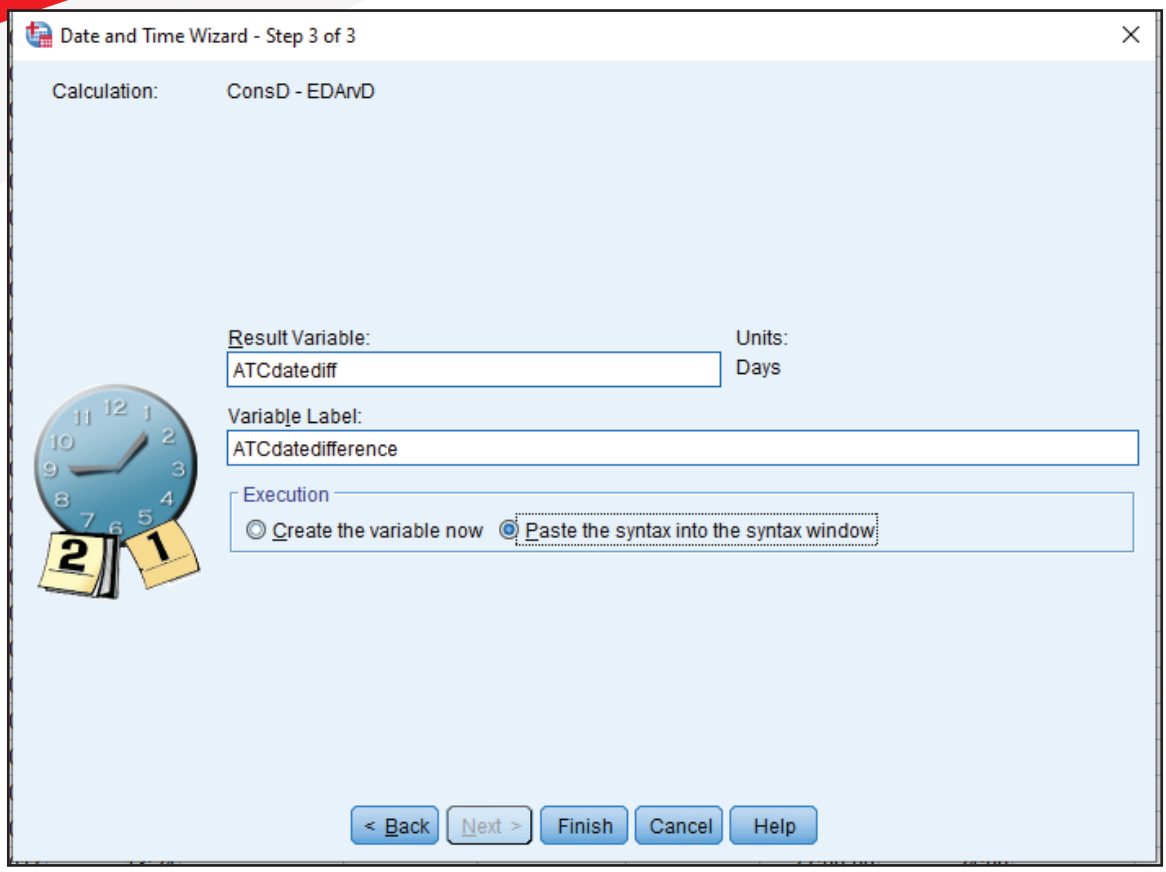


Figure 40: Rename the new variable

The new syntax for variable ATCdatediff will appear in the syntax window. Highlight the ATCdatediff syntax and click Run Selection. It will create new variable ATCdatediff in your data view.

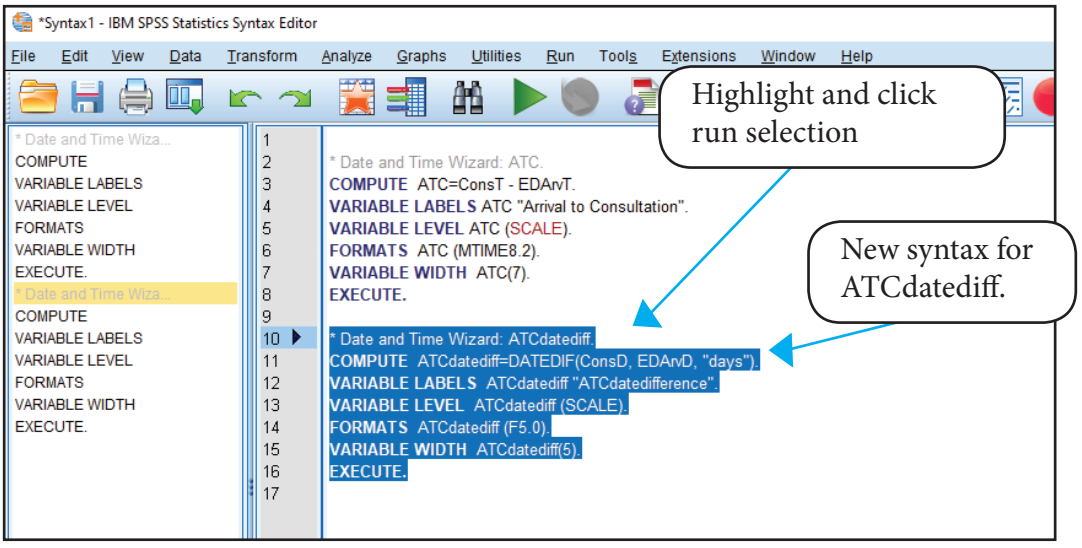


Figure 41: Syntax for ATC date differences

The new variable **ATCdatediff** will appear on your data view in the form of number 1 and 0.

0 is for data without any date difference.
1 is for data with different in days (e.g arrive to ED 17 Aug 2016 2315 PM and consult doctor at 18 Aug 2016 0030 AM).

AnvBedT	ATC	Oneday	ATCdatediff	var	var
.	14:29	24:00	0		
12:30:00	12:40	24:00	0		
.	12:30	24:00	0		
.	12:03	24:00	0		
.	7:25	24:00	0		
.	6:43	24:00	0		
.	6:13	24:00	0		
.	5:47	24:00	0		
.	5:40	24:00	0		

ATCdatedifference

Figure 42: New variable ATCdatediff created in the Data set

Next, we will calculate the final value for ATC. Open the Syntax window and type the syntax below into the syntax window.

```
DO IF (ATCdatediff = 0).
Compute ATCnew=ATC.
ELSE IF (ATCdatediff = 1).
Compute ATCnew=ATC+oneday.
END IF.
MISSING VALUES ATCnew (LO THRU 0).
EXECUTE.
VARIABLE LEVEL ATCnew (SCALE).
FORMATS ATCnew (TIME5).
VARIABLE WIDTH ATCnew(5).
EXECUTE.
```

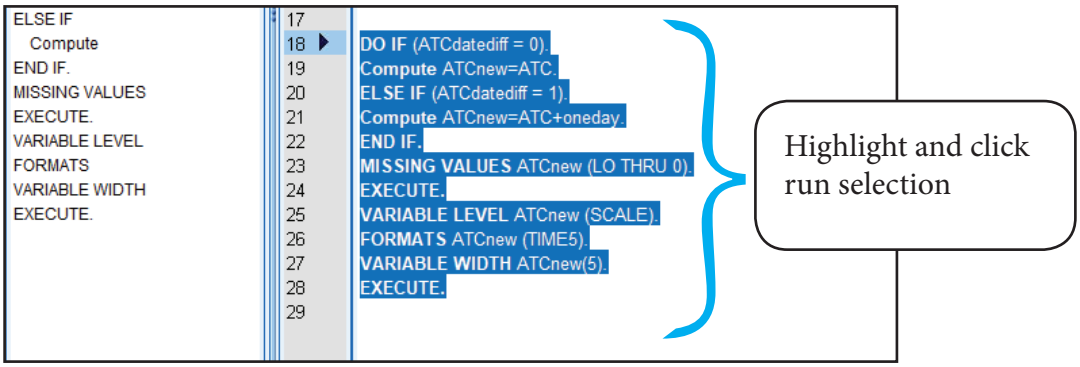


Figure 43: Highlight syntax and click Run to calculate the final ATC

Highlight and click run selection for syntax ATCnew. This will create the new variable ATCnew in the data view. This is the final value for ATC after calculation. We will use this variable to get the mean/average and throughput value.

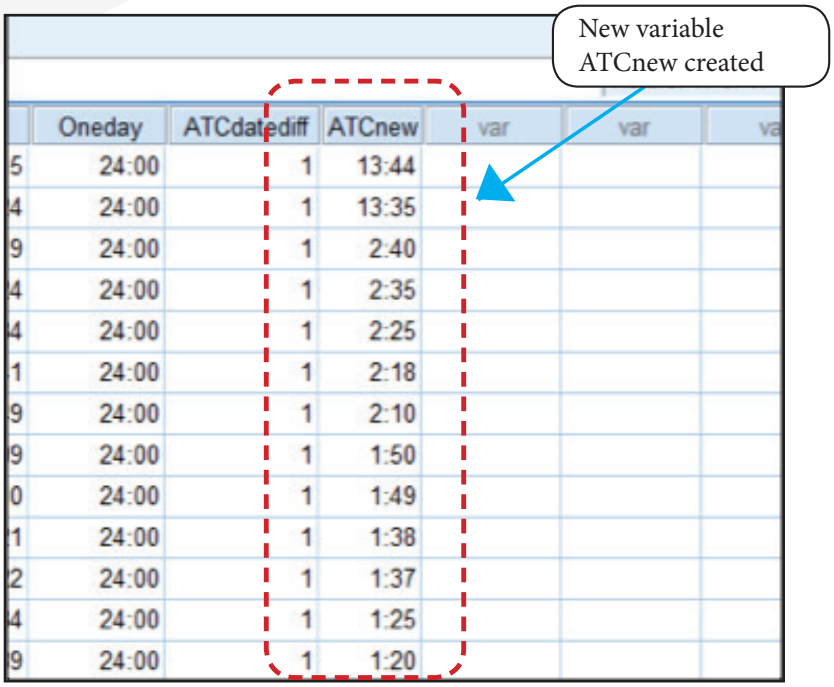


Figure 44: New variable, ATCnew in data set

2.3.1.2 Data analysis

Arrival to Consultation (ATC)

We will analyse the data to obtain the average value for Arrival to Consultation (ATC). Click Analyze and then choose Descriptive Statistics and click Explore.

