

ПРИВАТНИЙ ВИЩИЙ НАВЧАЛЬНИЙ ЗАКЛАД
«ХАРКІВСЬКИЙ МІЖНАРОДНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ»
Кафедра фундаментальних загальнонаукових дисциплін

МЕТОДИЧНІ МАТЕРІАЛИ ДО ПРАКТИЧНИХ ЗАНЯТЬ
освітньої компоненти

**INFORMATION TECHNOLOGY
IN HEALTHCARE MANAGEMENT**
(«Інформаційні технології в управлінні охороною здоров'я»
для студентів з англійською мовою навчання)

(назва освітньої компоненти)

підготовки другого (магістерського) рівня вищої освіти
галузь знань 22 ОХОРОНА ЗДОРОВ'Я
спеціальність 222 МЕДИЦИНА
освітньо-професійної програми МЕДИЦИНА

Курс _____ 1 (2) _____ Семестр _____ 2 (3) _____

Методичні матеріали до практичних занять розглянуто та затверджено на засіданні кафедри
фундаментальних загальнонаукових дисциплін
Протокол від «23» вересня 2022 року № 2

Зав. кафедри _____ Тетяна КУДРЯВЦЕВА
(підпис)

Затверджено на засіданні навчально-методичної комісії
Протокол від «28» лютого 2023 року № 2 (наказ № 23 від 28.02.2023)

Голова _____ Жанна ДАВИДОВА
(підпис)

РОЗРОБНИК : НЕССОНОВА Марина, доцент кафедри, к.т.н., доцент

(вказати ПРИЗВИЩЕ, ім'я авторів, їхні посади, наукові ступені та вчені звання)

Методичні матеріали для практичних занять з вибіркової освітньої компоненти «Інформаційні технології в управлінні охороною здоров'я» для студентів 1—2 курсів спеціальності 222 Медицина другого (магістерського) рівня вищої освіти з англійською мовою навчання містять методичні рекомендації до проведення практичних занять з усіх тем навчальної дисципліни. Кожна методична розробка містить такі складові: актуальність теми, мета і програмні результати навчання, що досягаються при опануванні теми, глосарій, перелік питань для розгляду, рекомендовані ресурси для підготовки, обладнання, хід роботи, завдання для практичної частини (для виконання на занятті), посилання на завдання для самостійної позааудиторної роботи.

Методичні розробки призначено для використання під час практичних занять викладачами, що проводять заняття за зазначеними темами як в оффлайн, так і в онлайн форматах. Зручність їх використання у навчальному процесі обумовлена наявністю необхідних посилань на літературні та інтернет-джерела, чіткістю структурування кожного практичного заняття, наявністю прикладів завдань для тренінгу застосування теоретичних знань на практиці.

МЕТОДИЧНА КАРТКА ПРАКТИЧНИХ ЗАНЯТЬ №№ 1—2

Тема: Spreadsheets software tools for sorting and filtering medical data records. Visualization of data and data slices

Актуальність теми:

The use of spreadsheets software tools for sorting and filtering medical data records is becoming increasingly important for medical professionals. Here are some reasons why:

- **Efficient data management:** The ability to organize large amounts of data in spreadsheets enables medical professionals to quickly and easily sort and filter records, making it much easier to find specific information, such as patient histories, test results, or medication lists. This can significantly improve their workflow and save them valuable time.
- **Improved data accuracy:** Spreadsheets software tools have built-in features that can help identify and correct errors in data, such as data validation and formula auditing. This can help ensure that the data being used is accurate and reliable.
- **Data visualization:** Spreadsheets software tools can create charts, graphs, and other visual representations of data. This can help medical professionals identify patterns and trends in the data, which can be useful for diagnosis, treatment planning, and research.
- **Collaborative tools:** Spreadsheets software tools can be used to share data and collaborate with other medical professionals. This can be especially useful in interdisciplinary teams, where multiple professionals may be working on the same patient.
- **Regulatory compliance:** Spreadsheets software tools can help medical professionals comply with regulatory requirements, such as HIPAA, by providing a secure platform for storing and sharing patient data.

In summary, knowledge of spreadsheets software tools is essential for medical professionals to efficiently manage, analyze, and communicate medical data records. It can help improve patient care, save time, and ensure compliance with regulatory requirements.

Цілі заняття: (сформовані загальні (ЗК) та спеціальні (фахові) (ФК) компетентності)

General:

- GC 10 – the ability to apply information and communicative technologies;
- GC 11 – the ability to search, process and analyze the information from different sources;
- GC 3 – the ability to apply knowledge in practical situations;
- GC 2 – the ability to learn and acquire actual knowledge;
- GC 4 – knowledge and understanding of the subject area and understanding of professional activity;
- GC 6 – the ability to make an informed decision;
- GC 1 – the ability to abstract thinking, analysis and synthesis;

Professional:

- PC 20 – the ability to conduct analysis of the activity of a doctor, healthcare institution or its department, conducting measures to ensure the quality and safety of medical care and improving the efficiency of the use of medical resources;
- PC 22 – the ability to conduct epidemiological and medical statistical researches, to process governmental, social, economic and medical information in healthcare;
- PC 1 – the ability to collect the information about a patient and to analyze clinical data;
- PC 25 – the ability to develop and implement scientific and applied projects in the field of healthcare;
- PC 27 – the ability to observe professional and academic integrity, to be responsible for the reliability of the obtained scientific results.

Практичні результати навчання (ПРН):

- to form fundamental professionally-oriented knowledge, skills, abilities, competencies necessary to perform typical professional tasks related to activities in the healthcare field, including special conceptual knowledge on medical information technology that provides the basis for medical data analysis in future researches, and forms critical thinking (PLO 2, PLO 3);
- to ensure the ability to apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex healthcare problems (PLO 29);
- to train the ability to search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information (PLO 28).

Обладнання та оснащення: персональний комп'ютер чи ноутбук, табличний процесор (MS Excel, Libre (Open) Office Calc, Google Sheets або інш.).

Глосарій теми: sorting order, custom sorting list, the key of sorting, multi-key sorting, filtering, autofilter, standard filter, advanced filter, filter criteria.

Зміст теми:

Питання, які розглядаються на занятті:

1. Spreadsheets tools for sorting. Sorting by values using one or several keys.
2. Custom sorting lists.
3. Sorting by cell format.
4. Spreadsheets tools for filtering data tables.
5. Features and limitation of AutoFilter
6. Features and limitation of Standard Filter
7. Advanced filter. General rules to specify criteria for advanced filters.
8. Data slices. Similarity and difference between slices and filters.

Список рекомендованих джерел інформації:

1. Слайди лекції, конспект лекції з теми.
2. Hoyt R.E. Health informatics: practical guide / Robert E. Hoyt, William R. Hersh. – 7th ed. – [S. l.] : Lulu.com, Informatics Education, 2018. – 475 p.
3. Essentials of Clinical Informatics / ed. by M.E. Frisse, K.E. Misulis. – [S. l.] : Oxford University Press, 2019. – 366 p.
4. Medical informatics: textbook for students of higher medical education establishments / I. Ye. Bulakh [et al.]. – 4th ed., rev.– Kyiv : Medicine, 2018. – 368 p.
5. Medical Informatics / S.J Singer [et al.]. – New York : Springer Science + Business Media, 2001. – 780 p.
6. Musen M.A. Handbook of Medical Informatics / ed. by M.A. Musen, J. van Bommel. – [S. l.] : Springer, 2002. – 628 p.

Хід заняття:

1. Контроль вхідного рівня знань з теми.

Запитання (повторення матеріалу, викладеного на лекції з теми):

1. What is sorting?
2. Which tools for sorting does common spreadsheet software have?
3. What is the sorting key?
4. What does it mean to sort data by one key? by several keys?
5. Describe some situations when it is important to use custom sorting lists.
6. How to sort medical records by cell format? When we need this?
7. What is filtering?

8. Which tools for filtering medical records does common spreadsheet software have?
9. What is the common technique of applying AutoFilter? Standard Filter?
10. Describe some situations when the functionality of autofilers and standard filters is not enough to select needed medical records.
11. What is the common technique of applying Advanced filter?
12. What are the general rules of specifying criteria for advanced filter?
13. How to use several criteria joined by logical AND operator in advanced filter criteria?
14. How to use several criteria joined by logical OR operator in advanced filter criteria?
15. What is data slice? Describe its similarity to and difference from filters.

2. Практична частина

Практичні завдання для послідовного виконання (практичний тренінг):

Lesson #1 (Sorting of medical data)

Task 0.

- Open 'logical-functions' spreadsheet (either 'simple-calculations' spreadsheet, or 'trauma' spreadsheet) you worked with at the previous in-class practical lessons and save it as 'sorting&filtering.xlsx' to your work folder.

Task 1.

- Sort patients by their last names alphabetically.

Hint: Place cursor in the "Patients Last Names" column, and use quick sort buttons on the Standard toolbar or **Data / Sort** command :

The screenshot shows the Microsoft Excel interface. The 'Data' menu is open, and the 'Sort...' option is selected. A red arrow points from the 'Sort...' button in the menu to the 'Sort Key 1' dropdown in the 'Sort' dialog box, which is set to 'Patient Last Name'. Another red arrow points from the 'Sort...' button in the menu to the quick sort buttons (A-Z and Z-A) on the Standard toolbar. The spreadsheet data is as follows:

	A	B	C		G	H	I	J
	Patient Code	Patient Last Name	age (years)		leukocytes (10 ⁹ /l)	leukocytes	stab neutrophils (%)	segmented neutrophils (%)
1								
2	3744	Miner	32		17.5	out of norm	30	51
3	5837	Petrenko	26					
4	7023	Chipman	32					
5	7975	Vasylieff	24					
6	781	Petrov	43					
7	4005	Vasemann	37					
8	1394	Jobbs	22					
9	2706	Squintman	42					
10	9120	Turner	34					
11	8326	Chatterman	44					
12	5303	Nickson	35					
13	9519	Cyreeff	32					
14	5135	Doronin	28					
15	3944	Simonson	51					
16	6040	Ivanov	54					
17	3397	Sandyman	46					

Answer the questions:

how many patients has last names that begins with C ?

how many women among them? _____

Task 2.

Make a copy of 'full_data' sheet and rename it to 'by-shock'.

In the 'by-shock' sheet sort patients by their shock index descending.

Answer the questions:

who has the highest value of the shock index? _____

how old is she/he? _____

what is his/her blood pressure? _____

Task 3.

Make a copy of 'full_data' sheet and rename it to 'by-age'.

In the 'by-age' sheet sort patients from the youngest to the oldest.

Answer the questions:

who is the oldest patient? _____

how much her/his treatment costs? _____

who is the youngest patient? _____

if his/her stub neutrophils decreased? _____

Task 4.

Make a copy of 'full_data' sheet and rename it to 'outcome-age'.

In the 'outcome-age' sheet sort patients by clinical outcome alphabetically so that patients with the same outcome are sorted by their age – from oldest to youngest.

Hint:

Use **Data / Sort** command with two levels of sorting (two keys):

Sort

Sort Criteria Options

Sort Key 1
clinically outcome [v] Ascending Descending

Sort Key 2
age (years) [v] Ascending Descending

Sort Key 3
- undefined - [v] Ascending Descending

Help Reset OK Cancel

- Answer the questions:
 who is the oldest patient among those who have complications?

 who is the youngest among the patients with the most unsuccessful clinical outcome?

Task 5.

- Make a copy of 'full_data' sheet and rename it to 'gender-bilirubin'.
- In the 'gender-bilirubin' sheet sort patients by gender (males at the top of the list, women – at the end) so that patients of the same gender are sorted ascending by total bilirubin.
- Answer the questions:
 code and the last name of that woman who has the highest value of total bilirubin?

 code and the last name of that man who has the lowest value of total bilirubin?

Task 6.

