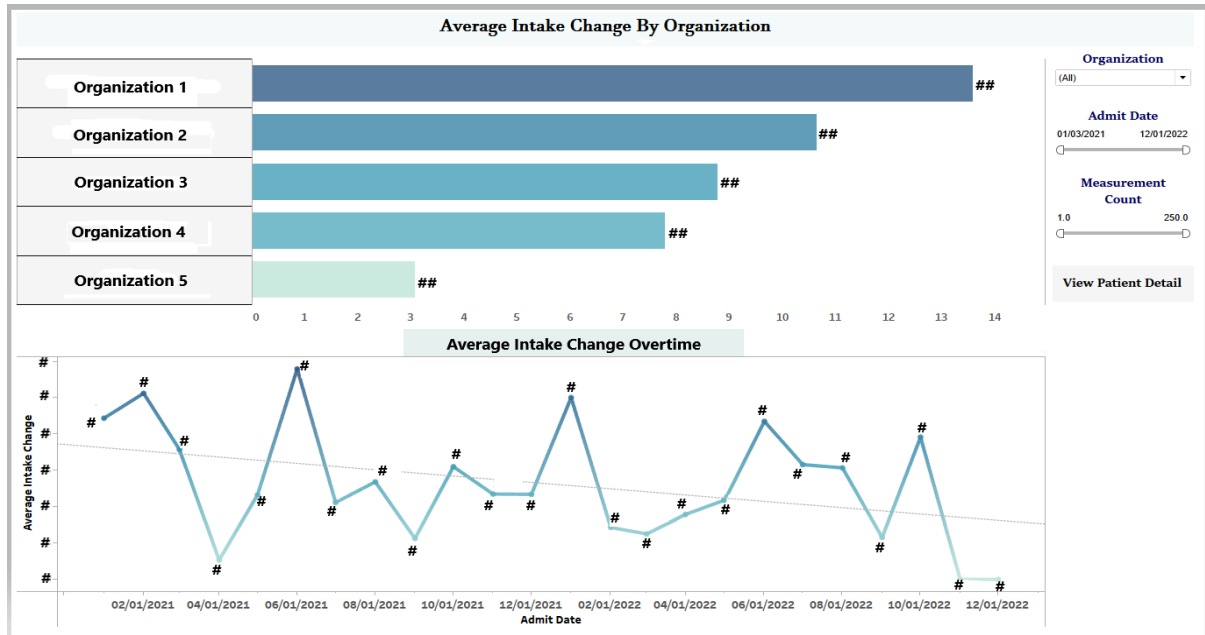


Targeted Measurements Dashboard – Intermountain Health



As an apprentice data analyst at Intermountain, I had the opportunity to work on the development of the Nutrition Measurements Dashboard for Inpatient Rehabilitation Services. This project aimed to track the average weight change and Nutrition Intake Percentage of each patient over time. The dashboard provides an overview of average weight loss and intake by Organization, along with line graphs illustrating changes over time. It also includes patient details for both weight and intake changes, allowing physicians to identify outliers and make informed decisions.

Situation:

The problem addressed by this project was the need for a comprehensive dashboard to monitor and track the average measurement change and intake percentage of patients undergoing the offered operational services. The goal was to provide physicians and operational services staff with actionable insights to make informed decisions about patient care based on the data. My role within the team was that of a technical data analyst apprentice, collaborating with other team members to develop the Targeted Measurements Dashboard.

The Targeted Measurements Dashboard project aligned with the organization's focus on data-driven decision-making and the continuous improvement of patient care. The Targeted Measurements Dashboard positively impacted Intermountain customers, such as the patients receiving the specific services. By tracking important changes and trends over time, physicians and operations staff could identify concerning outliers and provide appropriate interventions. The stakeholders involved in the project included physicians, operations staff, and management teams. The dashboard's insights enabled stakeholders to make data-driven decisions, leading to improved patient outcomes and satisfaction. I was interested in solving this business problem because it presented an opportunity to apply my data analysis skills in a meaningful way. Contributing to the development of a dashboard that could improve patient care outcomes aligned with my passion for leveraging data to drive positive impact in the healthcare field.

Task:

For this project, I utilized SQL for data retrieval and manipulation, and Tableau for data visualization.

To solve the problem, my plan involved:

- Identifying relevant data sources to retrieve the necessary measurements to calculate and document important changes.
- Cleaning and preparing the data for analysis using Oracle SQL, addressing any issues or inconsistencies that arose.

- Implementing calculations accurately both in Oracle SQL and Tableau to ensure the right numbers were displayed on the dashboard.
- Developing a user-friendly and interactive dashboard using Tableau to visualize the data effectively.
- Creating filters and patient details sections to enable individual patient analysis.
- Testing and iterating on the dashboard design to ensure usability and accuracy.

Success in solving the problem would be determined by the successful implementation and usage of the Targeted Measurements Dashboard by the stakeholders.

The data I had access to included important patient information regarding their measurements, the dates associated with the services provided to the patients (date of admission, date of discharge) and the organizations providing the service. This data was obtained from internal systems within the organization.