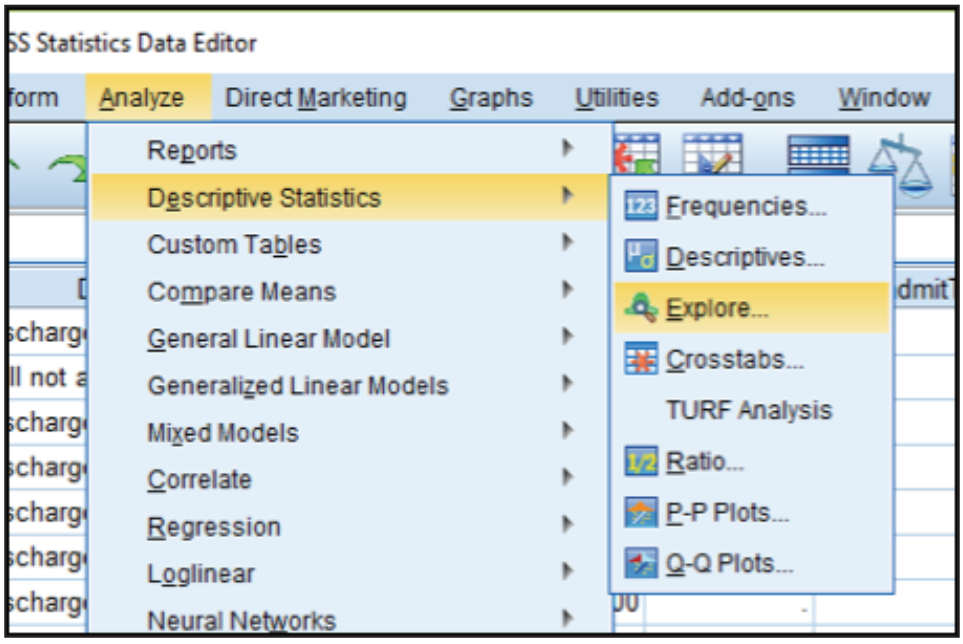


Figure 45: Descriptive analysis for ATC

Explore window will show interface as in Figure 46. Click ATCnew and insert into dependent list on the right side. In display section, choose Statistics. If you choose Both, the result will show both Statistics and Plot in Output window. Finally, click OK to proceed.

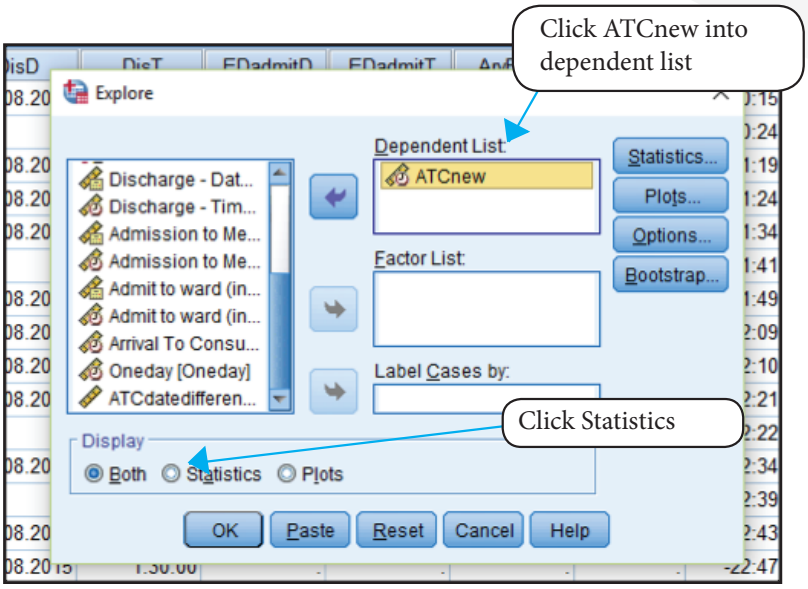


Figure 46: Explore window for further analysis

The result will appear in the Output window. The mean value is the average time for the Arrival to Consultation, ATC (Figure 47). In addition, you can also observe the minimum and maximum range for your data.

Case Processing Summary

	Cases				
	Valid		Missing		T
	N	Percent	N	Percent	N
ATCnew	632	95.8%	28	4.2%	660

The mean value shown is the average time for ATC (e.g 1:16 = 1 hour 16 mins)

Descriptives

			Statistic	Std. Error
ATCnew	Mean		1:16	0:03
	95% Confidence Interval for Mean	Lower Bound	1:09	
		Upper Bound	1:23	
	5% Trimmed Mean		1:05	
	Median		0:59	
	Variance		27509241.22	
	Std. Deviation		1:27	
	Minimum		0:01	
	Maximum		14:29	
	Range		14:27	
	Interquartile Range		0:55	
	Skewness		5.702	.097
	Kurtosis		42.513	.194

Figure 47: Descriptive analysis for Arrival to Consultation (ATC)- Average time

The next step is to find throughput value (e.g percentage patient being seen by doctor within 90 minutes for ATC), use the syntax provided in the syntax file. The syntax is as below:

```
DO IF  (XDATE.TIME(ATCnew) <= 1.5*60*60).
Compute Throughput_ATC=1.
ELSE IF (XDATE.TIME(ATCnew) > 1.5*60*60).
Compute Throughput_ATC=0.
END IF.
EXECUTE.
```

Highlight the syntax and click Run Selection.

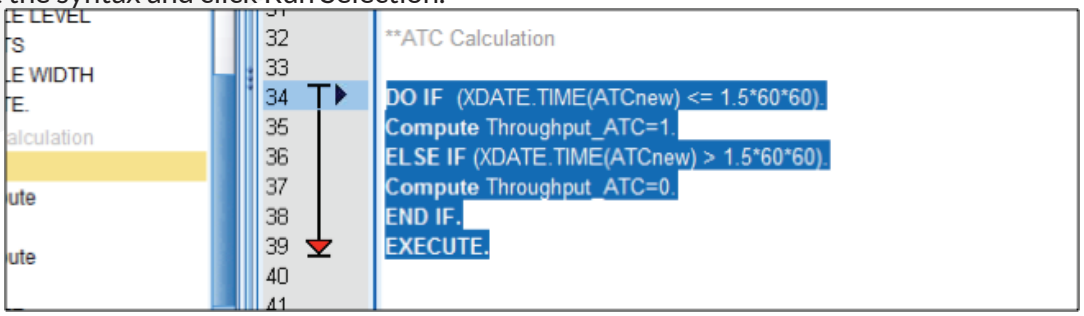


Figure 48: Paste the syntax to Syntax window

New variable named **Throughput ATC** will be created in your data view. The data will be shown as **1.00 = within 90 mins**, and **0.00 = more than 90 minutes**. Proceed with analysis by clicking **Analyze > Descriptive Statistics > Frequencies**

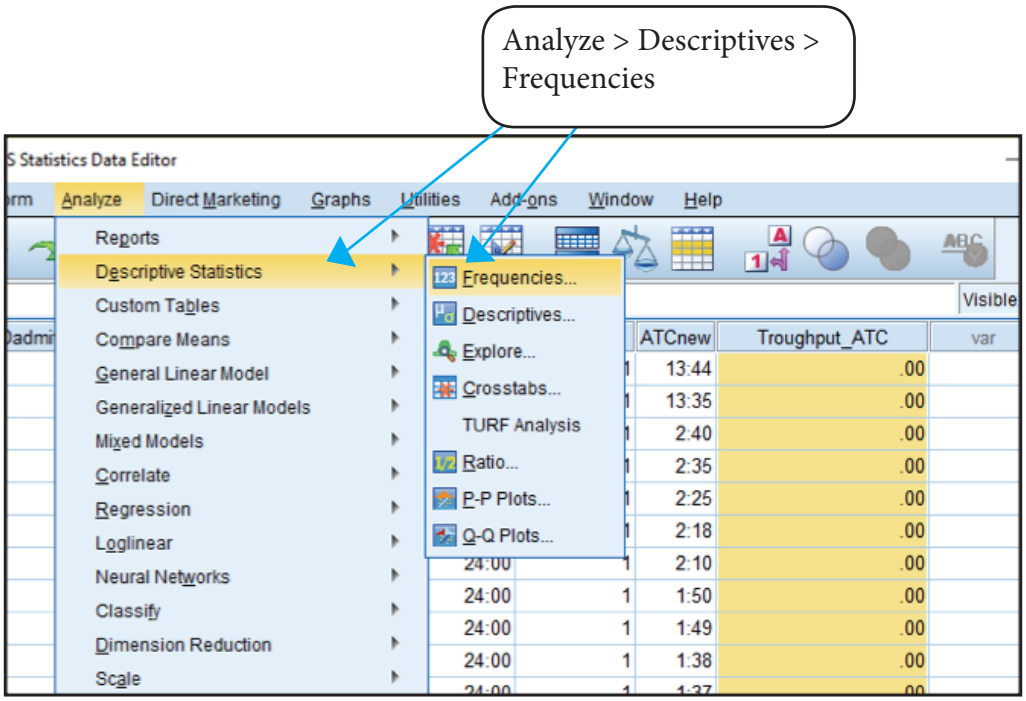


Figure 49: Analysis for Throughput ATC using Descriptive statistics

The result will be shown in the Output window. Use the value provided in the valid percent column. In this analysis, the result interpretation will be summarised as 75% of patients is seen within 90 minutes.

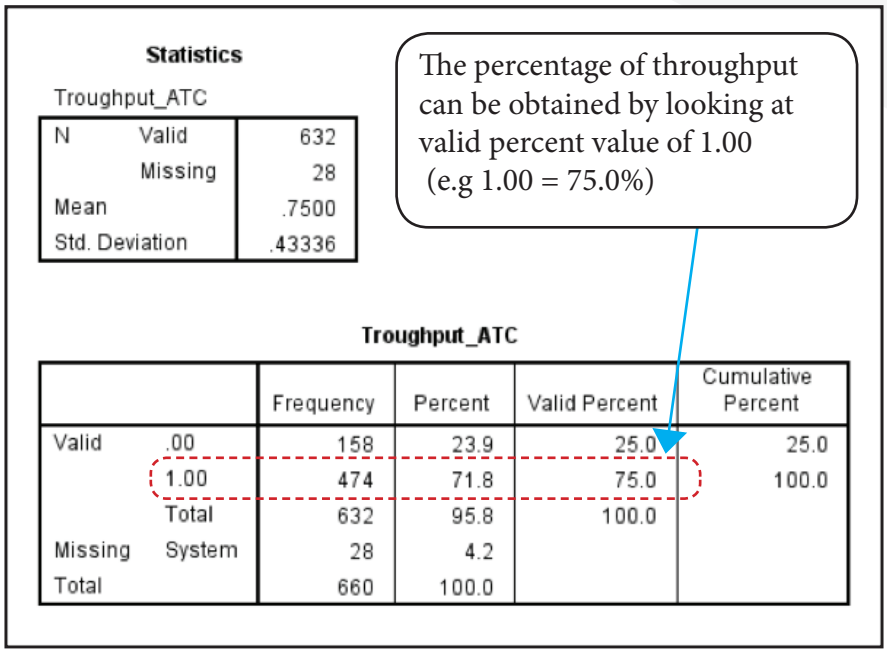


Figure 50:Results of descriptive analysis in Output window

Repeat and follow these steps for other variable such as **LOS (Length of Stay)** and **BWT (Bed Waiting Time).** But this time you do not need to create the variable oneday again, as the same variable can be used for analyses. The new variables needed to be created is **LOS, LOSdatediff, LOSnew, BWT, BWTdatediff, and BWTnew.**