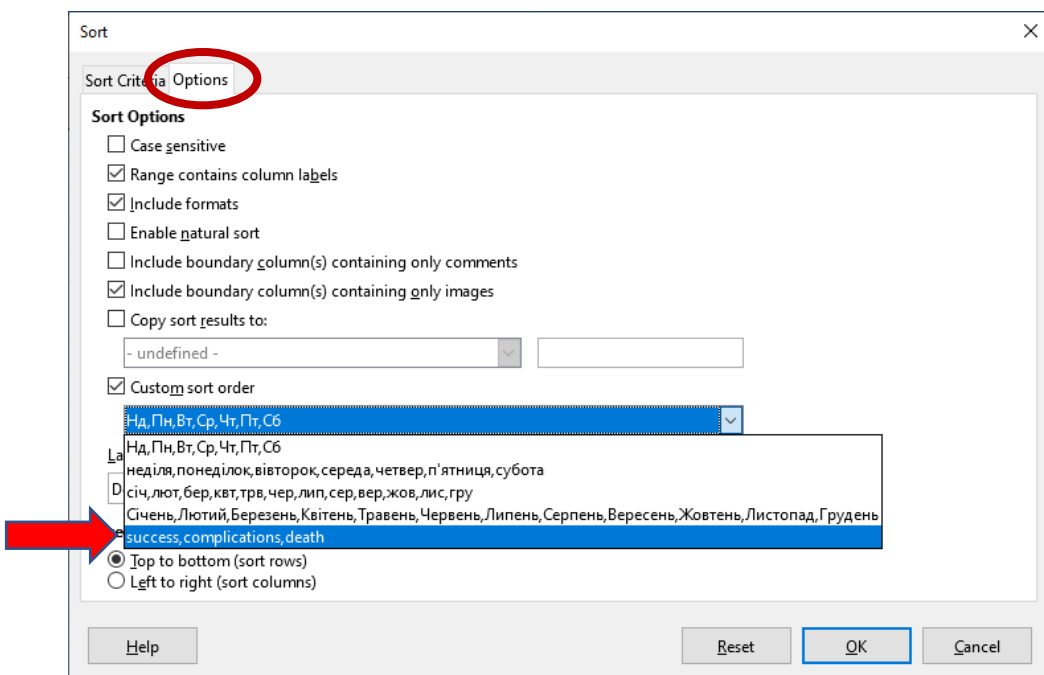
- Make a copy of 'full_data' sheet and rename it to 'age_group-leukocytes'.
- In the 'age_group-leukocytes' sheet sort patients by age group in opposite alphabetical order so that patients of the same age group are sorted descending by leukocytes.
- Answer the questions:
 who of the adults has the highest level of leukocytes in blood?

 who of the seniors has the lowest level of leukocytes in blood?

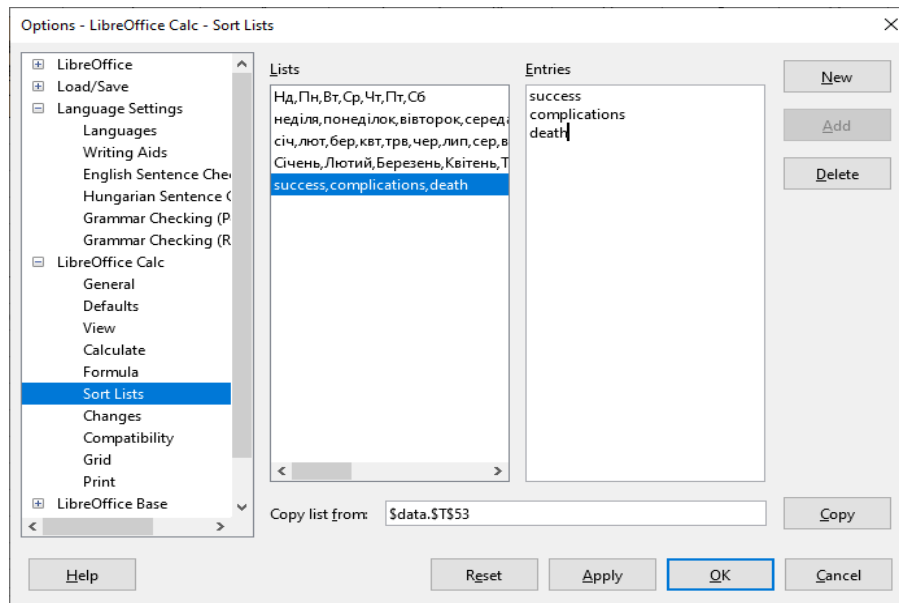
Task 7.

- Make a copy of 'full_data' sheet and rename it to 'success-compl-death'.
- In the 'success-compl-death' sheet sort patients by clinical outcome so that successful results are at the top of the list, then – patients with complications, and deaths – at the end of the list

Hint: Use **Data / Sort** command with custom order of sorting:



To create custom sort list go to **Tools / Options** menu:



Task 8.

- Make a copy of 'full_data' sheet and rename it to 'Hb'.
- In the 'Hb' sheet sort patients by their level of hemoglobin so that: patients with normal values – at the top of the list, then – patients with increased values, and at the end of the list – patients with decreased values of hemoglobin.
- Answer the questions:
 - who has the highest normal level of hemoglobin? _____
 - who has the lowest normal level of hemoglobin? _____

Task 9.

- Make a copy of 'full_data' sheet and rename it to 'gender-outcome-protein'.
- In the 'gender-outcome-protein' sheet sort patients by gender (females at the top of the list, men – at the end) so that patients of the same gender are sorted alphabetically by clinical outcome, and then (in a case of the same gender and clinical outcome) by total protein descending.
- Answer the questions:
 - how many women have complications? _____
 - who of the men with the successful result of treatment has the lowest level of protein in blood? _____

Task 10.

- Make a copy of 'full_data' sheet and rename it to 'age-segm-neutrophils'.
- In the 'age-segm-neutrophils' sheet sort patients by their age groups so that adults at the top of the list, seniors – after them, and juniors –at the end of the list; and the patients of each age group should be sorted ascending by their segmented neutrophils level in blood.

□ Answer the questions:

who of the juniors has the lowest level of segmented neutrophils in blood?

who of the seniors has the highest level of segmented neutrophils in blood?

Lesson #2 (Using filters for medical data processing)

Task 0.

□ Open 'sorting&filtering.xlsx' spreadsheet (or 'trauma' spreadsheet) you worked with at the previous in-class practical lessons and save it as 'filters.xlsx' to your work folder.

Task 1.

□ Back to 'full_data' sheet.

□ Use autofilter (or standard filter) to **select women with successful clinical outcome.**

Hint:

If you want to use Autofilter use the button on the Standard toolbar or **Data / AutoFilter** command.

Then use dropdowns at the columns headers to select patients with needed sex and outcome:

The screenshot shows the LibreOffice Calc interface with the 'Data' menu open and 'AutoFilter' selected. A red circle highlights the AutoFilter icon on the standard toolbar. Below, a detailed view of the 'gender' column dropdown filter is shown, with a red circle around the dropdown arrow and a red arrow pointing to the 'female' option, which is selected.

Patient Code	age (years)	age group	gender	hemoglobin (g/l)	leukocytes (10 ⁻⁹ g/l)
6085	34	adult	male	9	1.8
4497	34	adult	male	14	7.6
3611	57	adult	male	24	2.6
8124	34	adult	female	20	15
2453	39	adult	male	17	0.4
2890	44	adult	male	9	1.6
7445	34	adult	male	13	26
5748	21	junior	male		
6048	28	adult	male		
6045	57	adult	female		
1626	56	adult	female		
1125	17	junior	female		
7128	29	adult	female		
460	47	adult	female		
9285	56	adult	female		
2418	33	adult	male		
9047	25	adult	male		

If you want to use Standard filter go to menu **Data / More Filters / Standard Filter...** command and set conditions:

Operator	Field name	Condition	Value
	gender	=	female
AND	clinical out	=	success
	- none -	=	
	- none -	=	

- The result of filter copy to a new sheet; rename this sheet to ‘*success-women*’.

Task 2.

- Back to ‘*full_data*’ sheet.
- Use standard filter to **select patients with grade II blood loss**
(i.e. those with shock index values in the 0.9÷1.2 range).
- The result of filter copy to a new sheet; rename this sheet to ‘*II_blood_loss*’.

Task 3.

- Back to ‘*full_data*’ sheet.
- Use standard filter to **select patients with total bilirubin out of norm.**
- The result of filter copy to a new sheet; rename this sheet to ‘*blrbn_not_norm*’.

Task 4.

- Back to ‘*full_data*’ sheet.
- Use standard filter to **select adult patients with diastolic blood pressure not higher than 50 mmHg.**
- The result of filter copy to a new sheet; rename this sheet to ‘*adults*’.

Task 5.

- Back to ‘*full_data*’ sheet.
- Use standard filter to **select patients whose names end with ‘son’.**
- The result of filter copy to a new sheet; rename this sheet to ‘*sons*’.

Task 6.

- Back to ‘*full_data*’ sheet.
- Use standard filter to **select patients whose names begin with ‘A’ or ‘W’ letters.**
- The result of filter copy to a new sheet; rename this sheet to ‘*A&W*’.

Task 7.

- Back to ‘*full_data*’ sheet.
- Use standard filter to **select patients with unsuccessful outcomes whose treatment cost comes up to 300 EUR or more.**
- The result of filter copy to a new sheet; rename this sheet to ‘*expensive_UNsuccesses*’.

Task 8.

- Back to 'full_data' sheet.
- Use standard filter to **select patients with normal stab neutrophils but abnormal total bilirubin.**
- The result of filter copy to a new sheet; rename this sheet to 'stab-norm_bil_abnorm'.

Task 9.

- Back to 'full_data' sheet.
- Use standard filter to **select patients whose names has 'y' letter.**
- The result of filter copy to a new sheet; rename this sheet to 'Y'.

Task 10.

- Back to 'full_data' sheet.
- Use standard filter to **select those patients in whose names the second letter is 'e'.**
- The result of filter copy to a new sheet; rename this sheet to 'E'.

Task 11.

- Add a new sheet to your workbook, rename this sheet to 'hemoglobin-ok'.
- In this sheet write down the criteria for **advanced filter** to **select patients with normal hemoglobin values.**

Note: When creating conditions for advanced filter, put conditions that are joined by **AND** logical operator to **the same row.**

For example, this will select patients of junior age with normal values of stab neutrophils:

age group	stab neutrophils (%)	stab neutrophils (%)
junior	<=0.05	>=0.01

When creating conditions for advanced filter, put conditions that are joined by **OR** logical operator to **the separate rows.**

For example, this will select patients with leukocytes out of norm:

leukocytes (10 ⁻⁹ g/l)
<4
>9

Combine conditions joined by OR and AND logical operators to fulfill complicated searches.

For example, this will select patients with normal values of hemoglobin:

gender	hemoglobin (g/l)	hemoglobin (g/l)
male	>=130	<=160
female	>=120	<=140

- Back to 'full_data' sheet.
- Apply **advanced filter** to **select patients with normal hemoglobin.**
- The result of filter copy to the 'hemoglobin-ok' sheet and paste below the table with filter criteria.

Task 12.

- Add a new sheet to your workbook, rename this sheet to ‘*selection-12*’.
- In this sheet write down the criteria for **advanced filter** to *select seniors with normal leukocytes and adults with abnormal segmented neutrophils*.
- Back to ‘*full_data*’ sheet.
- Apply **advanced filter** to *select seniors with normal leukocytes and adults with abnormal segmented neutrophils*.
- The result of filter copy to the ‘*selection-12*’ sheet and paste below the table with filter criteria.

Task 13.

- Add a new sheet to your workbook, rename this sheet to ‘*normal-heart-rate*’.
- In this sheet write down the criteria for **advanced filter** to *select patients with normal heart rate values*.
- Back to ‘*full_data*’ sheet.
- Apply **advanced filter** to *select patients with normal heart rate*.
- The result of filter copy to the ‘*normal-heart-rate*’ sheet and paste below the table with filter criteria.

Task 14.

- Fulfill tasks 1—10 using **advanced filter**.
- The conditions for advanced filters and their results place in the sheets with the results of standard filters below the existing tables.
- Compare results of standard and advanced filtering (**!! They must coincide !!**).

3. *Заклучна частина*

3.1. Контроль виконаних завдань

3.2. Підведення підсумків (узагальнюємо типові завдання з обробки медичних даних, для розв’язку яких доречним є застосування засобів сортування медичних записів, засобів фільтрації)

3.3. Домашнє завдання для самостійної роботи (наголошуємо на правилах виконання і термінах здачі домашніх робіт).

3.3.1. Практичні завдання (завершуємо виконання практичних завдань, які не було розв’язано на аудиторному занятті)

3.3.2. Тестові завдання за розділом (посилання на проходження тестування: <https://onlinetestpad.com/4fvg6gz3jhluc>)

МЕТОДИЧНА КАРТКА ПРАКТИЧНИХ ЗАНЯТЬ №№ 3—4

Тема: Conditional subtotals functions in spreadsheets. Database functions for medical data analytics

Актуальність теми:

The ability to apply conditional subtotals functions and database functions of spreadsheets is important for medical professionals for several reasons:

- **Data analysis:** Conditional subtotals and database functions allow medical professionals to easily analyze and summarize large amounts of data. This can help them identify trends, patterns, and anomalies in patient data, which can be used for diagnosis, treatment planning, and research.
- **Efficient data management:** Conditional subtotals and database functions can help medical professionals quickly and easily organize and manage patient data. This can save them valuable time and improve their workflow.
- **Customized data views:** By using conditional subtotals and database functions, medical professionals can create customized views of patient data based on specific criteria. This can help them identify patients with certain conditions or treatments, for example, and create targeted treatment plans.
- **Collaborative tools:** Conditional subtotals and database functions can be used to share data and collaborate with other medical professionals. This can be especially useful in interdisciplinary teams, where multiple professionals may be working on the same patient.
- **Accuracy and compliance:** By using conditional subtotals and database functions, medical professionals can ensure that patient data is accurate and comply with regulatory requirements, such as HIPAA, by providing a secure platform for storing and sharing patient data.