Action:

I began by collecting the required data and cleaning it to ensure its accuracy and integrity. To determine the datasets needed for the use-case, I referred to the available metadata. Using Oracle SQL, I efficiently retrieved and manipulated the relevant data for analysis. During the analysis process, my initial approach involved calculating the intake changes within the SQL query itself. However, after experimenting with a CASE WHEN statement, I realized that performing these calculations using a calculated field in Tableau would yield better results. Therefore, I decided to transfer the calculations to Tableau for improved accuracy and flexibility in visualizing the data.

Intake changes calculation commented out in Oracle SQL:

```
-- ,ce.event_end_dts,
-- ce.result_val,
-- CASE WHEN ce.result_val = '1-25%' THEN 25
-- WHEN ce.result_val = '26-50%' THEN 50
-- WHEN ce.result_val = '51-75%' THEN 75
-- WHEN ce.result_val = '76-100%' THEN 100
-- WHEN ce.result_val = '90-100% (Disorder eating protocol)' THEN 100
-- WHEN ce.result_val = 'NPO' THEN 0
-- WHEN ce.result_val = 'None' THEN 0
-- END AS Percent_Intake
```

To build the dashboard, I used aggregate functions to retrieve the required data. By utilizing these functions, I was able to filter out the initial intake by using the performed dates as a criterion.

In addition, I utilized multiple JOIN functions to retrieve additional data from other related tables. This allowed me to combine the relevant information and enrich the dataset with the details needed for the dashboard.

SQL calculations and part of the JOINS:

```
, MAX(ce.RESULT_VAL) KEEP (DENSE_RANK FIRST ORDER BY ce.PERFORMED_DTS) AS First_Intake
, MAX(ce.RESULT_VAL) KEEP (DENSE_RANK LAST ORDER BY ce.PERFORMED_DTS) AS Last_Intake
, COUNT (*) AS Measurement_Count
, MIN(ce.PERFORMED_DTS) AS First_Intake_DTS
, MAX(ce.PERFORMED_DTS) AS Last_Intake_DTS
FROM
  cerner_dm.encounter e
  JOIN mstr_person.patient_full pf ON pf.person_mk = e.person_mk
  JOIN mstr_location.location_patient_care lpc ON lpc.location_mk = e.location_mk
  JOIN cerner.clinical_event ce ON e.encntr_id = ce.encntr_id
```

To accurately calculate the intake changes, I used the IF THEN function within Tableau. This function allowed me to transform groups of percentages into numerical values that represented the changes in intake. By utilizing this approach, I ensured precise and meaningful calculations to track and analyse the changes effectively.

FIRST INTAKE %

Nutrition Intake Query

×

```
IF [First Intake] = '1-25%' THEN 25
ELSEIF [First Intake] = '26-50%' THEN 50
ELSEIF [First Intake] = '51-75%' THEN 75
ELSEIF [First Intake] = '76-100%' THEN 100
ELSEIF [First Intake] = '90-100% (Disorder eating protocol)'
ELSEIF [First Intake] = 'None' THEN 0
ELSEIF [First Intake] = 'NPO' THEN 0
END
```

The calculation is valid.

6 Dependencies ▾

Apply

OK

The next step involved creating an additional calculated field to represent the most recent intake, which would be utilized to obtain the intake change values. I followed the same format as the initial calculation to generate this field, ensuring consistency in the calculation process. By following this approach, I calculated the intake changes based on the comparison between the last intake and previous intake values.

LAST INTAKE %

Nutrition Intake Query

×

```
IF [Last Intake] = '1-25%' THEN 25
ELSEIF [Last Intake] = '26-50%' THEN 50
ELSEIF [Last Intake] = '51-75%' THEN 75
ELSEIF [Last Intake] = '76-100%' THEN 100
ELSEIF [Last Intake] = '90-100% (Disorder eating protocol)'
ELSEIF [Last Intake] = 'None' THEN 0
ELSEIF [Last Intake] = 'NPO' THEN 0
END
```

The calculation is valid.

6 Dependencies ▾

Apply

OK

To obtain the intake changes, I generated a final calculated field by subtracting the initial intake value from the most recent intake value. This calculation involved subtracting the first intake change from the last intake change. By performing this subtraction, I derived the overall intake change, providing a comprehensive understanding of the changes that occurred over the given timeframe.