Call Not Attended (CNA)

The analysis of Call not attended (CNA) will be presented in the form of percentage value. The analysis will utilize the Disposition variable in the dataset (Figure 51). Begin the analysis by selecting **Analyze > Descriptive Statistics > Frequencies** (Figure 52)

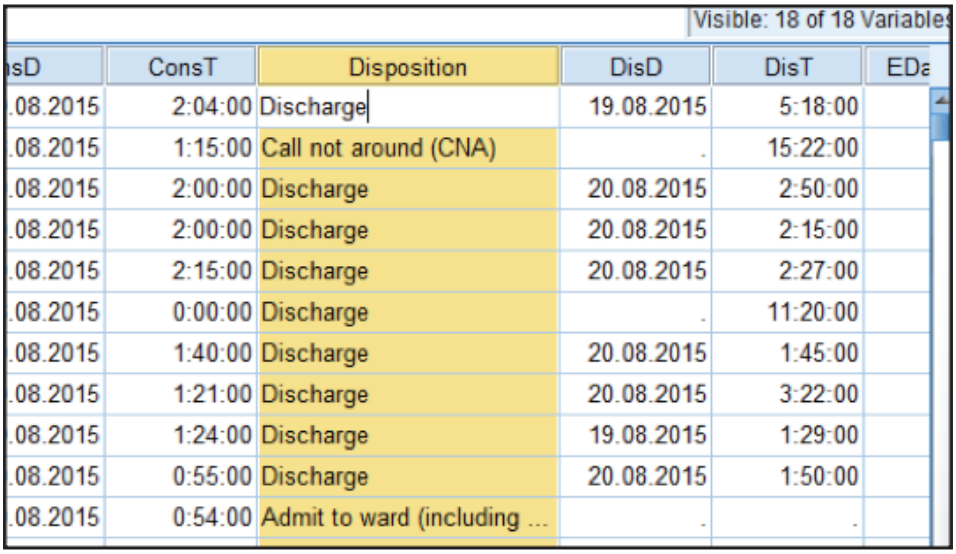


Figure 51: Disposition variable was used to analyse Call not attended

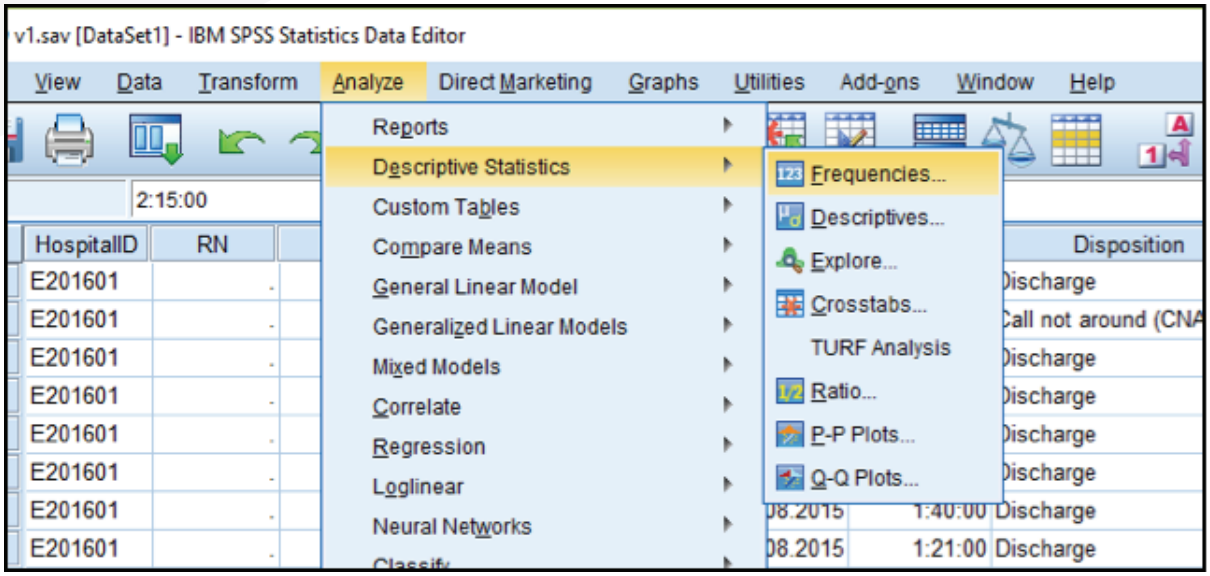


Figure 52: Frequency analysis for Call not attended

After Frequencies window appear, select Disposition in variable list on the left and click the arrow to bring it to variable box on the right (Figure 53). Next, click **Statistics > click mean and standard deviation** and click **Continue and OK**.

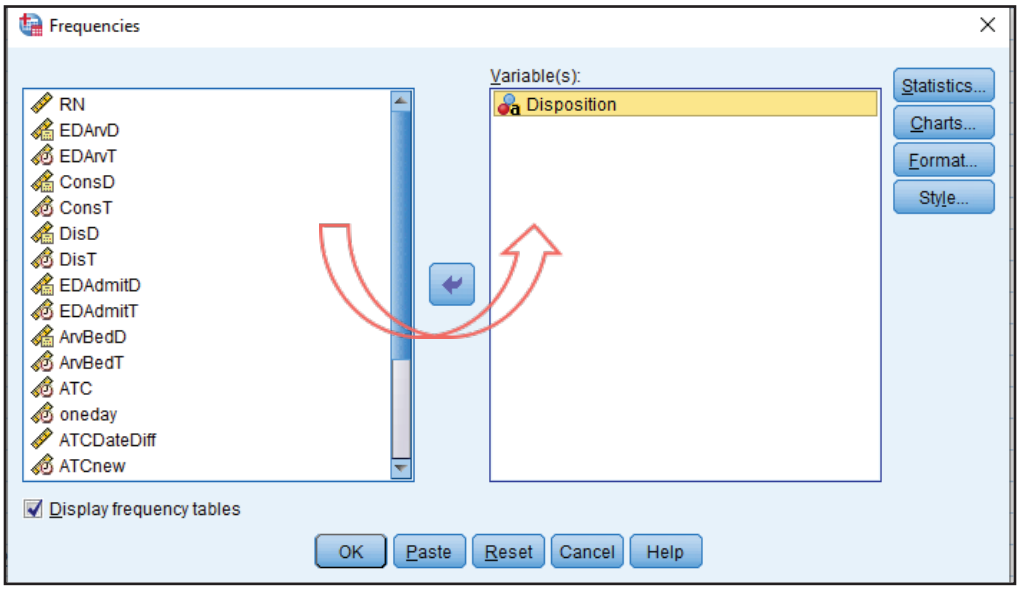


Figure 53: Selecting Disposition variable for analysis

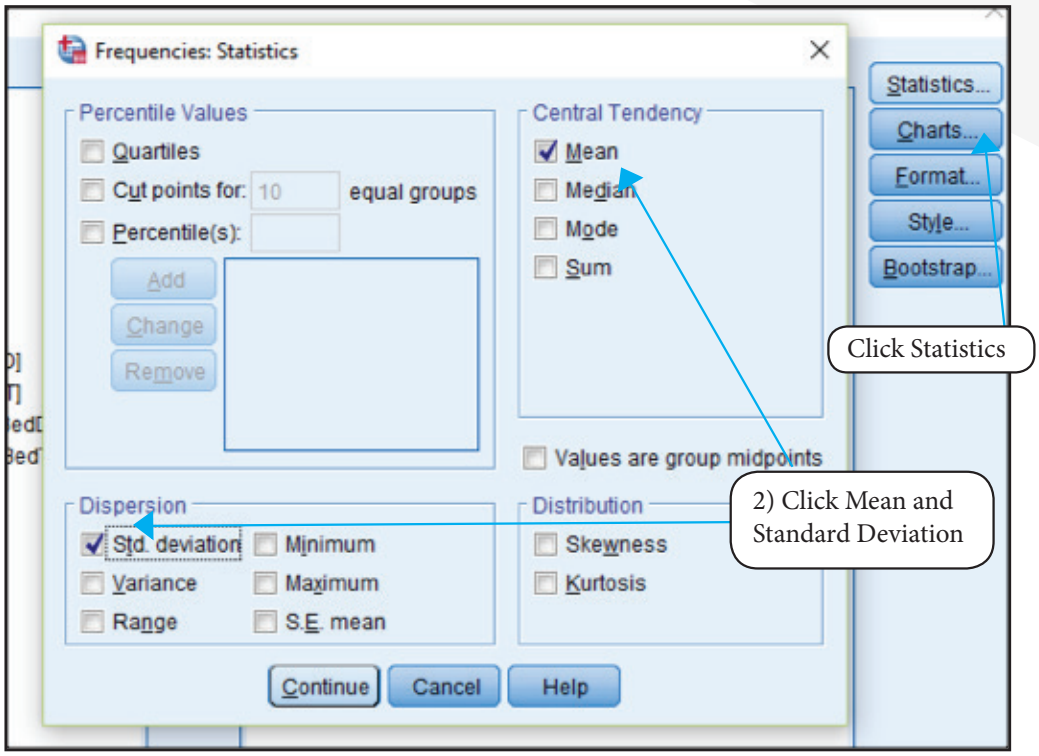


Figure 54: Analysis for Frequencies

The result is shown in the output file as frequency table (Figure 55). Based on the example given, there are 27 number of **Call Not Around (CNA)** which equals to 4.1 %. Always see the valid percent column for results because it has excluded all the missing values in our data.

Frequencies

Statistics

Disposition

N	Valid	660
	Missing	0

Disposition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Admit to ward (including referral)	49	7.4	7.4	7.4
	Call not around (CNA)	27	4.1	4.1	11.5
	Discharge	584	88.5	88.5	100.0
	Total	660	100.0	100.0	

Figure 55: Result for Call not attended

NOTE: Keep the syntax for future use. In case you need to analyse similar set of data again, you just highlight and run selection. However, this action is only possible IF the variable name is the SAME with the syntax. In case the variable is different, you still can use the syntax but you need to CHANGE THE VARIABLE NAME on the syntax.

Example:

COMPUTE ATC= **Consultation - Arrival.**
VARIABLE LABELS ATC "Arrival to consultation".
VARIABLE LEVEL ATC (SCALE).
FORMATS ATC (TIME5).
VARIABLE WIDTH ATC(5).
EXECUTE.