In summary, knowledge of conditional subtotals and database functions is essential for medical professionals to efficiently manage, analyze, and communicate medical data records. It can help improve patient care, save time, and ensure compliance with regulatory requirements.

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- to ensure the ability to apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex healthcare problems (PLO 29);
- to train the ability to search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information (PLO 28).

Обладнання та оснащення: персональний комп'ютер чи ноутбук, табличний процесор (MS Excel, Libre (Open) Office Calc, Google Sheets або інш.).

Глосарій теми: subtotals, conditional subtotals, spreadsheets built-in functions: COUNTIF(S), SUMIF(S), AVERAGEIF(S), MAXIFS, MINIFS, database functions: DCOUNT(A), DSUM, DAVERAGE, DMIN, DMAX, DGET.

Зміст теми:

Питання, які розглядаються на занятті:

1. Conditional subtotals built-in spreadsheets functions.
2. Built-in spreadsheets functions to work with sheet as with database.

Список рекомендованих джерел інформації:

1. Слайди лекції, конспект лекції з теми.
2. Hoyt R.E. Health informatics: practical guide / Robert E. Hoyt, William R. Hersh. – 7th ed. – [S. l.] : Lulu.com, Informatics Education, 2018. – 475 p.
3. Essentials of Clinical Informatics / ed. by M.E. Frisse, K.E. Misulis. – [S. l.] : Oxford University Press, 2019. – 366 p.
4. Medical informatics: textbook for students of higher medical education establishments / I. Ye. Bulakh [et al.]. – 4th ed., rev.– Kyiv : Medicine, 2018. – 368 p.
5. Medical Informatics / S.J Singer [et al.]. – New York : Springer Science + Business Media, 2001. – 780 p.
6. Musen M.A. Handbook of Medical Informatics / ed. by M.A. Musen, J. van Bommel. – [S. l.] : Springer, 2002. – 628 p.

Хід заняття:

1. Контроль вхідного рівня знань з теми.

Запитання (повторення матеріалу, викладеного на лекції з теми):

1. Which of the spreadsheet functions are used to answer the questions like “How many...?”
2. Which of the spreadsheet functions are used to find total value of some numerical index for the whole data table?
3. Which of the spreadsheet functions are used to find total value of some numerical index for the subset of a data table specified by certain criteria?
4. Which of the spreadsheet functions are used to find average value of some numerical index for the whole data table? for the subset of a data table specified by certain criteria?
5. Which of the spreadsheet functions are used to find the highest / the lowest value of some numerical index for the whole data table? for the subset of a data table specified by certain criteria?
6. Which of the spreadsheet functions are used to get the value from the database by certain criteria?

2. Практична частина

Практичні завдання для послідовного виконання (практичний тренінг):

Lesson #3

Task 0.

- Open 'med-network-report-example.xlsx' spreadsheet and save it to your work folder.
- Calculate the income obtained from each of the procedures in the corresponding column using formula expression.

Note: In the further tasks make your calculations in empty cells aside the data table or in a separate sheet(s). For each result of calculations give a comment with the explanation of the obtained number.

In tasks 1—7 use conditional subtotal functions (i.e. COUNTIF(S) , SUMIF(S) , AVERAGEIF(S) , MINIFS or MAXIFS) to answer the questions		<i>max pts</i>
Task 1.	Find total expenses of medical center located in Paris.	1
Task 2.	Find average fee paid for Dr. James.	1
Task 3.	Find the highest income in Dnipro.	1
Task 4.	Find the number of physical examinations with negative income.	2
Task 5.	Find the lowest clinic expenses in summer 2020.	2
Task 6.	Find total income for instrumental diagnostics procedures made in Warsaw, Bratislava and Prague.	3
Task 7.	Find average fee paid for Dr. Priest in Vienna and Zurich.	4
<i>Total for conditional subtotals functions (max pts) =</i>		14
In tasks 8—10 use database functions to answer the questions		
Task 8.	Use database functions to answer the questions of tasks 1—7.	14
Task 9.	For task 3 additionally find the type of service, for which this highest income was obtained, and when it happens.	2
Task 10.	For task 5 additionally find the city, where these lowest expenses were paid, and the income in this case.	2
<i>Total for database functions (max pts) =</i>		18

Lesson #4

Task 0. (max = 3 pts)

- Open 'diets' spreadsheet and save it to your work folder.
- Rename 'Sheet 1' to 'main data'.
- Assume that duration of each diet is 92 days. Write this value into cell B2.
- Calculate the end dates of each diet in the corresponding column using formula expression.
- Calculate the weight loss for each patient in the corresponding column using formula expression;
apply percentage format with two decimals to the result of your calculations.

Note:
$$\text{weight loss}(\%) = 100\% - \frac{\text{final weight}}{\text{weight before the diet}}$$

- Calculate Body Mass Index (BMI) for each patient before the diet in the corresponding column using formula expression.

Note:
$$\text{BMI} = \frac{\text{weight in kg}}{(\text{height in m})^2}$$

- Add three empty columns after the columns with patients' weights change, name this triple similarly (i.e. 'change in BMI' : 'BMI 1st month', 'BMI 2nd month', 'BMI 3rd month'), and calculate BMIs for each patient after the 1st, 2nd and 3rd months of the diet using formula expression.
- Find effectiveness of the diet for each patient according to the rule:
 - if the weight loss is greater than 15%, the diet has **excellent** effectiveness;
 - if the patient gained the weight instead of losing it, the diet has **negative** effectiveness;
 - if the weight loss is between 5% and 15%, the diet has **good** effectiveness;
 - otherwise the diet has **minor** effectiveness.

Use logical function(s) to find the diets effectiveness !

In tasks 1—7 use conditional subtotal functions
(i.e. **COUNTIF(S)**, **SUMIF(S)**, **AVERAGEIF(S)**, **MINIFS** or **MAXIFS**)
to answer the questions.

Note: *In the further tasks make your calculations in empty cells aside the data table or in a separate sheet(s).
For each result of calculations give a comment with the explanation of the obtained number.*

Task 1. (max = 2 pts)

- For how many of patients the effectiveness of the diet was excellent?
- How many of them were treated by Dr. Nopain?

Task 2. (max = 5 pts)

- What was the average BMI before the diet for patients, who started diet A in 2021?
- How their BMI change during three months of the diet?
- Plot the results of your calculations in a columnar chart. Format the chart as per sample:

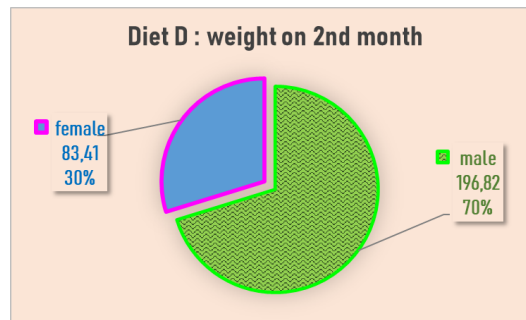


Task 3. (max = 1 pts)

- Find the highest BMI at the end of the diet among Dr. Cuddy's patients.

Task 4. (max = 5 pts)

- Find total weight at the 2nd month of the diet D of those patients, for whom the diet was of good effectiveness.
- Find the same separately for men and women.
- Plot your result in the pie chart. Format this chart as per sample:



Task 5. (max = 2 pts)

- How many patients were overweight before the diet?
- How many of them reach the normal weight after the 1st month of the diet?

Hint: Look at the patients' BMI values to determine the overweight or normal conditions.

Task 6. (max = 2 pts)

- How many patients used diets A and B?
- What is the highest weight at the end of the diet among them?

Task 7. (max = 3 pts)

- How many patients treated by doctors Cuddy and House have negative results (effectiveness of a diet)?
- What is their average BMI at the end of the diet?
- What was the lowest weight before the diet among these patients?

In task 8 use database functions
to answer the questions.

Task 8.

- Do tasks 1—7 using database functions.** (max = 2 pts × 7 tasks = 14 pts)
- Compare results of calculations (! they should coincide !).**
- In task 3 additionally** find the name of the patient with the highest BMI at the end of the diet, and when she/he ends the diet. (max = 2 pts)
- In task 7 additionally** find the name of the patient with the lowest weight before the diet, his/her final weight, and the name of the doctor who treats him/her. (max = 2 pts)

3. Заключна частина

3.1. Контроль виконаних завдань

3.2. Підведення підсумків (узагальнюємо типові завдання з обробки медичних даних, для розв'язку яких доречним є застосування функцій умовного підрахунку, функцій баз даних; окреслюємо особливості завдань управління охороною здоров'я, для яких оптимальнішим є використання тих чи інших функцій)

3.3. Домашнє завдання для самостійної роботи (наголошуємо на правилах виконання і термінах здачі домашніх робіт).

Примітка: за цією темою передбачається самостійна робота з виконання практичних завдань за темою. Перелік завдань до самостійної (домашньої) роботи наведено у методичних матеріалах до самостійної роботи освітньої компоненти.

МЕТОДИЧНА КАРТКА ПРАКТИЧНИХ ЗАНЯТЬ №№ 5—6

Тема: Using pivot tables for analytics in medicine and healthcare. Subtotals and structuring datasheets

Актуальність теми:

Pivot tables are a powerful tool in spreadsheet software that allow medical professionals to easily analyze and summarize large amounts of data. Here are some reasons why it is important for medical professionals to have skills in using pivot tables in healthcare management:

- **Efficient data management:** Pivot tables allow medical professionals to quickly and easily organize and manage large amounts of patient data. This can save them valuable time and improve their workflow.
- **Data analysis:** Pivot tables enable medical professionals to analyze and summarize patient data, allowing them to identify trends and patterns that may not be immediately apparent from raw data. This can help in diagnosis, treatment planning, and research.
- **Customized data views:** Pivot tables allow medical professionals to create customized views of patient data based on specific criteria, such as age, sex, or diagnosis. This can help them identify patients with certain conditions or treatments, for example, and create targeted treatment plans.
- **Collaborative tools:** Pivot tables can be used to share data and collaborate with other medical professionals. This can be especially useful in interdisciplinary teams, where multiple professionals may be working on the same patient.
- **Accuracy and compliance:** By using pivot tables, medical professionals can ensure that patient data is accurate and comply with regulatory requirements, by providing a secure platform for storing and sharing patient data.

In summary, skills in using pivot tables are essential for medical professionals to efficiently manage, analyze, and communicate medical data records. It can help improve patient care, save time, and ensure compliance with regulatory requirements.

Цілі заняття: (сформовані загальні (ЗК) та спеціальні (фахові) (ФК) компетентності)

General:

- GC 10 – the ability to apply information and communicative technologies;
- GC 11 – the ability to search, process and analyze the information from different sources;
- GC 3 – the ability to apply knowledge in practical situations;
- GC 2 – the ability to learn and acquire actual knowledge;
- GC 4 – knowledge and understanding of the subject area and understanding of professional activity;
- GC 6 – the ability to make an informed decision;
- GC 1 – the ability to abstract thinking, analysis and synthesis;

Professional:

- PC 20 – the ability to conduct analysis of the activity of a doctor, healthcare institution or its department, conducting measures to ensure the quality and safety of medical care and improving the efficiency of the use of medical resources;
- PC 22 – the ability to conduct epidemiological and medical statistical researches, to process governmental, social, economic and medical information in healthcare;
- PC 1 – the ability to collect the information about a patient and to analyze clinical data;
- PC 25 – the ability to develop and implement scientific and applied projects in the field of healthcare;
- PC 27 – the ability to observe professional and academic integrity, to be responsible for the reliability of the obtained scientific results.

Практичні результати навчання (ПРН):

- to form fundamental professionally-oriented knowledge, skills, abilities, competencies necessary to perform typical professional tasks related to activities in the healthcare field, including special conceptual knowledge on medical information technology that provides the basis for medical data analysis in future researches, and forms critical thinking (PLO 2, PLO 3);
- to ensure the ability to apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex healthcare problems (PLO 29);
- to train the ability to search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information (PLO 28).

Обладнання та оснащення: персональний комп'ютер чи ноутбук, табличний процесор (MS Excel, Libre (Open) Office Calc, Google Sheets або інш.).

Глосарій теми: subtotals tools in spreadsheet, grouping data, levels of data grouping, pivot tables, pivot table fields, row / column fields, filter fields, values fields, value field functions, pivot charts.

Зміст теми:

Питання, які розглядаються на занятті:

1. Spreadsheets tools for structuring datasheets. Levels of structure.
2. Pivot tables for analytics in medicine and healthcare.
3. Pivot charts for data visualization.