INTAKE CHANGE

Nutrition Intake Query

×

[LAST INTAKE %] - [FIRST INTAKE %]

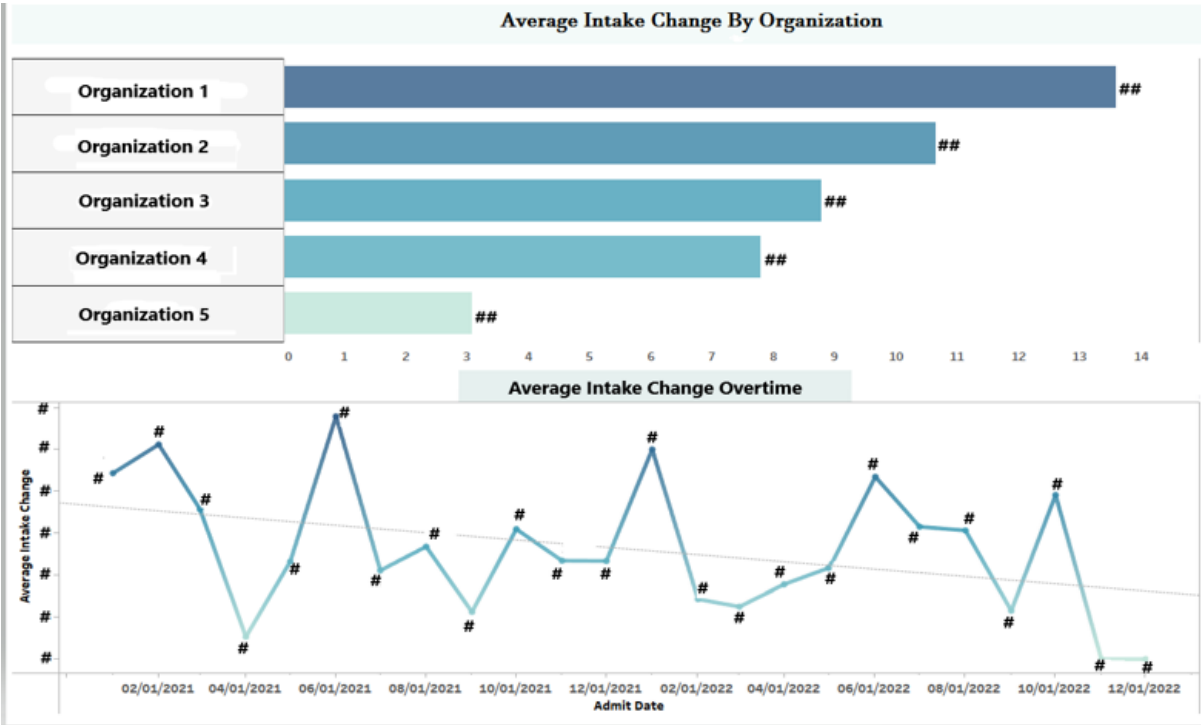
The calculation is valid.

5 Dependencies ▾

Apply

OK

Utilized Tableau's visualizations to create interactive charts and graphs, presenting the average weight change and Intake Percentage over time. I used bar charts and line charts to represent the data in a way that the user can understand easily:



I conducted thorough testing and iterative improvements on the design and functionality of the dashboard to enhance the user experience and ensure accuracy. This involved incorporating multiple filters and maintaining a consistent colour palette throughout the dashboard.

Furthermore, to provide a more in-depth exploration of the data and identify outliers, I included a dedicated "Patient Details" dashboard. To facilitate the identification of abnormal intake changes, I introduced an outlier status field and filter. This was achieved by creating another calculated field that allowed users to easily identify patients whose intake changes deviated from what is considered normal. By incorporating these features, the dashboard provided a comprehensive analysis and empowered users to gain deeper insights into the data.

```
' ABS (WEIGHT_CHANGE) > 20 THEN 'OUTLIER' ELSE 'NORMAL' END
```

Patient Detail - Weight Changes									
Fin Number	Patient	Admit Date	Discharge Date	Organization	Outlier Status	Measurement Count	First Weight	Last Weight	Weight Change
		7/13/2021	07/26/2021		OUTLI..	5.0	187.7	80.0	-107.70
		1/21/2022	02/04/2022		OUTLI..	3.0	194.0	87.2	-106.80
		9/17/2022	09/30/2022		OUTLI..	18.0	170.0	66.0	-104.00
		2/26/2021	03/19/2021		OUTLI..	13.0	217.7	114.1	-103.60
		10/1/2021	11/12/2021		OUTLI..	23.0	177.9	77.7	-100.20

Fin Number

Patient

Discharge Date
01/09/2021 12/01/2022

Organization
(All)

Outlier Status
(All)

Return to Dashboa...

Result:

The analysis conducted through the Targeted Measurements Dashboard provided valuable insights into the operation services at Intermountain. The findings revealed trends and patterns in patient average measurement changes in relation to intake changes percentages over time. This information allowed healthcare professionals to identify outliers and make informed decisions based on individual patient details. The Targeted Measurements Dashboard was successfully integrated into the regular workflow of physicians and operation Services staff. It served as a central hub for tracking and monitoring patient data, enabling personalized and targeted care. The project effectively addressed the problem and empowered stakeholders to make data-driven decisions, positively impacting patient care outcomes. Next steps include continuous monitoring and evaluation of the dashboard's effectiveness, gathering user feedback for improvements, and expanding its functionality. Overall, the Targeted Measurements Dashboard project successfully provided insights for operation services, supporting data-driven decision-making, and improving patient care.