COMPUTE ATC= **ConsT - EdArvT**.
VARIABLE LABELS ATC "Arrival To Consultation".
VARIABLE LEVEL ATC (SCALE).
FORMATS ATC (TIME5).
VARIABLE WIDTH ATC(5).
EXECUTE.

2.3.2 Medical Ward

3.3.2.1 Transformation data

Create New variable → Discharge Time (DT): duration of time from doctor's decision to discharge patient until the time patient leaves bed (either going home/discharge lounge/referred to ward).

Before analysis, DT variable need to be created in the dataset since it is a new variable. By using Transform tab, select Date and Time Wizard. Then, choose Option 4 to calculate with dates and time. Next, click Next (Figure 56 and 57).

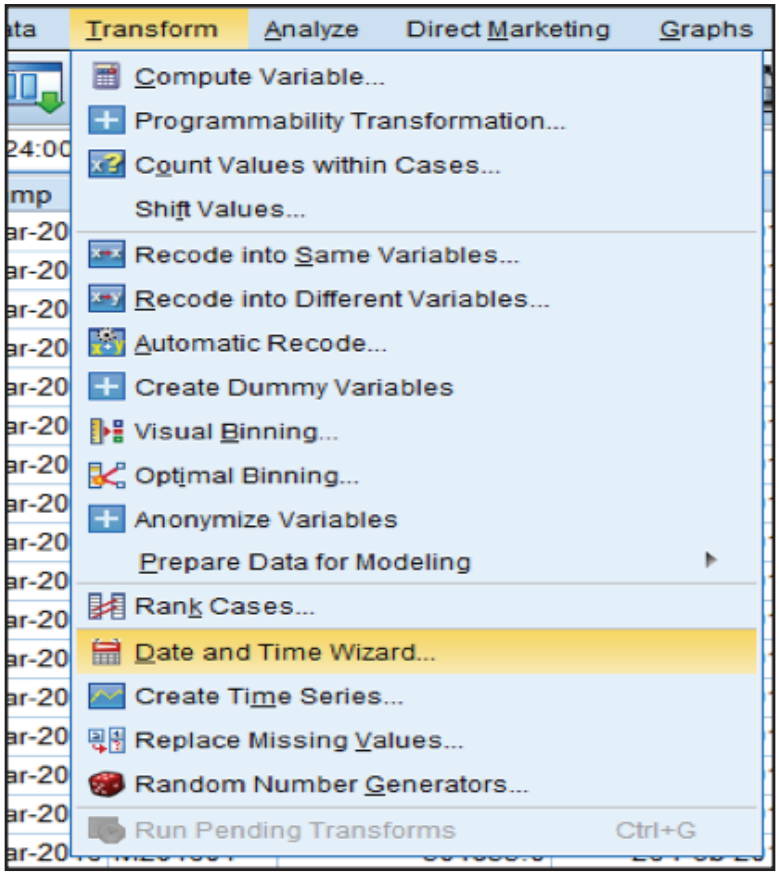


Figure 56: Transform data using Date and Time wizard

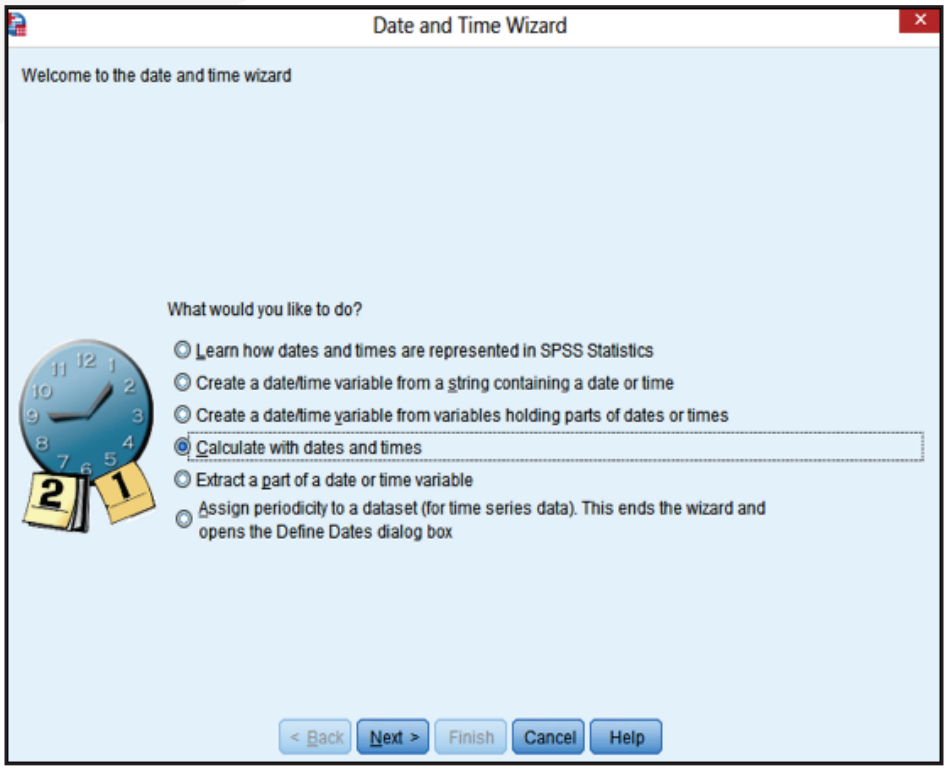


Figure 57: Calculate with dates and time

Then, choose Option 3 to subtract two durations and insert variable LeaveBedT into Duration 1 and DecDcT into Duration 2. Click Next.

Rename the new variable by typing DT on Result variable and type Discharge Time on variable label. Choose hh:mm:ss in the Output Format and click to paste the syntax into the syntax window and click Finish. Once the syntax window appears with the newly pasted syntax, highlight the item and click Run. The new variable, Discharge time will appear in data view (Figure 58-59).

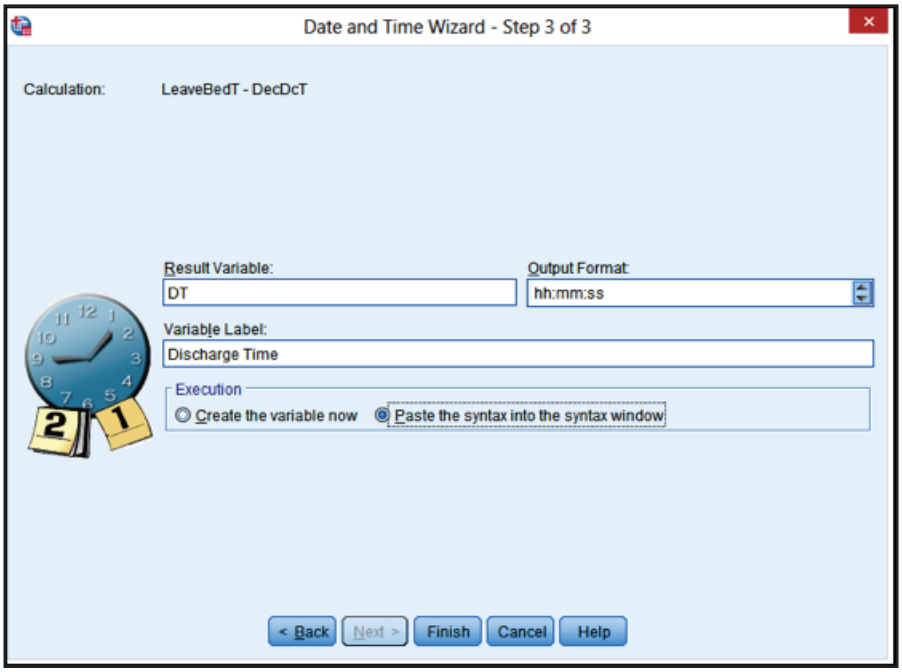


Figure 58: Rename the new variable, Discharge time

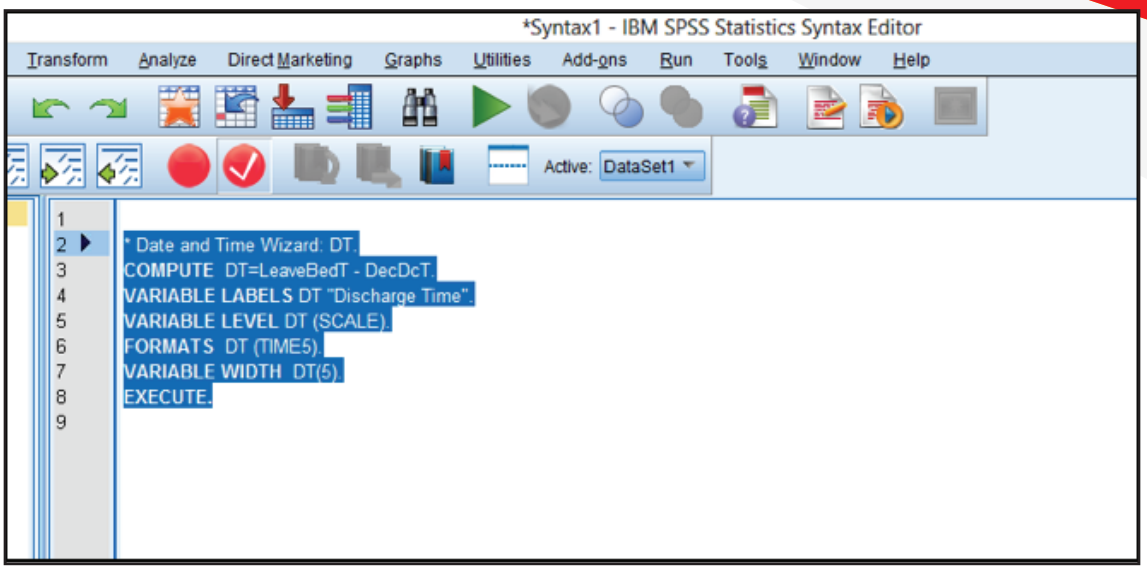


Figure 59: Syntax for Discharge time in Syntax window

We need to check for outliers such as missing data, illogical data or any negative value before we proceed with the analysis. First, click column DT and right click to sort all the value ascending (Figure 60).