Список рекомендованих джерел інформації:

1. Слайди лекції, конспект лекції з теми.
2. Hoyt R.E. Health informatics: practical guide / Robert E. Hoyt, William R. Hersh. – 7th ed. – [S. l.] : Lulu.com, Informatics Education, 2018. – 475 p.
3. Essentials of Clinical Informatics / ed. by M.E. Frisse, K.E. Misulis. – [S. l.] : Oxford University Press, 2019. – 366 p.
4. Medical informatics: textbook for students of higher medical education establishments / I. Ye. Bulakh [et al.]. – 4th ed., rev.– Kyiv : Medicine, 2018. – 368 p.
5. Medical Informatics / S.J Singer [et al.]. – New York : Springer Science + Business Media, 2001. – 780 p.
6. Musen M.A. Handbook of Medical Informatics / ed. by M.A. Musen, J. van Bommel. – [S. l.] : Springer, 2002. – 628 p.

Хід заняття:***1. Контроль вхідного рівня знань з теми.***

Запитання (повторення матеріалу, викладеного на лекції з теми):

1. What are subtotals? Which spreadsheet tools to find subtotals do you know?
2. How to group / ungroup data in the spreadsheet?
3. Which stages of data preparation for structuring should be completed?
4. What is pivot table?
5. What is the pivot chart?
6. Which kind of fields can be used for columns / rows / filters of the pivot table (chart)?
7. Which kind of fields can be used for values in the pivot table (chart)?
8. Which functions and settings can be applied for pivot table values?
How they differ depending on the data type of the values field?

2. Практична частина

Практичні завдання для послідовного виконання (практичний тренінг):

Lesson #5 (Subtotals and structuring datasheets)

Task 0.

- Open 'med-network-report-example.xlsx' spreadsheet and save it to your work folder.
- Calculate the income obtained from each of the procedures in the corresponding column using formula expression.

Task 1. Make a copy of 'sample_data' sheet and rename this copy to 'simple_subtotals'. In the 'simple_subtotals' sheet display subtotals that show the lowest expenses for services provided by each doctor. Adjust the view of the table with subtotals as per sample:

	A	B	C	D	E	F	G	H
1	record ID	date	city	type of service	doctor	fee	expenses of the clinic	income
66					Smith, Samuel Min		23,04 €	
131					Priest, Mary Min		25,09 €	
197					Nickson, Neigel Min		17,47 €	
250					Meddison, Martha Min		12,61 €	
251	#136904	2-Mar-21	Bratislava	Surgery	McFish, Frederic	82,55 €	86,74 €	-4,19 €
252	#150243	27-Feb-20	Sofia	Diagnostics	McFish, Frederic	1 425,45 €	196,76 €	1 228,69 €
304	#859454	15-Mar-21	Bratislava	Physical examination	McFish, Frederic	328,35 €	90,13 €	238,22 €
305	#867144	14-Oct-22	Dnipro	Physiotherapy	McFish, Frederic	65,65 €	183,19 €	-117,54 €
306	#875461	17-Jul-20	Vienna	Consultation	McFish, Frederic	104,08 €	446,04 €	-341,96 €
307	#914978	21-Nov-20	Dnipro	Surgery	McFish, Frederic	96,01 €	130,05 €	-34,04 €
308	#926551	5-Jun-20	Dnipro	Consultation	McFish, Frederic	1 029,88 €	178,85 €	851,03 €
309	#933537	16-Aug-20	Zurich	Physical examination	McFish, Frederic	219,38 €	25,17 €	194,21 €
310	#942829	17-May-22	Dnipro	Instrumental diagnostics	McFish, Frederic	873,14 €	39,56 €	833,58 €
311	#975740	4-Nov-20	Warsaw	Surgery	McFish, Frederic	353,85 €	498,75 €	-144,90 €
312					McFish, Frederic Min		18,02 €	
373					Larry, Lusy Min		11,27 €	
434					James, John Min		14,51 €	
509					Backer, Robert Min		23,77 €	
510					Grand Min		11,27 €	
511								

max pts

2

Task 2. Make a copy of 'sample_data' sheet and rename this copy to '2_level_subtotals'. In the '2_level_subtotals' sheet display subtotals that show total incomes obtained from different doctors' services in each city. Adjust the view of the table with subtotals as per sample:

	A	B	C	D	E	F	G	H
1	record ID	date	city	type of service	doctor	fee	expenses of the clinic	income
55								26 715,53 €
102								17 795,92 €
152								18 441,98 €
206								25 038,12 €
210								
214					Smith, Samuel Total			825,54 €
221					Priest, Mary Total			1 296,30 €
227					Nickson, Neigel Total			4 915,63 €
231					Meddison, Martha Total			3 425,49 €
237					McFish, Frederic Total			1 884,31 €
242					Larry, Lusy Total			1 202,55 €
243					James, John Total			1 788,23 €
250					Backer, Robert Total			3 868,38 €
251								19 206,43 €
309								27 611,93 €
357								23 039,55 €
367								
376					Smith, Samuel Total			2 796,66 €
377	#359280	27-Oct-21	Prague	Instrumental diagnostics	Nickson, Neigel	125,01 €	23,64 €	101,37 €
378	#439196	27-Jan-20	Prague	Physiotherapy	Nickson, Neigel	1 303,41 €	286,75 €	1 016,66 €
379	#619844	27-Apr-22	Prague	Physical examination	Nickson, Neigel	710,90 €	336,45 €	374,45 €
380	#758141	22-Sep-21	Prague	Medication prescription	Nickson, Neigel	1 344,26 €	455,52 €	888,74 €
381	#832543	26-May-22	Prague	Diagnostics	Nickson, Neigel	507,42 €	118,01 €	389,41 €
382	#848540	26-Dec-20	Prague	Diagnostics	Nickson, Neigel	1 085,45 €	118,73 €	966,72 €
383	#935041	3-Oct-21	Prague	Surgery	Nickson, Neigel	706,62 €	53,45 €	653,17 €
384					Nickson, Neigel Total			4 390,52 €
390					Meddison, Martha Total			1 144,04 €
396					McFish, Frederic Total			186,53 €
400					Larry, Lusy Total			1 914,70 €
407					James, John Total			2 669,75 €
416					Backer, Robert Total			5 464,27 €
417								19 332,04 €
456								15 923,56 €
503								20 276,53 €
562								31 639,27 €
609								20 716,89 €
610								265 817,75 €
611								

3

Total (max pts.) =

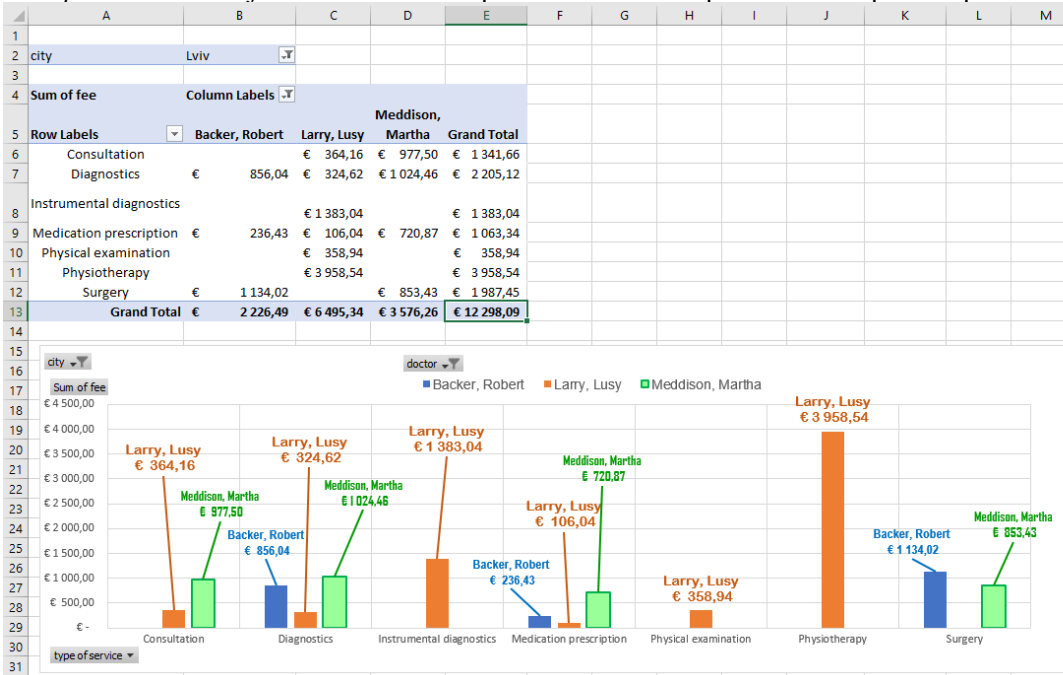
5

Lesson #6 (Using pivot tables and pivot charts for analytics in medicine and healthcare)

max pts

Task 1

Create the pivot table with the pivot chart based on the data from 'med-network-report-example.xlsx' and adjust the view of the pivot table and the pivot chart as per sample:



5

Task 2

Create the pivot table based on the data from 'diets.xlsx' (use datatable from your version of assignment #2) and adjust the view of the pivot table as per sample:

Count of Patient	gender	F	M	Grand Total
low		1	5	6
moderate		3	2	5
good		1	1	2
Grand Total		5	7	12

Count of Patient	gender	F	M	Grand Total
low		8,33%	41,67%	50,00%
moderate		25,00%	16,67%	41,67%
good		8,33%	0,00%	8,33%
Grand Total		41,67%	58,33%	100,00%

2+
2

Task 3

Create the pivot table based on the data from 'diets.xlsx' (use datatable from your version of assignment #2) and adjust the view of the pivot table as per sample:

Average of weight loss %	Diet A	Diet B	Diet C	Diet D	Grand Total
2020	2,5%	5,9%	14,3%	20,8%	10,5%
2021	14,2%	16,0%	17,3%	18,4%	16,2%
January			22,5%		22,5%
February		23,0%		21,3%	22,2%
April	-5,4%	27,8%		15,7%	16,5%
May	39,6%		17,1%		28,3%
June	26,8%		16,5%	15,7%	19,7%
July	27,0%		16,6%		21,8%
August		26,7%	8,8%		17,7%
September	-5,9%				-5,9%
October	24,0%	11,7%		5,0%	13,1%
November	1,1%	4,9%		35,3%	10,2%
December	10,1%			17,1%	12,4%
2022	10,0%	15,7%	10,4%	10,2%	11,7%
2023	22,1%	15,3%	8,0%	5,5%	13,1%
January	23,4%		17,3%		20,4%
February		16,1%		9,9%	13,0%
March	19,5%	15,1%	-10,6%	3,2%	9,5%
Grand Total	12,1%	14,0%	12,5%	14,4%	13,1%

3

Total (max pts) = 12

3. *Заклучна частина*

3.1. Контроль виконаних завдань

3.2. Підведення підсумків (узагальнюємо типові завдання з обробки медичних даних, для розв'язку яких доречним є групування даних, структурування електронних таблиць, загальні етапи для досягнення мети; узагальнюємо типові завдання охорони здоров'я і медицини, для яких корисним є аналіз даних за допомогою зведених таблиць, правила їх побудови та основні можливості щодо представлення інформації).

3.3. Домашнє завдання для самостійної роботи (наголошуємо на правилах виконання і термінах здачі домашніх робіт).

Примітка: за цією темою передбачається самостійна робота з виконання практичних завдань за темою. Перелік завдань до самостійної (домашньої) роботи наведено у методичних матеріалах до самостійної роботи освітньої компоненти.

МЕТОДИЧНА КАРТКА ПРАКТИЧНИХ ЗАНЯТЬ №№ 7—8

Тема: Freeware tools to create dashboards. Using dashboards to analyze processes in healthcare and medicine

Актуальність теми:

Dashboards are a visual representation of complex data that allows medical students to easily monitor, analyze and communicate patient data. Here are some reasons why it is important for medical students to have skills in using dashboards in healthcare:

- **Improved decision making:** Dashboards enable medical students to make informed decisions based on real-time data. This can help them identify trends, patterns, and anomalies in patient data, which can be used for diagnosis, treatment planning, and research.
- **Efficient data management:** Dashboards allow medical students to quickly and easily organize and manage patient data, saving them valuable time and improving their workflow.
- **Customized data views:** Dashboards enable medical students to create customized views of patient data based on specific criteria, such as age, sex, or diagnosis. This can help them identify patients with certain conditions or treatments, for example, and create targeted treatment plans.
- **Collaborative tools:** Dashboards can be used to share data and collaborate with other medical professionals. This can be especially useful in interdisciplinary teams, where multiple professionals may be working on the same patient.
- **Improved patient outcomes:** By using dashboards to monitor and analyze patient data, medical students can identify potential health risks and take action to prevent or treat them, ultimately leading to improved patient outcomes.

In summary, skills in using dashboards are essential for medical students to efficiently manage, analyze, and communicate medical data. It can help improve patient care, save time, and ensure compliance with regulatory requirements.

Цілі заняття: (сформовані загальні (ЗК) та спеціальні (фахові) (ФК) компетентності)

General:

- GC 10 – the ability to apply information and communicative technologies;
- GC 11 – the ability to search, process and analyze the information from different sources;
- GC 3 – the ability to apply knowledge in practical situations;
- GC 2 – the ability to learn and acquire actual knowledge;
- GC 4 – knowledge and understanding of the subject area and understanding of professional activity;
- GC 6 – the ability to make an informed decision;
- GC 1 – the ability to abstract thinking, analysis and synthesis;

Professional:

- PC 20 – the ability to conduct analysis of the activity of a doctor, healthcare institution or its department, conducting measures to ensure the quality and safety of medical care and improving the efficiency of the use of medical resources;
- PC 22 – the ability to conduct epidemiological and medical statistical researches, to process governmental, social, economic and medical information in healthcare;
- PC 1 – the ability to collect the information about a patient and to analyze clinical data;
- PC 25 – the ability to develop and implement scientific and applied projects in the field of healthcare;
- PC 27 – the ability to observe professional and academic integrity, to be responsible for the reliability of the obtained scientific results.

Практичні результати навчання (ПРН):

- to form fundamental professionally-oriented knowledge, skills, abilities, competencies

necessary to perform typical professional tasks related to activities in the healthcare field, including special conceptual knowledge on medical information technology that provides the basis for medical data analysis in future researches, and forms critical thinking (PLO 2, PLO 3);

- to ensure the ability to apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex healthcare problems (PLO 29);
- to train the ability to search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information (PLO 28).

Обладнання та оснащення: персональний комп'ютер чи ноутбук, табличний процесор (MS Excel, Libre (Open) Office Calc, Google Sheets або інш.), програмне забезпечення для побудови аналітичних панелей (MS Power BI – *основне*, Tableau або інш.).

Глосарій теми: dashboard, interactive visualization, visual, types of visuals: clustered chart, stacked chart, waterfall chart, map, card, multi-row card, tree map, decomposition tree, funnel chart, scatter, slicer, gauge, table, matrix.

Зміст теми:

Питання, які розглядаються на занятті:

1. Importing data from a spreadsheet to BI software.
2. Creating interactive visuals of different types.
3. Using visuals to represent data in healthcare management.

Список рекомендованих джерел інформації:

1. Слайди лекції, конспект лекції з теми.
2. Hoyt R.E. Health informatics: practical guide / Robert E. Hoyt, William R. Hersh. – 7th ed. – [S. l.] : Lulu.com, Informatics Education, 2018. – 475 p.
3. Essentials of Clinical Informatics / ed. by M.E. Frisse, K.E. Misulis. – [S. l.] : Oxford University Press, 2019. – 366 p.
4. Medical informatics: textbook for students of higher medical education establishments / I. Ye. Bulakh [et al.]. – 4th ed., rev.– Kyiv : Medicine, 2018. – 368 p.
5. Medical Informatics / S.J Singer [et al.]. – New York : Springer Science + Business Media, 2001. – 780 p.
6. Musen M.A. Handbook of Medical Informatics / ed. by M.A. Musen, J. van Bommel. – [S. l.] : Springer, 2002. – 628 p.

Хід заняття:

1. Контроль вхідного рівня знань з теми.

Запитання (повторення матеріалу, викладеного на лекції з теми):

1. What are dashboards? What are they used for?
2. Which software can be used to create dashboards?
3. What is visual? Why it is known as *interactive* visualization tool?
4. Which types of visuals do you know?
5. Describe some tasks of medical and/or healthcare management data processing when each type of visuals can be used.
6. Stacked charts and clustered charts. What are similarities and differences between them?
7. Pie charts and donut charts. What are similarities and differences between them?
8. Waterfall charts and funnel chart. What are similarities and differences between them?
9. Table visuals, matrix visuals, cards and multi-row cards. What are similarities and differences between them?

2. Практична частина

Практичні завдання для послідовного виконання (практичний тренінг):

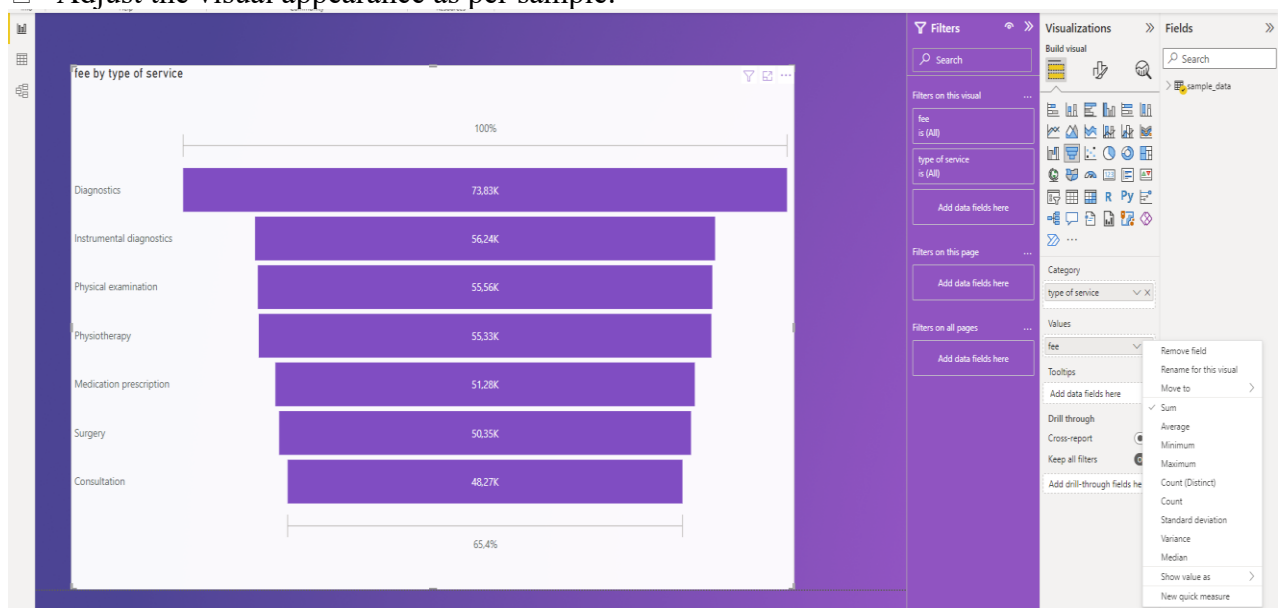
Task 1.

- Start MS Power BI, create new report file and save it as ‘*medical-network-BI.pbix*’ to your work folder.
- Import data from ‘*med-network-report-example.xlsx*’ spreadsheet to your Power BI report.
- Switch to data view at the left pane, and check the imported data (it should look as in the preview given below)

record ID	date	city	type of service	doctor	fee	expenses of the clinic	income
#137460	воскресенье, 28 августа 2022 г.	Lviv	Diagnostics	Smith, Samuel	1165,62	207,99	957,63
#147425	понедельник, 20 июня 2022 г.	Dnipro	Diagnostics	Backer, Robert	434,45	149,12	285,33
#150243	четверг, 27 февраля 2020 г.	Sofia	Diagnostics	McFish, Frederic	1425,45	196,76	1228,69
#155546	пятница, 8 июля 2022 г.	Lviv	Diagnostics	Meddison, Martha	1024,46	385,45	639,01
#171654	суббота, 8 января 2022 г.	Warsaw	Diagnostics	Nickson, Neigel	167,66	314,13	-146,47
#194789	среда, 11 марта 2020 г.	Vienna	Diagnostics	Nickson, Neigel	500,97	330,96	170,01
#209885	суббота, 28 ноября 2020 г.	Paris	Diagnostics	Larry, Lusy	161,73	244,71	-82,98
#218093	среда, 3 ноября 2021 г.	Bratislava	Diagnostics	Backer, Robert	1373,85	110,08	1263,77
#233279	понедельник, 5 декабря 2022 г.	Kyiv	Diagnostics	Backer, Robert	166,95	284,2	-117,25
#238296	пятница, 1 июля 2022 г.	Zurich	Diagnostics	Backer, Robert	1144,08	484,19	659,89
#240960	среда, 9 ноября 2022 г.	Kharkiv	Diagnostics	Larry, Lusy	315,05	103,21	211,84
#285368	пятница, 13 августа 2021 г.	Bratislava	Diagnostics	Smith, Samuel	1013,62	461,67	551,95
#297424	среда, 7 декабря 2022 г.	Warsaw	Diagnostics	Backer, Robert	242,26	280,13	-37,87
#308366	четверг, 15 апреля 2021 г.	Gdansk	Diagnostics	Smith, Samuel	900,34	252,2	648,14
#319249	четверг, 30 июля 2020 г.	Warsaw	Diagnostics	James, John	1356,67	81,7	1274,97
#321290	среда, 3 августа 2022 г.	Zurich	Diagnostics	Meddison, Martha	1269,42	186,75	1082,67
#326474	пятница, 28 мая 2021 г.	Sofia	Diagnostics	Priest, Mary	327,49	177,99	149,5

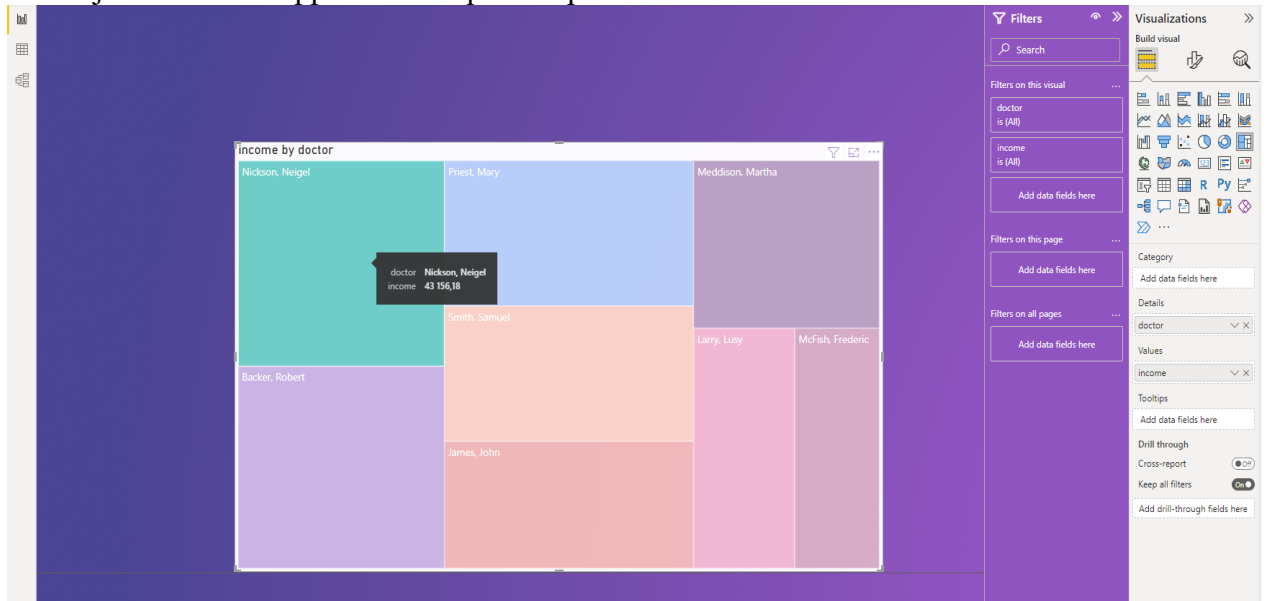
Task 2.

- Switch to the report view at the left pane, rename ‘Page 1’ to ‘basic visuals’.
- In the ‘basic visuals’ page create the **funnel** visual that shows total fees paid for different types of services provided by the network of clinics.
- Adjust the visual appearance as per sample:



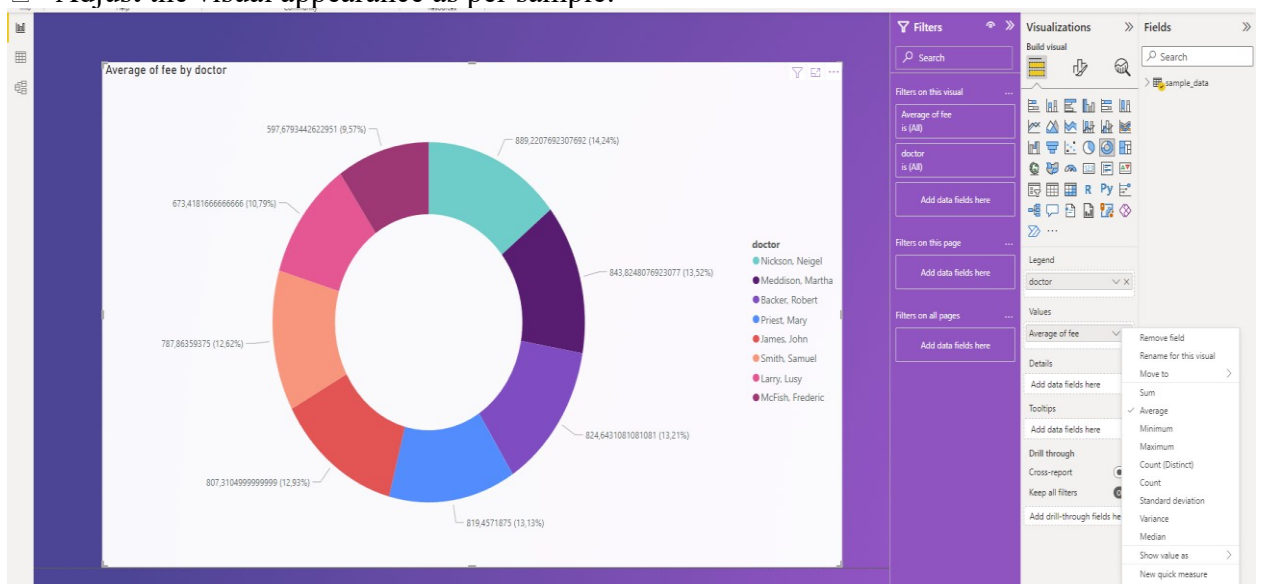
Task 3.