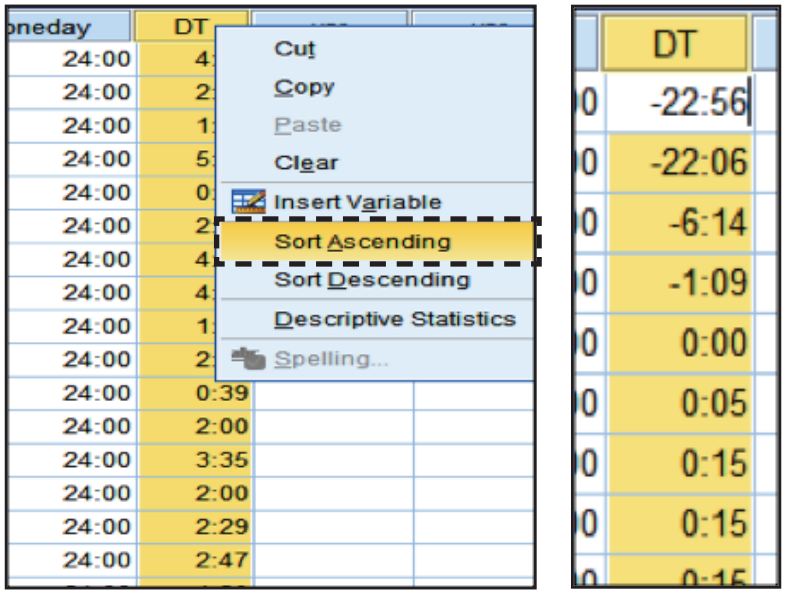


Figure 60: Sort all data in column DT to check for any discrepancies.

Once sorted, make a decision on each of the outliers either to delete or recheck again from original data source. If the negative value given is large number i.e -23:40, this might be due to the differences in date. Kindly proceed with the next step.

If the data consist of any negative value related to differences in date, we need to create new variable, DTDateDiff. First, click Transform and click Date and Time wizard. Select Option 4 to calculate with date and time (Figure 60)

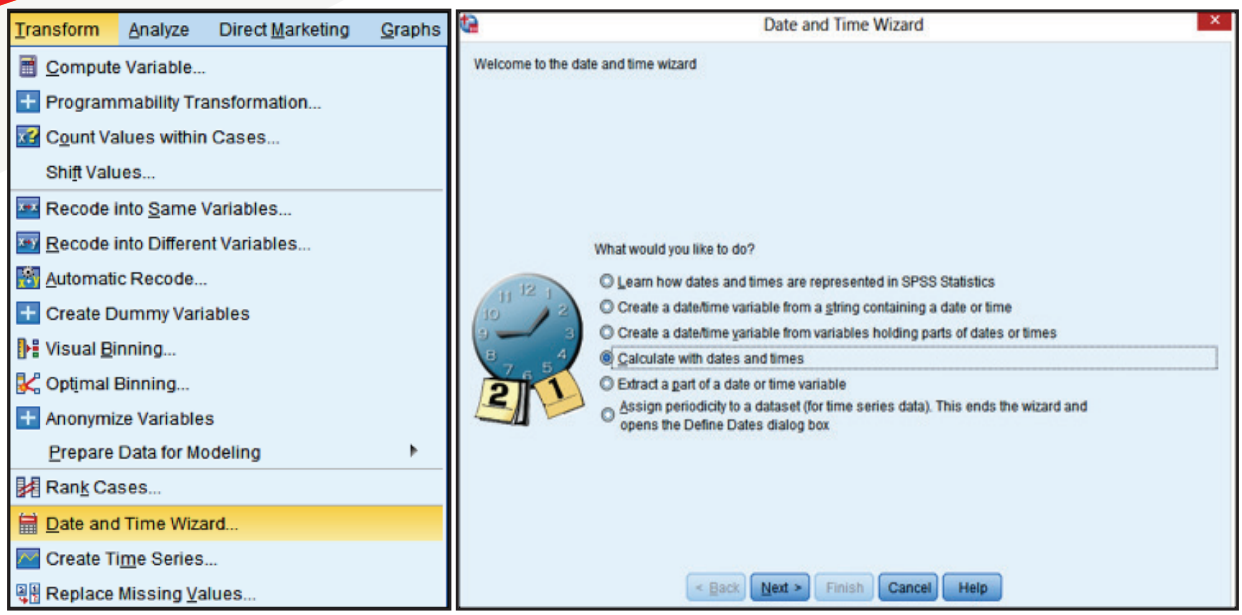


Figure 61: Date and Time wizard to create new variable, DTDateDiff

Then, click Next and select Option 2 to calculate the number of time units between two dates and proceed with Next (Figure 61).

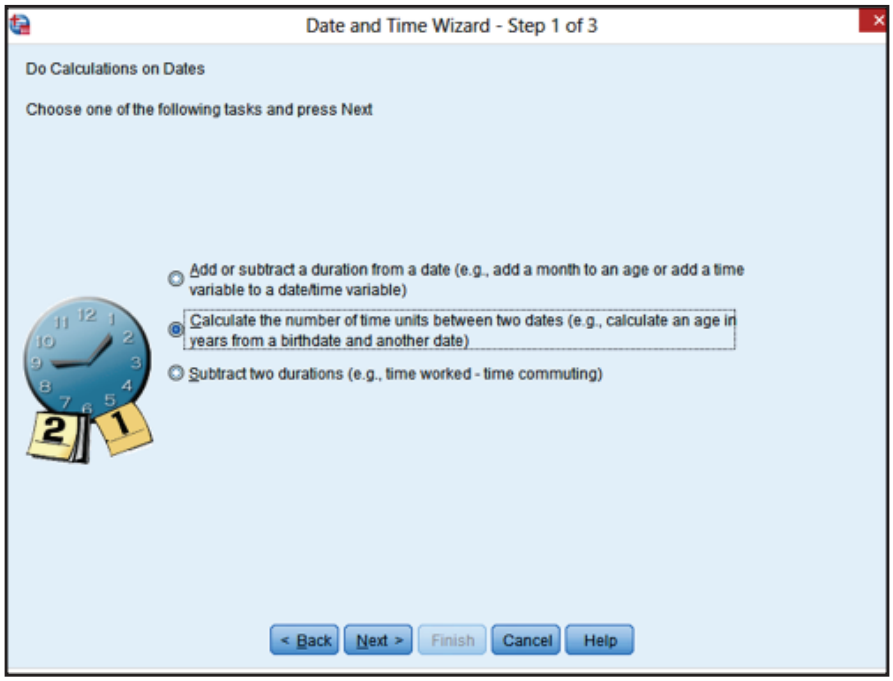


Figure 62: Step 1 of 3 in Date and Time wizard

Insert LeaveBedD variable in Date 1 and DecDcD in Date 2 area. Ensure the unit is in Days and select Truncate to integer and click Next (Figure 63).

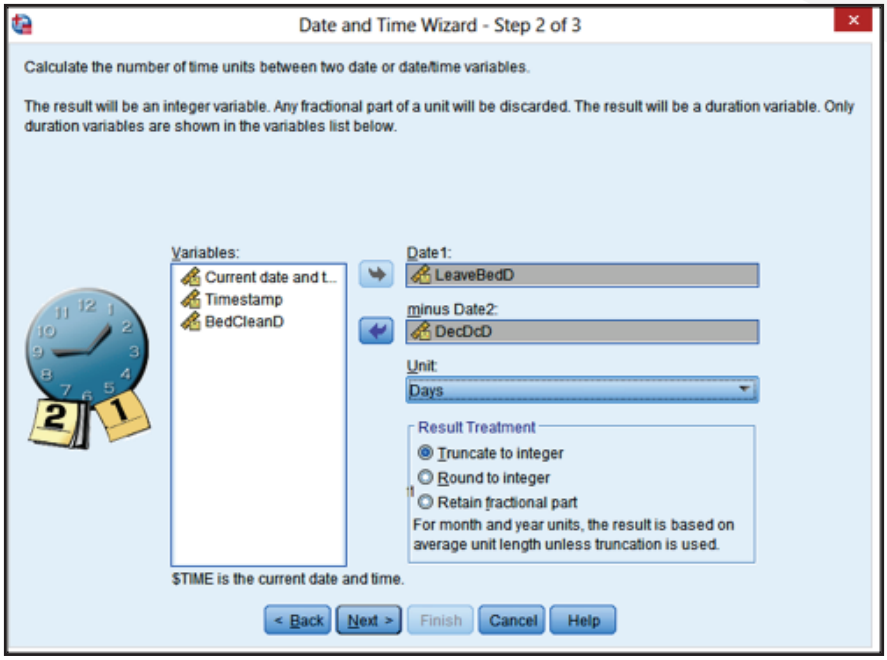


Figure 63: Step 2 of 3 in Date and Time wizard

Rename the result variable with DTDateDiff and variable label with a complete variable name. Finally select the option to paste the syntax into syntax window and click Finish (Figure 64).

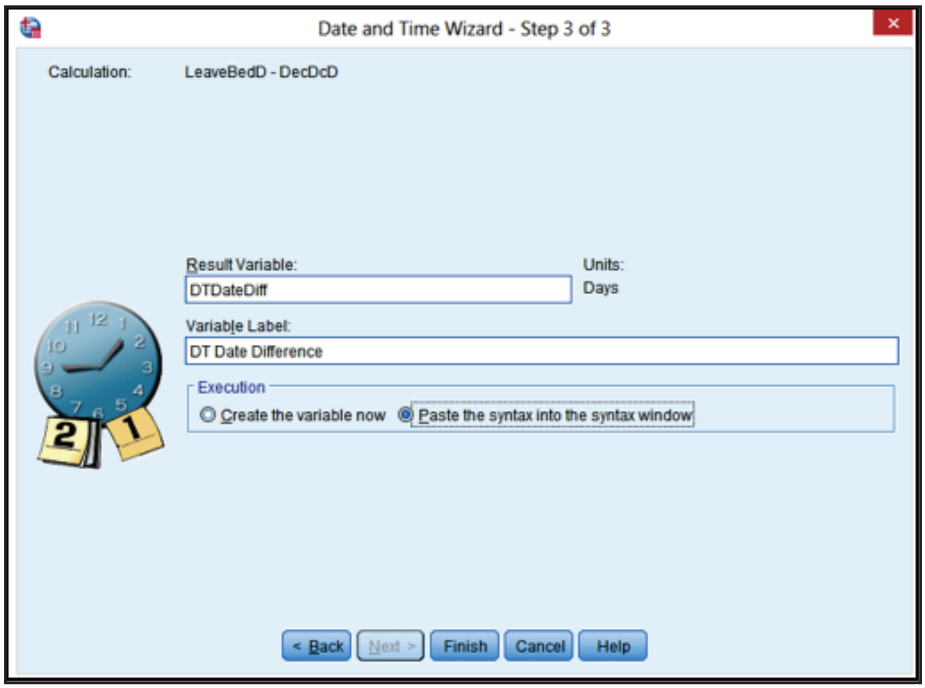


Figure 64: Step 3 of 3 in Date and Time wizard

Syntax window will appear with the new syntax for calculation of date difference in discharge time (Figure 65).

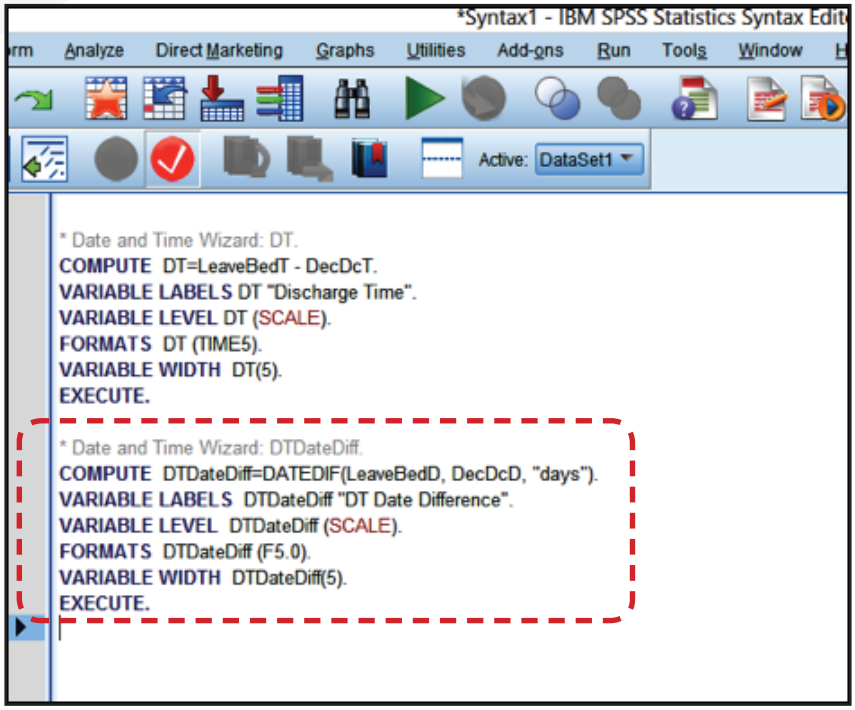


Figure 65: Syntax for DTDateDiff variable

Proceed by highlighting the syntax and click Run to execute the syntax. The result will appear as a new variable in data view.

Next, we will calculate the final value for DT. Open the Syntax window and type the syntax below into the syntax window.

```
* Date and Time Wizard: DTnew
DATASET ACTIVATE DataSet1.
DO IF (DTDateDiff=0).
COMPUTE DTnew=DT.
ELSE IF (DTDateDiff=1 & XDATE.TIME(DT)<=0).
COMPUTE DTnew=DT+oneday*DTDateDiff.
END IF.
MISSING VALUES DTnew (LO THRU 0).
EXECUTE.
VARIABLE LEVEL DTnew (SCALE).
FORMATS DTnew (TIME5).
VARIABLE WIDTH DTnew(5).
EXECUTE.
```

Highlight and click run selection for syntax DTnew. This will create the new variable ATCnew in the data view. This is the final value for DT after calculation. We will use this variable to get the mean/average and throughput value.

Before proceeding to the analysis part, create new variable labelled “oneday” in the data set. Follow the same steps taken in Section 2.3.1.1: Transformation data for Emergency department data.

2.3.2.2 Data analysis

Discharge Time (DT)

We will analyse the data to obtain the average value for Discharge Time (DT). Click Analyze and then choose Descriptive Statistics and click Explore.

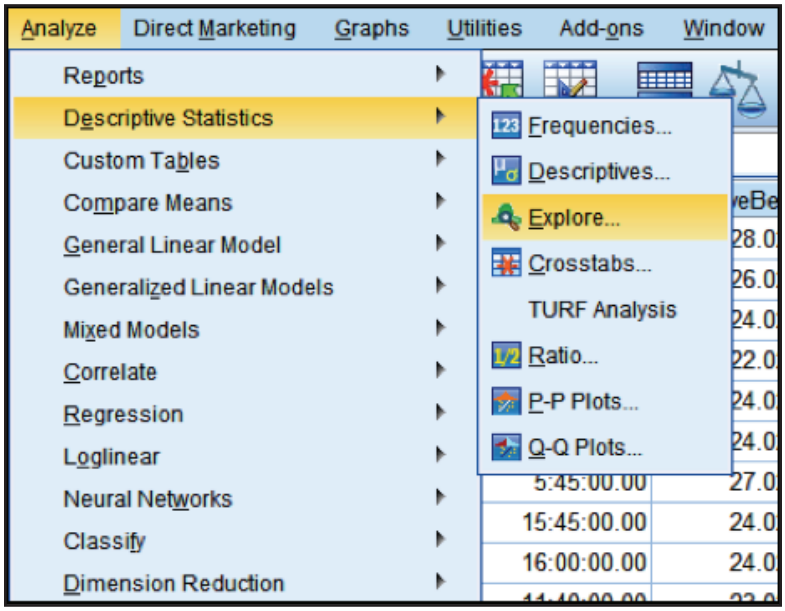


Figure 66: Descriptive analysis for Discharge time

Explore window will show interface as in Figure 67. Click DTnew and insert into dependent list on the right side. In display section, choose Statistics. If you choose Both, the result will show both Statistics and Plot in Output window. Finally, click OK to proceed.

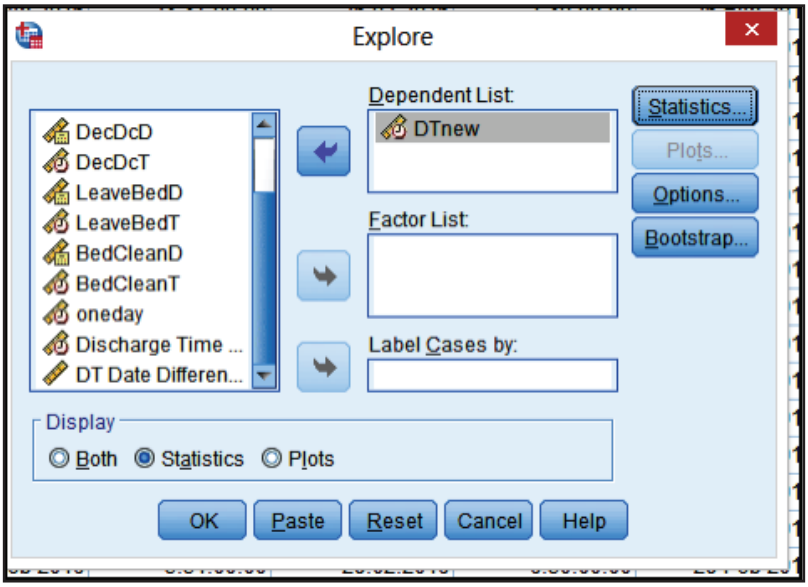


Figure 67: Explore window for analysis

The results will appear in the Output window. The mean value is the average time for DT (Figure 68). In addition, you can also observe the minimum and maximum range for the respective data.

Descriptives

			Statistic	Std. Error
DTnew	Mean		3:34	0:11
	95% Confidence Interval for Mean	Lower Bound	3:11	
		Upper Bound	3:57	
	5% Trimmed Mean		3:23	
	Median		3:00	
	Variance		85812128.57	
	Std. Deviation		2:34	
	Minimum		0:04	
	Maximum		14:15	
	Range		14:10	
	Interquartile Range		3:02	
	Skewness		1.150	.185
	Kurtosis		1.213	.367

Figure 68: Analysis result for Discharge time

The next step is to find throughput value (e.g percentage of patients being discharge within 240 minutes for DT), by using the syntax provided in the syntax file. The syntax is as below:

```
DO IF  (XDATE.TIME(DTnew) <= 4*60*60).
Compute ThroughputDT=1.
ELSE IF (XDATE.TIME(DTnew) > 4*60*60).
Compute ThroughputDT=0.
END IF.
EXECUTE.
```

Copy and paste the syntax in the syntax window. Highlight and click Run to execute. New variable named **Throughput DT** will be created in your data view. The data will be shown as **1.00 = within 240 mins**, and **0.00 = more than 240 minutes**. Proceed with analysis by clicking **Analyze > Descriptive Statistics > Frequencies** (Figure 69).

Frequencies

Statistics

ThroughputDT

N	Valid	173
	Missing	3

ThroughputDT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	56	31.8	32.4	32.4
	1.00	117	66.5	67.6	100.0
	Total	173	98.3	100.0	
Missing	System	3	1.7		
Total		176	100.0		

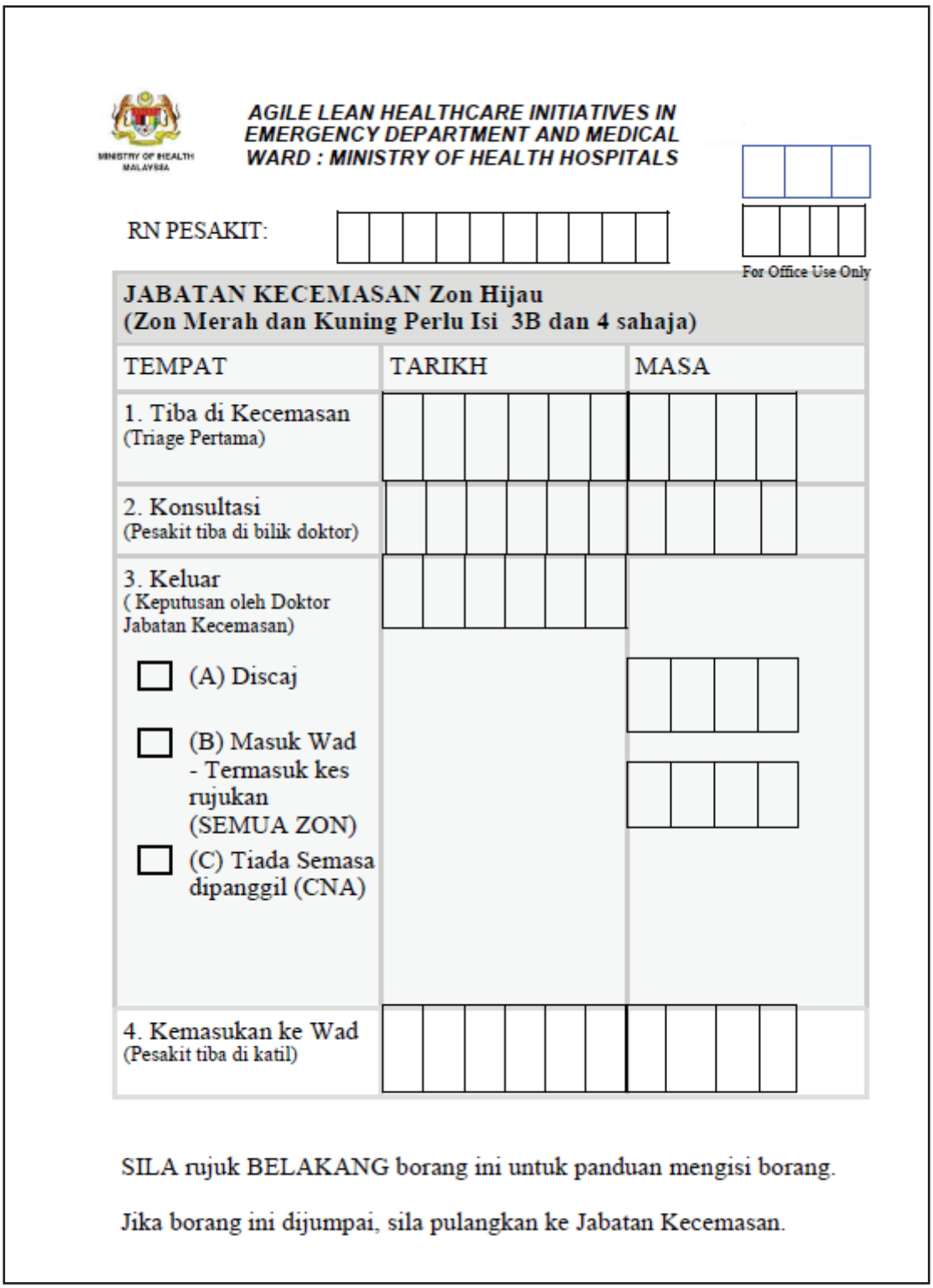
Figure 69: Frequency analysis for Throughput DT

Proceed with the analysis for Bed Turnaround Time (BTT) and Throughput BTT by using the same step as Discharge Time. Kindly refer to Appendix 3 for all syntax.