- In the 'basic visuals' page add the **tree map** visual that shows total income gained for the network of clinics by each doctor.
- Adjust the visual appearance as per sample:



Task 4.

- In the 'basic visuals' page add the **donut chart** visual that shows average fee obtained by each doctor.
- Adjust the visual appearance as per sample:



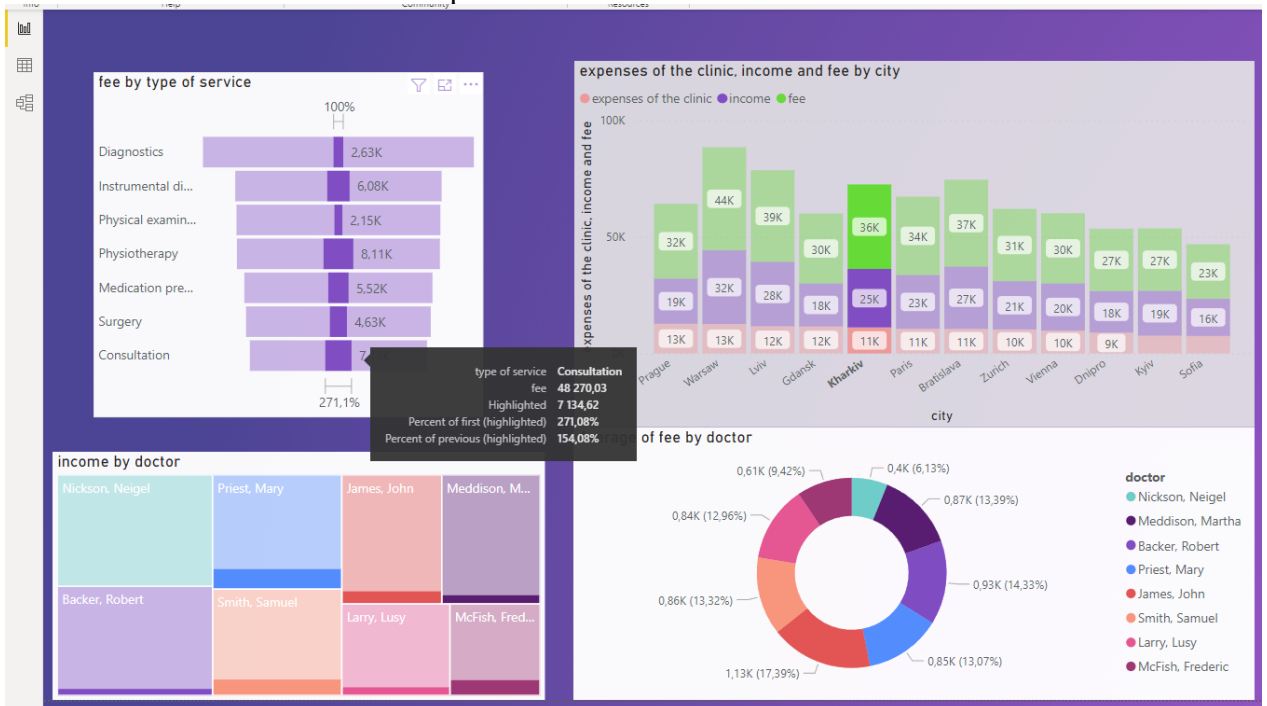
Task 5.

- In the 'basic visuals' page add the **stacked column chart** visual that shows total incomes, fees, and clinic expenses in each city.
- Adjust the visual appearance as per sample:



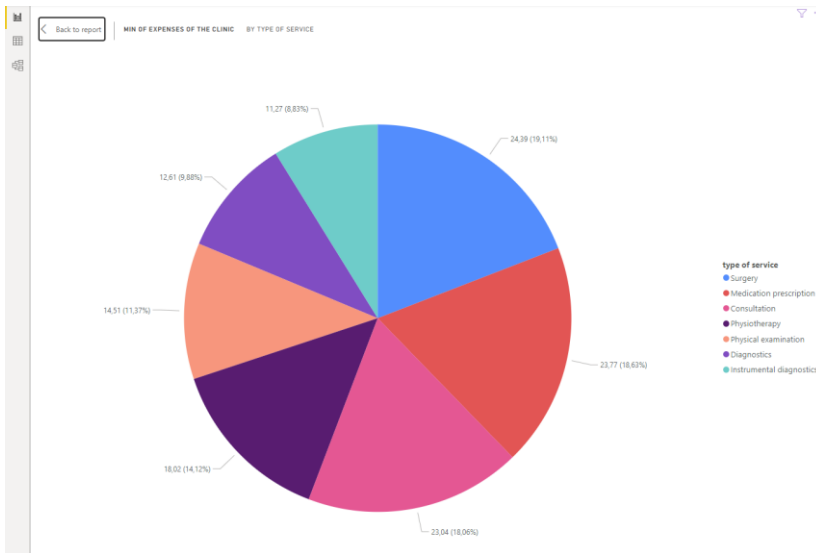
Task 6.

- In the 'basic visuals' page arrange your four visuals as per sample and adjust them to highlight the information about services provided in Kharkiv:



Task 7.

- Add new page to your report, rename it to 'clinic expenses'.
- In the 'clinic expenses' page create the **pie chart** visual that shows the lowest expenses for different types of services provided by the network of clinics.
- Adjust the visual appearance as per sample:



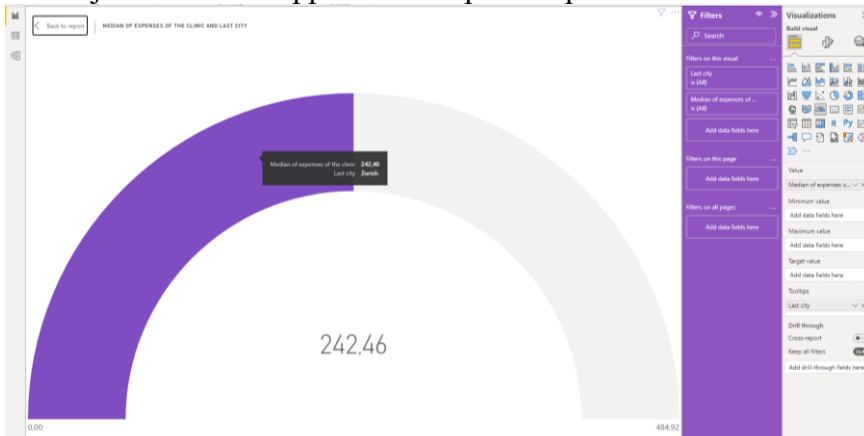
Task 8.

- In the 'clinic expenses' page create the **waterfall chart** visual that shows the highest expenses paid in each city by the network of clinics.
- Adjust the visual appearance as per sample:



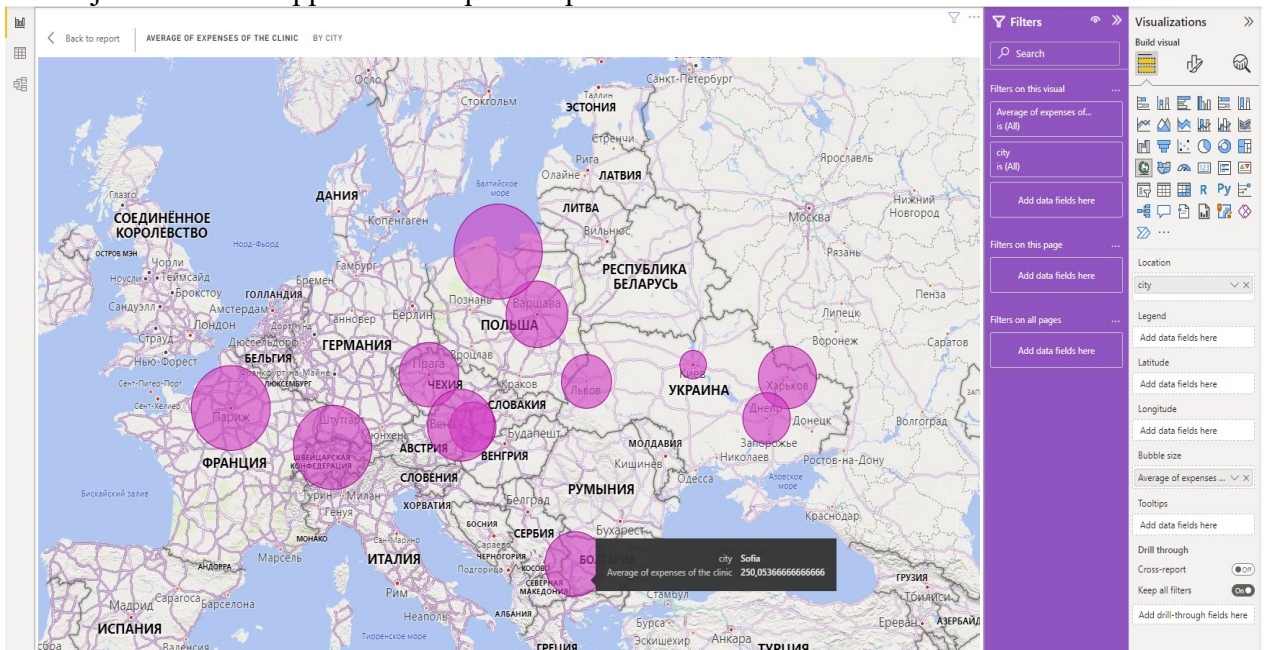
Task 9.

- In the 'clinic expenses' page create the **gauge** visual that shows the median of expenses paid by the network of clinics.
- Adjust the visual appearance as per sample:



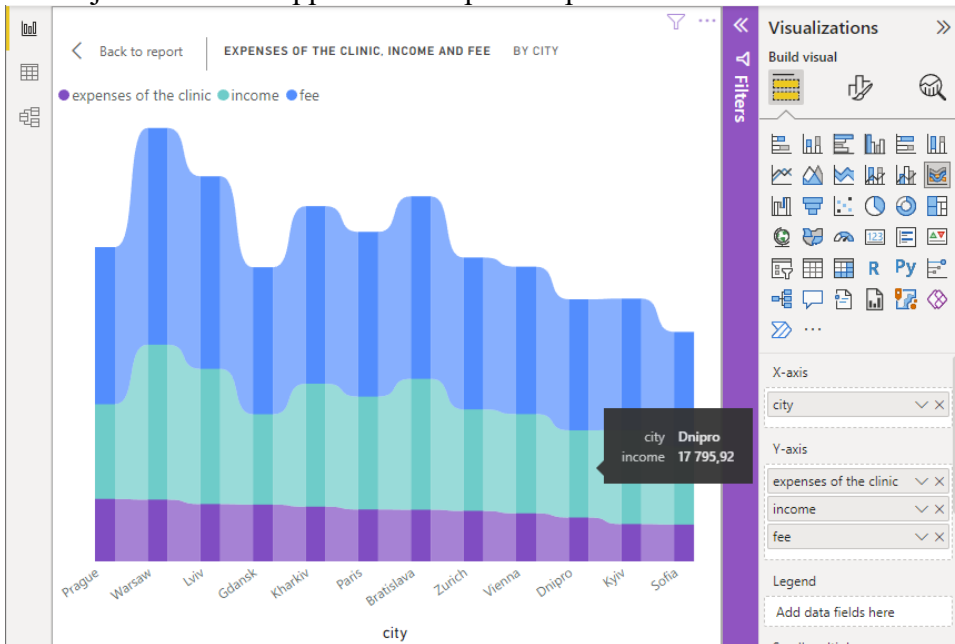
Task 10.