Appendices

Appendix 1

Emergency deparment



MINISTRY OF HEALTH MALAYSIA

AGILE LEAN HEALTHCARE INITIATIVES IN EMERGENCY DEPARTMENT AND MEDICAL WARD : MINISTRY OF HEALTH HOSPITALS

RN PESAKIT:

For Office Use Only

JABATAN KECEMASAN Zon Hijau
(Zon Merah dan Kuning Perlu Isi 3B dan 4 sahaja)

TEMPAT	TARIKH	MASA
1. Tiba di Kecemasan (Triage Pertama)		
2. Konsultasi (Pesakit tiba di bilik doktor)		
3. Keluar (Keputusan oleh Doktor Jabatan Kecemasan)		
☐ (A) Discaj		
☐ (B) Masuk Wad - Termasuk kes rujukan (SEMUA ZON)		
☐ (C) Tiada Semasa dipanggil (CNA)		
4. Kemasukan ke Wad (Pesakit tiba di katil)		

SILA rujuk BELAKANG borang ini untuk panduan mengisi borang.

Jika borang ini dijumpai, sila pulangkan ke Jabatan Kecemasan.

FRONT

A. Pengenalan

Kementerian Kesihatan Malaysia sedang menjalankan Projek LEAN Agile Healthcare dengan kerjasama PEMANDU, Institut Penyelidikan Sistem Kesihatan dan UniKL. Objektif utama kajian ini adalah untuk meningkatkan kualiti perkhidmatan di hospital.

B. Panduan

1. Borang ini dibahagikan kepada EMPAT stesen untuk pengumpulan data di Jabatan Kecemasan:

	Definisi	**Pegawai yang bertanggungjawab**
a. Tiba di Kecemasan	Pesakit tiba di Jabatan Kecemasan (Triage Pertama)	Paramedik yang berada di triage
b. Konsultasi	Pesakit sampai di Bilik Doktor	Doktor yang merawat pesakit
c. Keluar	Doktor Jabatan Kecemasan membuat keputusan samaada untuk masuk ke wad/ rujukan/discaj	Doktor yang merawat pesakit
d. Kemasukan ke Wad	Pesakit tiba di katil	Jururawat yang bertugas di wad perubatan

2. Sila isikan masa dan tarikh yang TEPAT pada ruangan yang disediakan. Tarikh dalam format ddmmyy, masa dalam format 2400.
3. Jika tarikh adalah sama untuk setiap kotak, hanya kotak pertama perlu diisi.

BACK

Medical Ward

AGILE LEAN HEALTHCARE INITIATIVES IN EMERGENCY DEPARTMENT AND MEDICAL WARD : MINISTRY OF HEALTH HOSPITALS

RN PESAKIT: | | | | | | | | | | |

For Office Use Only

WAD PERUBATAN		
	TARIKH	MASA
1. Doktor membuat keputusan untuk discaj		
2. Pesakit tinggalkan katil (i.e balik rumah/ *discharge lounge)*		
3. Katil Sedia (untuk pesakit lain)		

A. Pengenalan

Kementerian Kesihatan Malaysia sedang menjalankan Projek LEAN Agile Healthcare dengan kerjasama PEMANDU, Institut Penyelidikan Sistem Kesihatan dan UniKL. Objektif utama kajian ini adalah untuk meningkatkan kualiti perkhidmatan di hospital.

B. Panduan

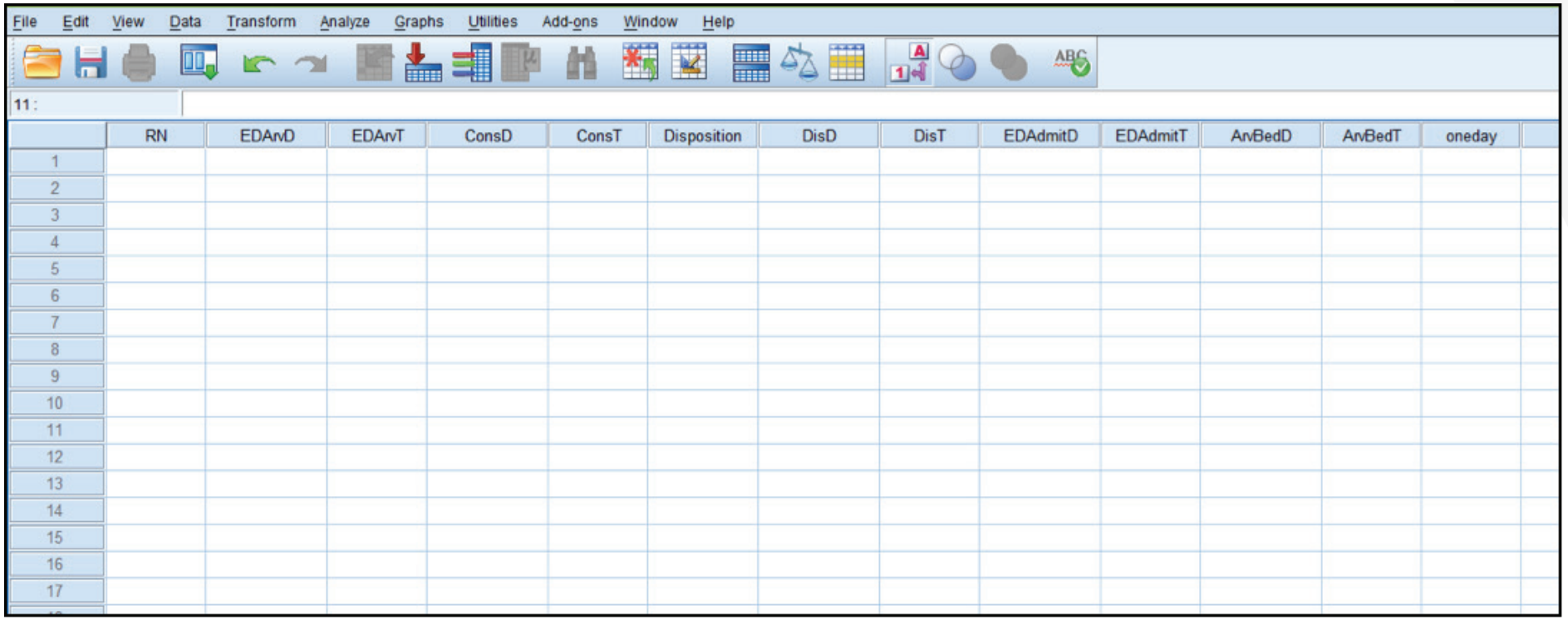
1. Borang ini dibahagikan kepada EMPAT stesen untuk pengumpulan data di Wad Perubatan:

	Definisi	**Pegawai yang bertanggungjawab**
a. Doktor membuat keputusan untuk discaj	Keputusan untuk discaj dibuat oleh Doktor	Doktor/Jururawat yang bertugas
b. Pesakit tinggalkan katil	Masa pesakit tinggalkan katil samaada untuk balik ke rumah/*transfer out* atau *discharge lounge*. Katil sedia untuk dibersihkan.	Jururawat yang bertugas
c. Katil Sedia	Katil telah dibersihkan dan sedia digunakan oleh pesakit yang lain	Jururawat yang bertugas

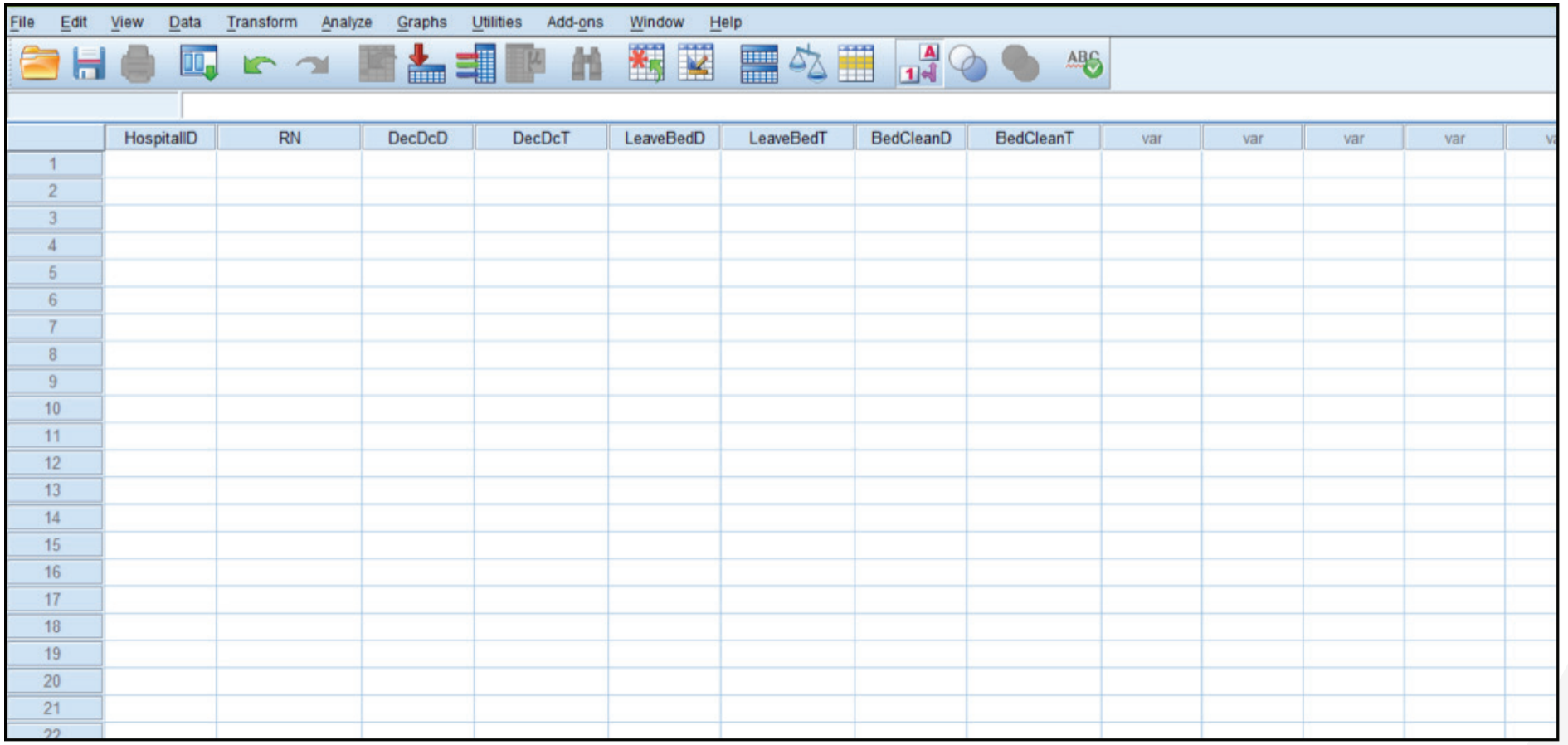
2. Sila isikan masa dan tarikh yang TEPAT pada ruangan yang disediakan.
3. Jika tarikh adalah sama untuk setiap kotak, hanya kotak pertama perlu diisi.

Appendix 2

1. SPSS Data View - Emergency Department



2. SPSS Data View – Medical Ward



Appendix 3

1. Syntax for Emergency department

NO.	SUBJECT	SYNTAX
1.	Creating ATC (Arrival to Consultation)	* Date and Time Wizard: ATC. COMPUTE ATC=ConsT - EDArvT. VARIABLE LABELS ATC. VARIABLE LEVEL ATC (SCALE). FORMATS ATC (TIME5). VARIABLE WIDTH ATC(5). EXECUTE.
2.	Creating ATCdatediff	* Date and Time Wizard: ATCdatediff. COMPUTE ATCdatediff=DATEDIF(ConsD, EDArvD, “days”). VARIABLE LABELS ATCdatediff “ATCdatedif-ference”. VARIABLE LEVEL ATCdatediff (SCALE). FORMATS ATCdatediff (F5.0). VARIABLE WIDTH ATCdatediff(5). EXECUTE.
3.	Creating ATCnew	DO IF (ATCdatediff = 0). Compute ATCnew=ATC. ELSE IF (ATCdatediff = 1). Compute ATCnew=ATC+oneday. END IF. MISSING VALUES ATCnew (LO THRU 0). EXECUTE. VARIABLE LEVEL ATCnew (SCALE). FORMATS ATCnew (TIME5). VARIABLE WIDTH ATCnew(5). EXECUTE.
4.	Creating LOS (Length of Stay)	COMPUTE LOS= DisT - EDArvT. VARIABLE LABELS LOS “Length of stay”. VARIABLE LEVEL LOS (SCALE). FORMATS LOS (TIME5). VARIABLE WIDTH LOS(5). EXECUTE.

5.	Creating LOSdatediff	* Date and Time Wizard: LOSdatediff. COMPUTE LOSdatediff=DATEDIF(DisD, EDArvD, “days”). VARIABLE LABELS LOSdatediff. VARIABLE LEVEL LOSdatediff (SCALE). FORMATS LOSdatediff (F5.0). VARIABLE WIDTH LOSdatediff(5). EXECUTE.
6.	Creating LOSnew	DO IF (LOSdatediff = 0). COMPUTE LOSnew=LOS. ELSE IF (LOSdatediff = 1). COMPUTE LOSnew=LOS+(oneday*LOSdate-diff). END IF. MISSING VALUES LOSnew (LO THRU 0). EXECUTE. VARIABLE LEVEL LOSnew (SCALE). FORMATS LOSnew (TIME5). VARIABLE WIDTH LOSnew(5). EXECUTE.
7.	Creating BWT (Bed Waiting Time)	* Date and Time Wizard: BWT. COMPUTE BWT= ArvBedT - EDAdmitT. VARIABLE LABELS BWT “Bed waiting time”. VARIABLE LEVEL BWT (SCALE). FORMATS BWT (TIME5). VARIABLE WIDTH BWT(5). EXECUTE.
8.	Creating BWTdatediff	* Date and Time Wizard: BWTdatediff. COMPUTE BWTdatediff=DATEDIF(ArvBedD, EDAdmitD, “days”). VARIABLE LABELS BWTdatediff “BWT date difference”. VARIABLE LEVEL BWTdatediff (SCALE). FORMATS BWTdatediff (F5.0). VARIABLE WIDTH BWTdatediff(5). EXECUTE.
9.	Creating BWTnew	DO IF (BWTdatediff = 0). Compute BWTnew=BWT. ELSE IF (BWTdatediff >= 1). COMPUTE BWTnew=BWT+(oneday*BWTda-tediff). FORMATS BWTnew(TIME6). END IF. EXECUTE.

10.	Creating Throughput_ATC	DO IF (XDATE.TIME(ATCnew) <= 1.5*60*60). Compute Throughput_ATC=1. ELSE IF (XDATE.TIME(ATCnew) > 1.5*60*60). Compute Throughput_ATC=0. END IF. EXECUTE.
11.	Creating Throughput_LOS	DO IF (XDATE.TIME(LOSnew) <= 2*60*60). Compute Throughput_LOS=1. ELSE IF (XDATE.TIME(LOSnew) > 2*60*60). Compute Throughput_LOS=0. END IF. EXECUTE.
12.	Creating Throughput BWT	DO IF (XDATE.TIME(BWTnew) <= 2*60*60). Compute Throughput_LOS=1. ELSE IF (XDATE.TIME(BWTnew) > 2*60*60). Compute Throughput_BWT=0. END IF. EXECUTE.
13.	Analyzing ATC	EXAMINE VARIABLES=ATCnew /PLOT NONE /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
14.	Analyzing LOS	EXAMINE VARIABLES=LOSnew /PLOT NONE /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
15.	Analyzing BWT and Dispo-sition	EXAMINE VARIABLES=BWTnew /PLOT NONE /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL. FREQUENCIES VARIABLES=Disposition /ORDER=ANALYSIS.
16.	Analyzing ThroughputATC	FREQUENCIES VARIABLES=Throughput_ATC /ORDER=ANALYSIS.
17.	Analyzing ThroughputLOS	FREQUENCIES VARIABLES=Throughput_LOS /ORDER=ANALYSIS.

2. Syntax for Medical ward

NO.	SUBJECT	SYNTAX
1.	Creating DT (Discharge Time)	* Date and Time Wizard: DT. COMPUTE DT=LeaveBedT - DecDcT. VARIABLE LABELS DT “Discharge Time”. VARIABLE LEVEL DT (SCALE). FORMATS DT (TIME5). VARIABLE WIDTH DT(5). EXECUTE.
2.	Creating DTDateDiff	* Date and Time Wizard DTDateDiff. COMPUTE DTDateDiff=DATEDIF(LeaveBedD, DecDcD, “days”). VARIABLE LABELS DTDateDiff. VARIABLE LEVEL DTDateDiff (SCALE). FORMATS DTDateDiff (F5.0). VARIABLE WIDTH DTDateDiff (5). EXECUTE.
3.	Creating DTnew	* Date and Time Wizard: DTnew DATASET ACTIVATE DataSet1. DO IF (DTDateDiff=0). COMPUTE DTnew=DT. ELSE IF (DTDateDiff=1 & XDATE.TIME(DT)<=0). COMPUTE DTnew=DT+oneday*DTDateDiff. END IF. MISSING VALUES DTnew (LO THRU 0). EXECUTE. VARIABLE LEVEL DTnew (SCALE). FORMATS DTnew (TIME5). VARIABLE WIDTH DTnew(5). EXECUTE.
4.	Creating BTT (Bed Turnaround Time)	* Date and Time Wizard: BTT. COMPUTE BTT= BedCleanT - LeaveBedT. VARIABLE LABELS BTT “Bed turnaround time”. VARIABLE LEVEL BTT (SCALE). FORMATS BTT (TIME5). VARIABLE WIDTH BTT(5). EXECUTE.

5.	Creating BTTDateDiff	* Date and Time Wizard: BTTDateDiff. COMPUTE BTTDateDiff=DATEDIF(BedCleanD, LeaveBedD, “days”). VARIABLE LABELS BTTDateDiff. VARIABLE LEVEL BTTDateDiff (SCALE). FORMATS BTTDateDiff (F5.0). VARIABLE WIDTH BTTDateDiff(5). EXECUTE.
6.	Creating BTTnew	* Date and Time Wizard: BTTnew. DATASET ACTIVATE DataSet1. DO IF (BTTDateDiff = 0). Compute BTTnew=BTT. ELSE IF (BTTDateDiff = 1 & XDATE.TIME(BTT) <= 0). Compute BTTnew=BTT+oneday*BTTDateDiff. END IF. MISSING VALUES BTTnew (LO THRU 0). EXECUTE. VARIABLE LEVEL BTTnew (SCALE). FORMATS BTTnew (TIME5). VARIABLE WIDTH BTTnew(5). EXECUTE.
7.	Creating ThroughputDT	DO IF (XDATE.TIME(DTnew) <= 4*60*60). Compute ThroughputDT=1. ELSE IF (XDATE.TIME(DTnew) > 4*60*60). Compute ThroughputDT=0. END IF. EXECUTE.
8.	Creating ThroughputBTT	DO IF (XDATE.TIME(BTTnew) <= 0.5*60*60). Compute ThroughputBTT=1. ELSE IF (XDATE.TIME(BTTnew) > 0.5*60*60). Compute ThroughputBTT=0. END IF. EXECUTE.
9.	Analyzing DTnew	EXAMINE VARIABLES=DTnew /PLOT NONE /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.

10.	Analyzing BTTnew	EXAMINE VARIABLES=BTTnew /PLOT NONE /STATISTICS DESCRIPTIVES /CINTERVAL 95 11 /MISSING LISTWISE /NOTOTAL.
11.	Analyzing ThroughputDT	DATASET ACTIVATE DataSet1. FREQUENCIES VARIABLES=ThroughputDT /ORDER=ANALYSIS.
12.	Analyzing ThroughputBTT	DATASET ACTIVATE DataSet1. FREQUENCIES VARIABLES=ThroughputBTT /ORDER=ANALYSIS.

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