- In the 'clinic expenses' page create the **map** visual that shows average expenses paid by the network of clinics in each city.
- Adjust the visual appearance as per sample:



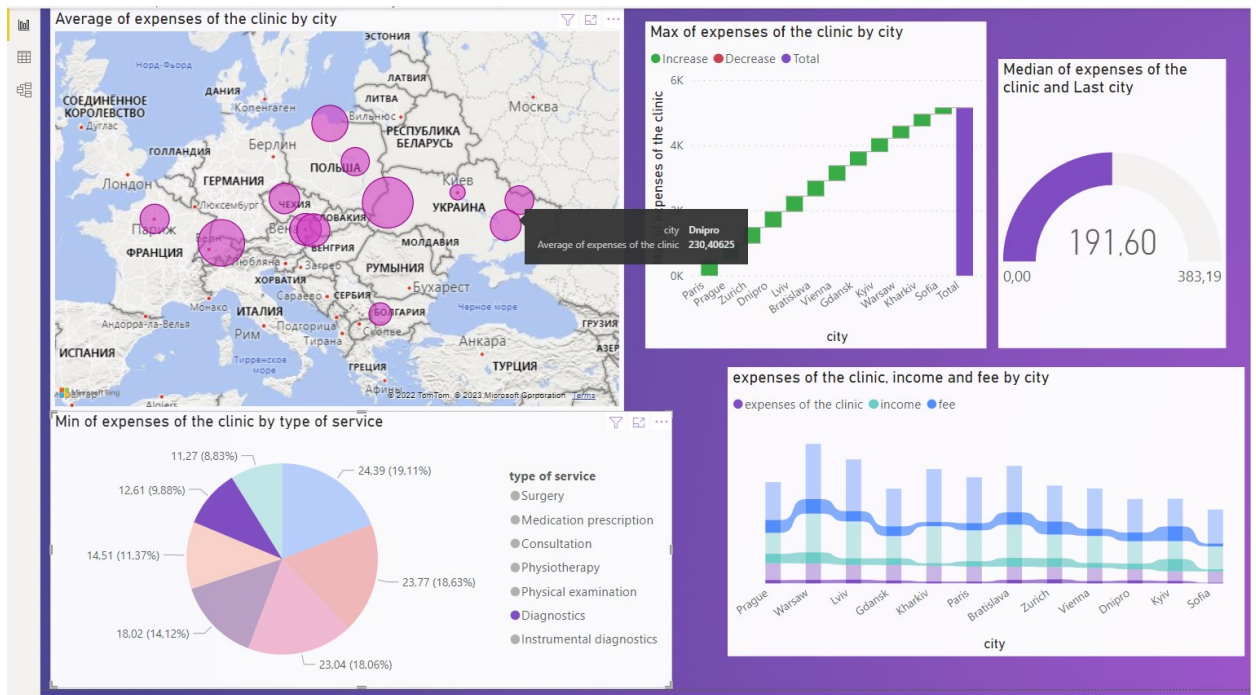
Task 11.

- In the 'clinic expenses' page create the **ribbon chart** visual that shows total fees, incomes, and expenses in each city.
- Adjust the visual appearance as per sample:



Task 12.

- In the 'clinic expenses' page arrange your four visuals as per sample and adjust them to highlight the information about diagnostics:



3. *Заключна частина*

3.1. Контроль виконаних завдань

3.2. Підведення підсумків (узагальнюємо типові завдання з візуалізації даних для завдань управління охороною здоров'я і типи віджетов, найбільш доречні для тих чи інших завдань)

3.3. Домашнє завдання для самостійної роботи (наголошуємо на правилах виконання і термінах здачі домашніх робіт).

Примітка: за цією темою передбачається самостійна робота з виконання практичних завдань за темою. Перелік завдань до самостійної (домашньої) роботи наведено у методичних матеріалах до самостійної роботи освітньої компоненти.

МЕТОДИЧНА КАРТКА ПРАКТИЧНИХ ЗАНЯТЬ №№ 9—10

Тема: Using freeware tools to conduct surveys in healthcare management and patients' records analysis

Актуальність теми:

Medical questionnaires are an important tool for gathering patient data, and it is essential for medical students to have skills in creating and processing the results of these questionnaires. Here are some reasons why:

- **Accurate diagnosis and treatment:** Medical questionnaires can help medical students obtain a complete picture of a patient's medical history, current symptoms, and lifestyle habits, which can be used to make an accurate diagnosis and create an effective treatment plan.
- **Efficient data management:** By using electronic medical questionnaires, medical students can efficiently manage and store large amounts of patient data in a secure and organized manner.
- **Data analysis:** Medical questionnaires can be used to analyze patient data, identify trends and patterns, and track changes in a patient's health over time. This can be used to improve diagnosis, treatment planning, and research.
- **Improved patient communication:** By using medical questionnaires, medical students can obtain more detailed and accurate information from their patients, which can help improve communication and build trust with their patients.
- **Compliance with regulatory requirements:** By using standardized medical questionnaires, medical students can ensure that they are collecting the necessary information to comply with regulatory requirements.

In summary, skills in creating and processing the results of medical questionnaires are essential for medical students to effectively gather, manage, and analyze patient data. This can lead to improved diagnosis and treatment, better patient communication, and compliance with regulatory requirements.

Цілі заняття: (сформовані загальні (ЗК) та спеціальні (фахові) (ФК) компетентності)

General:

- GC 10 – the ability to apply information and communicative technologies;
- GC 11 – the ability to search, process and analyze the information from different sources;
- GC 3 – the ability to apply knowledge in practical situations;
- GC 2 – the ability to learn and acquire actual knowledge;
- GC 4 – knowledge and understanding of the subject area and understanding of professional activity;
- GC 6 – the ability to make an informed decision;
- GC 1 – the ability to abstract thinking, analysis and synthesis;

Professional:

- PC 20 – the ability to conduct analysis of the activity of a doctor, healthcare institution or its department, conducting measures to ensure the quality and safety of medical care and improving the efficiency of the use of medical resources;
- PC 22 – the ability to conduct epidemiological and medical statistical researches, to process governmental, social, economic and medical information in healthcare;
- PC 1 – the ability to collect the information about a patient and to analyze clinical data;
- PC 25 – the ability to develop and implement scientific and applied projects in the field of healthcare;
- PC 27 – the ability to observe professional and academic integrity, to be responsible for the reliability of the obtained scientific results.

Практичні результати навчання (ПРН):

- to form fundamental professionally-oriented knowledge, skills, abilities, competencies necessary to perform typical professional tasks related to activities in the healthcare field, including special conceptual knowledge on medical information technology that provides the basis for medical data analysis in future researches, and forms critical thinking (PLO 2, PLO 3);
- to ensure the ability to apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex healthcare problems (PLO 29);
- to train the ability to search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information (PLO 28).

Обладнання та оснащення: персональний комп'ютер чи ноутбук, табличний процесор (MS Excel, Libre (Open) Office Calc, Google Sheets або інш.), програмне забезпечення для побудови аналітичних панелей (MS Power BI – *основне*, Tableau або інш.), програмне забезпечення для створення опитувальників і збору результатів (Google forms або інш.).

Глосарій теми: surveys in healthcare, medical questionnaires, forms, online questionnaires, form controls, multiply choice questions, check box, radio button, grid, scale.

Зміст теми:

Питання, які розглядаються на занятті:

1. Questionnaires in Medicine. The purpose of their use, the types of questionnaires.
2. Online questionnaires. Software to create online questionnaire and conduct survey.
3. Saving and processing result of the survey.
4. Developing the electronic form for the own survey.

Список рекомендованих джерел інформації:

1. Слайди лекції, конспект лекції з теми.
2. Bennet A.E. Questionnaires in medicine: a guide to their design and use / A.E. Bennet, K. Ritchie. – London : Published for the Nuffield Provincial Hospital Trust by the Oxford University Press, 1975. – 116 p.
3. Hoyt R.E. Health informatics: practical guide / Robert E. Hoyt, William R. Hersh. – 7th ed. – [S. l.] : Lulu.com, Informatics Education, 2018. – 475 p.
4. Essentials of Clinical Informatics / ed. by M.E. Frisse, K.E. Misulis. – [S. l.] : Oxford University Press, 2019. – 366 p.
5. Medical informatics: textbook for students of higher medical education establishments / I. Ye. Bulakh [et al.]. – 4th ed., rev. – Kyiv : Medicine, 2018. – 368 p.
6. Medical Informatics / S.J Singer [et al.]. – New York : Springer Science + Business Media, 2001. – 780 p.
7. Musen M.A. Handbook of Medical Informatics / ed. by M.A. Musen, J. van Bommel. – [S. l.] : Springer, 2002. – 628 p.

Хід заняття:

1. Контроль вхідного рівня знань з теми.

Запитання (повторення матеріалу, викладеного на лекції з теми):

1. Why we need to use questionnaires in medicine and healthcare?
2. Describe the range of tasks in healthcare management where it is useful to make a survey?
3. Describe the range of tasks in medicine where it is useful to make a survey?
4. Which software to create online survey forms do you know?
5. Enlist the main features and possibilities of google forms.
6. Which types of questions are available in google forms?

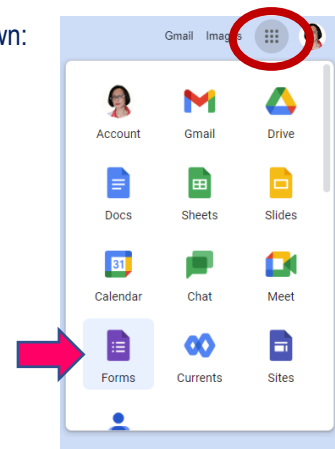
7. What are the similarities and differences between the questions of “short text” type and of “paragraph” type?
8. What are the similarities and differences between the questions of “date” type and of “time” type?
9. What are the similarities and differences between the questions of “multiple choice” type and of “dropdown” type?
10. What are the similarities and differences between the questions of “multiple choice” type and of “checkboxes” type?
11. What are the similarities and differences between the questions of “checkboxes” type and of “dropdown” type?
12. Describe situations when we may need to use “file upload” type of questions.
13. Describe situations when we may need to use “linear scale” type of questions.
14. What are the similarities and differences between the questions of “checkbox grid” type and of “multiple choice grid” type?
15. What is the difference between a quiz and a questionnaire?
16. Why it is not optimal to set all the questions as required?
17. Why it is not optimal to set all the questions as nonrequired?
18. Describe situations when we may need to collect respondents’ emails.
19. How to save the questionnaire responses to a separate spreadsheet?

2. Практична частина

Практичні завдання для послідовного виконання (практичний тренінг):

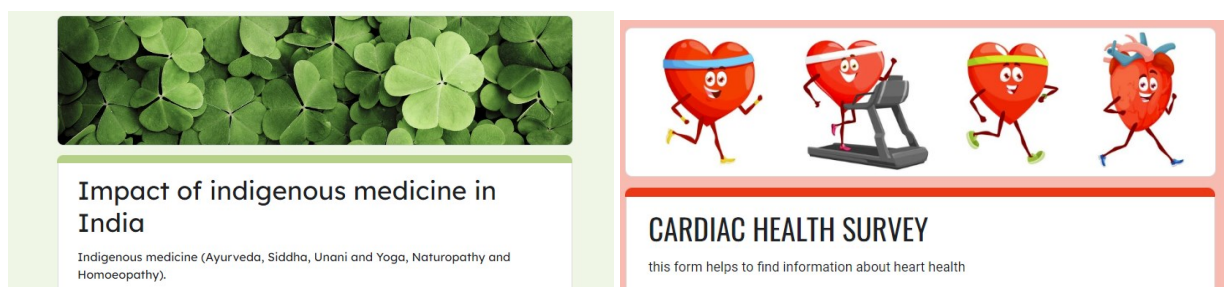
Task 1. Create new google form and save it with the name of your survey.

- From your google account pick Forms from Google apps dropdown:
- In the “Start a new form” section click “Blank”.
- Write the name of your form instead of “Untitled form” in the form header, and press <Enter>.



Task 2. In the form header specify the purpose of your survey shortly.


For example,





SLEEP APNEA

This survey concentrates on the serious disorder of sleep apnea (condition that causes you to stop breathing while you're sleeping).



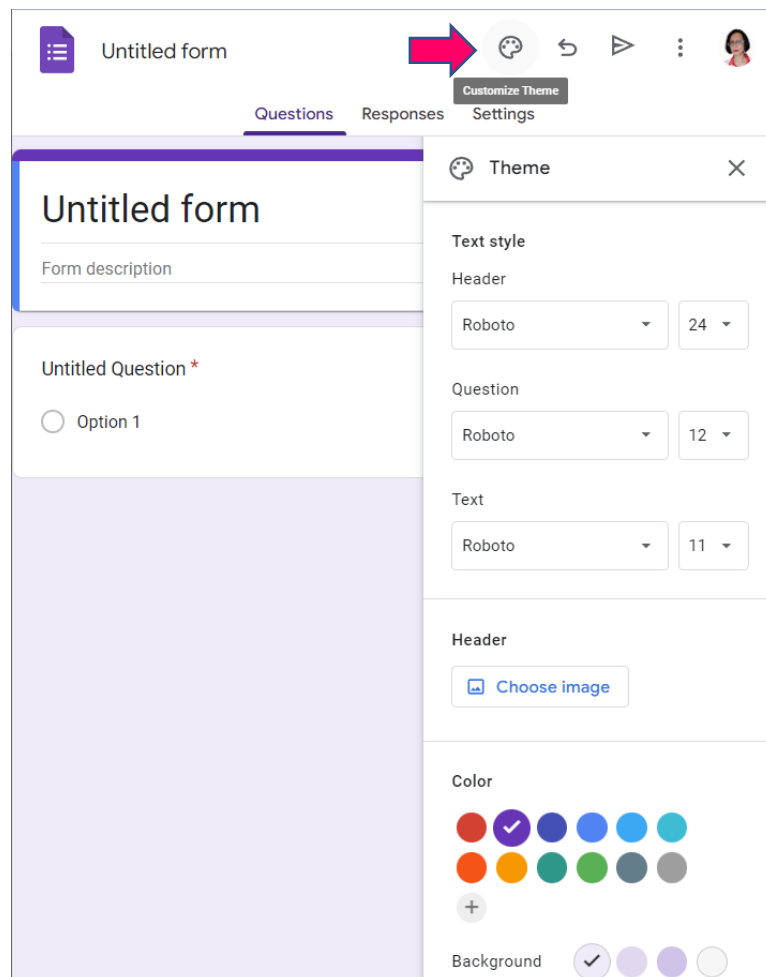
Dengue fever

Dengue viruses are spread to people through the bites of infected Aedes species mosquitoes (Ae. aegypti or Ae. albopictus). These are the same types of mosquitoes that spread Zika and chikungunya viruses

Task 3. Customize your form:

- add header image,
- change theme colors,
- change default fonts for questions, header and text

Use “Customize Theme” commands:

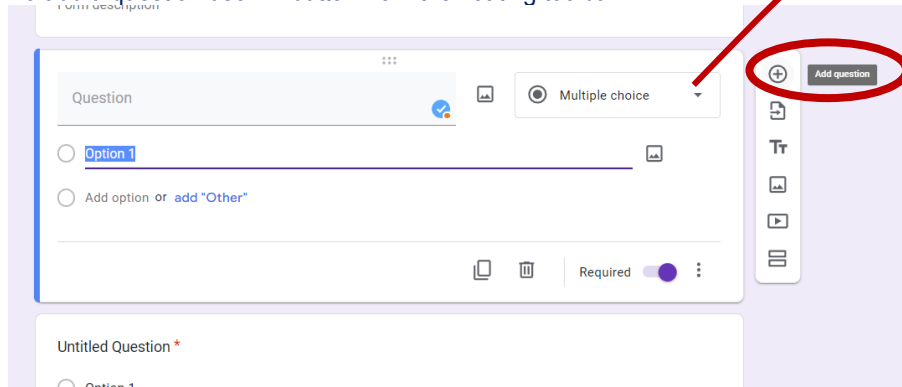


Task 4. Add questions to your form. Use questions of different types:

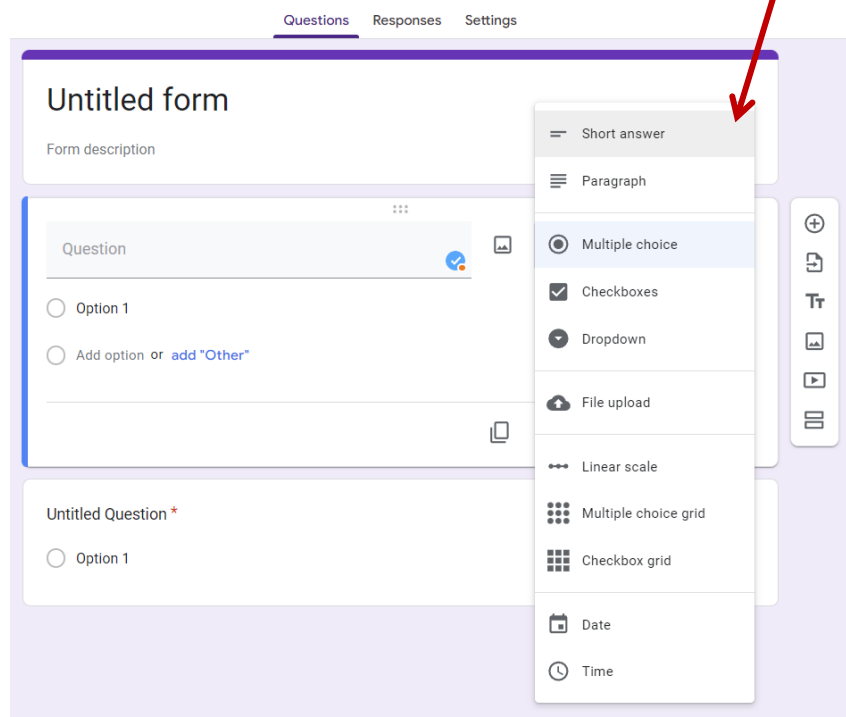
- multiple choice questions,
- dropdowns,
- check boxes,
- scale(s),

- date/time,
- short text.

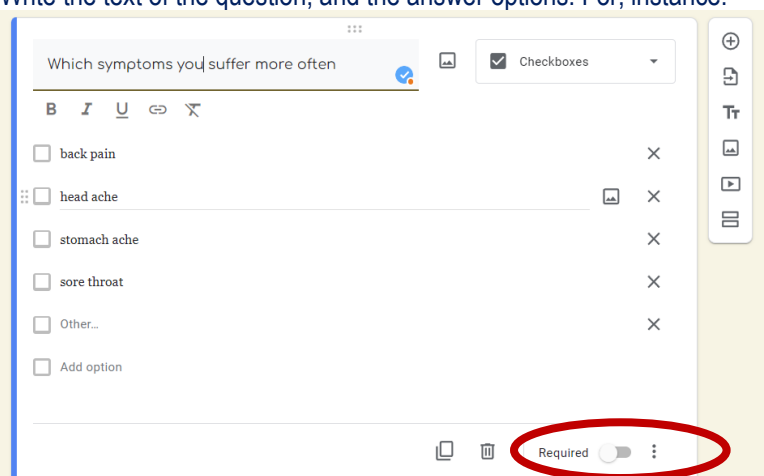
To add a question use “+” button from the floating toolbar:



To change the question type use dropdown at the top right in the question layout:



Write the text of the question, and the answer options. For, instance:



Switch on or off the option that sets if the answer for the question is required or not (at the bottom right in the question layout).

Task 5.

Use images for some questions and answers.

The screenshot shows a form editor interface with three tabs: Questions, Responses, and Settings. The 'Questions' tab is active, displaying a question: "which doctor you prefer to visit?". To the right of the question is a dropdown menu set to "Checkboxes". Below the question is a large image placeholder containing an illustration of several medical professionals (doctors, nurses, and a person in a protective suit) standing together. Below the image are suggestions for answers: "Smith", "Morrison", "Baker", and "Add option or add 'Other'". Each suggestion has a checkbox and a close button (X). A red arrow points from a callout box to the image icon in the question header, with the text "This adds image to the whole question". Another red arrow points from a callout box to the "Add image" button in the suggestions list, with the text "This adds image to the option (possible answer)".

Task 6.

Adjust the form settings:

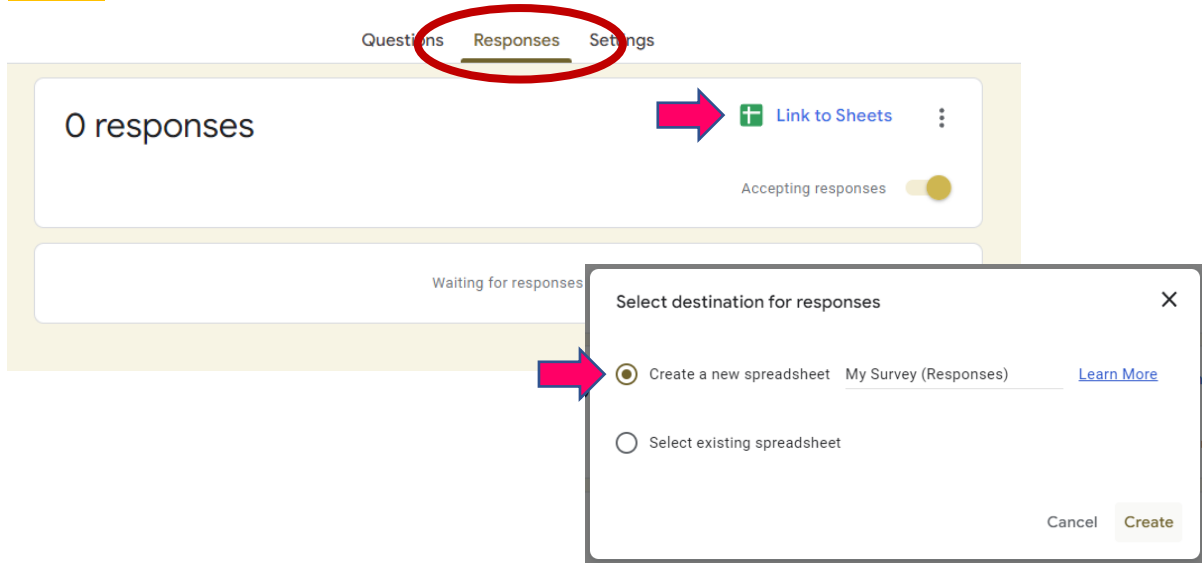
- Do not collect emails;
- Do not restrict the access to users from corporate domain;
- Do not make your form as quiz unless you form reproduces some medical scale;
- The rest settings are up to you.

The screenshot shows the "Settings" page in the form editor. The "Settings" tab is highlighted with a red circle. The page is divided into several sections:

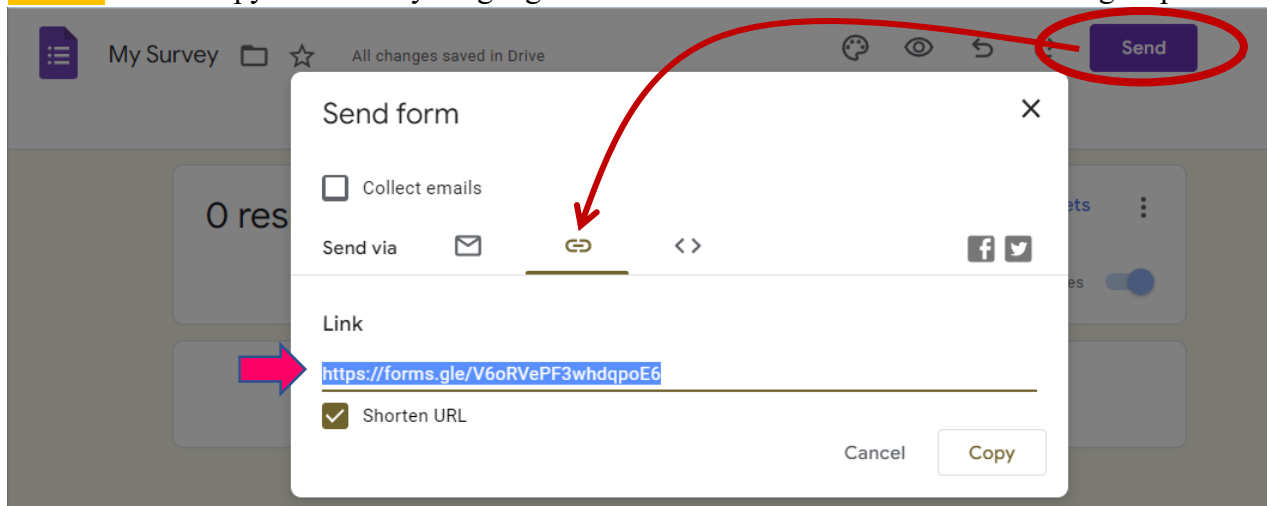
- Make this a quiz:** A toggle switch is turned off. Below it, the text reads: "Assign point values, set answers, and automatically provide feedback".
- Responses:** A section header with a caret icon. Below it, the text reads: "Manage how responses are collected and protected".
- Collect email addresses:** A toggle switch is turned off.
- Send responders a copy of their response:** A dropdown menu is set to "Off". Below it, the text reads: "Requires Collect email addresses".
- Allow response editing:** A toggle switch is turned off. Below it, the text reads: "Responses can be changed after being submitted".
- REQUIRES SIGN IN:** A section header.
- Restrict to users in Kharkiv International Medical University and its trusted organizations:** A toggle switch is turned off.
- Limit to 1 response:** A toggle switch is turned off.

Task 7.

Create a spreadsheet to collect responses to your form.

**Task 8.**

Copy the link to your google form and share it around to start collecting responses.



3. Заключна частина

3.1. Контроль виконаних завдань

3.2. Підведення підсумків (узагальнюємо типові завдання медицини і охорони здоров'я, для яких доречним є проведення опитувань; правила створення анкети, типи запитань та більш доречні засоби їх реалізації за допомогою гугл форм).

3.3. Домашнє завдання для самостійної роботи (наголошуємо на правилах виконання і термінах здачі домашніх робіт).

Примітка: за цією темою передбачається самостійна робота з виконання опитування і обробки його результатів. Етапи виконання і вимоги до завдання самостійної роботи більш детально наведено у методичних матеріалах до самостійної роботи освітньої компоненти.