Knowledge, attitude, and practice of oncologists toward chemotherapy resistance: A questionnaire development and pilot testing

Sociodemographic characteristics

1. Age_____ years (write as numbers please)

2. Gender

____ Male

____ Female

3. Educational level
   ____ Med Bachelor
   ____ Med Master
   ____ Medical Doctor
   ____ Post- doctorate

4. Clinical specialization

_____ Medical oncologist
_____ Surgical oncologist
_____ Radiation oncologist
_____ Chemotherapy oncologist
_____ Others (please specify)

5. Years in practice as a doctor_____ years (write as numbers)

6. Years of experience as an oncologist (practice in oncology field) _____ years

7. Title or position
   _____ Professor
   _____ Assistant Professor
   _____ Resident
   _____ Fellow
   _____ Others (Please specify)

8. Have you experienced any chemotherapy resistance case before?

____ Yes
____ No

Knowledge

Items	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1. I know what chemotherapy resistance is					
2. I am aware that chemotherapy resistance can exist among cancer patients.					
3. I am aware that chemotherapy resistance can happen at any stage of cancer disease					
4. I have sufficient knowledge about how to use chemotherapy appropriately for my current practice					
5. I am aware of the activities and lifestyle habits that should be avoided to counter chemotherapy resistance.					
6. I have sufficient knowledge about Chemotherapy-Resistance-Test (CRT-test)					
7. I used to ask for CTR-test prior to chemotherapy administration					

Items	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
8. When CTR-test result showed slight resistance (SR), this means the treatment plan most likely would not lead to an effective chemotherapy					
9. When CTR-test result showed extreme resistance (ER), a new chemotherapy treatment should be planned					
10. When CTR-test result showed medium resistance (MR), this means the probability of therapeutic failure is low					
11. Chemotherapy resistance is a critical health issue worldwide					
12. Chemotherapy resistance can be transmitted from one cancer patient to another					
13. Every cancer patient treated with chemotherapy is at high risk of chemotherapy resistance					
14. Misuse of chemotherapy can lead to					

chemotherapy resistance					
Items	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
15. Chemotherapy resistance occurs when cancer cells become resistant to chemotherapy, and they no longer work as well					
16. Chemotherapy resistance occurs because of a gene-mutation happened in the cancer tissue					
17. Chemotherapy resistance occurs because of cancer cells may pump the drug out of the cell as fast as it is going in using a molecule called p-glycoprotein					
18. Chemotherapy resistance occurs because of cancer cells may stop taking in the drugs because the protein that transports the drug across the cell wall stops working					
19. Chemotherapy resistance occurs because of the cancer cells may learn how to repair the DNA breaks caused by some anti-cancer drugs.					
20. Chemotherapy resistance occurs because of cancer					

cells may develop a mechanism that inactivates the drug					
Items	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
21. Chemotherapy resistance occurs because of some of the cancer cells that are not killed by the chemotherapy mutate (change) and become resistant to the drug.					
22. Delaying chemotherapy plays a major role in incidence of chemotherapy resistance.					
23. Reducing chemotherapy dose plays a major role in incidence of chemotherapy resistance.					
24. Using of mono-chemotherapy rather than combination-chemotherapy plays a major role in incidence of chemotherapy resistance					
25. Chemotherapy resistance is associated with the use of specific types of chemotherapy					
26. The use or administration of multiple types of chemotherapy treatments can					

cause chemotherapy resistance					
Items	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
27. Long duration (i.e., number of cycles) of chemotherapy can cause chemotherapy resistance					
28. High dose of chemotherapy can cause chemotherapy resistance					
29. Route of chemotherapy administration can play role in incidence of chemotherapy resistance					
30. Anemia plays a major role in incidence of chemotherapy resistance.					
31. Hormonal factors contribute to chemotherapy resistance in breast cancer.					
32. Age is a determinant of chemotherapy resistance.					

Note: Positive statements: Items (1-6, 9,11, 15-22, 24-26, 29).

Negative statements: Items (7, 8. 12-14, 23, 27, 28, 30-32).

Attitude

Items	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1. Chemotherapy resistance is the patient's fault.					
2. Chemotherapy resistance is all because of the oncologist's fault.					
3. If proper steps are taken, chemotherapy resistance can be combated.					
4. I am confident that we can still beat cancer disease successfully after incidence of chemotherapy resistance.					
5. If a patient receives proper information about the risk of chemotherapy resistance, it can be avoided					
6. Oncologists should fully assess factors that cause chemotherapy resistance in patients before					

commencing chemotherapy treatment					
7. I am satisfied with the current treatment guideline to treat chemotherapy resistance					
Items	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
8. Rapid and effective diagnostic techniques are required for diagnosis of chemotherapy resistance					
9. Personalizing chemotherapy treatment will help to prevent and/or overcome chemotherapy resistance problem					
10. National and healthcare policies are impractical against chemotherapy resistance					
11. Some chemotherapy resistance stems from genetic factors and it cannot be rectified.					
12. The patients' coping mechanisms have a bearing on their ability to overcome drug resistance.					

13. Chemotherapy resistance decreases the chance of survival					

Note: Positive statements: Items (3-6,8-13).

Negative statements: Items (1,2,7).

Practice

Items	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1. Chemotherapy protocols should be improved.					
2. I have easy access to guidelines I need on managing chemotherapy resistance					
3. I have easy access to the materials I need to give advice on prudent chemotherapy use and chemotherapy resistance					
4. In the last 12 months, I received sufficient information about chemotherapy resistance					
5. On the basis of information I receive, I change my practice on prescribing and/or administering of chemotherapy					
6. my country has a national action plan on					

chemotherapy resistance					
7. Chemotherapy resistance is very common in my practical settings					
Items	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
8. I usually consult my colleagues about any case of chemotherapy resistance					
9. When there is chemotherapy resistance, alternative treatments, which are equally effective to chemotherapy, should be used					
10. The sharing of information with patients on how to self-monitor and self-manage during chemotherapy resistance could be improved.					
11. I treat a patient with chemotherapy resistance similarly to those who do not have chemotherapy resistance					
12. Incidence of chemotherapy resistance is more common in specific types of					

cancers than others.					
13. Cross-resistance in chemotherapy can be detected and rectified in patients.					
Items	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
14. Chemotherapy should be stopped immediately when it shows no signs of efficacy.					
15. Physicians, nurses, and healthcare personnel should be trained in detecting chemotherapy resistance.					
16. Oncologists should clearly explain to their patients about the consequences of chemotherapy resistance					
17. Therapeutic privilege among oncologists should be revised to allow more transparency.					

18. While facing a case of chemotherapy resistance, I will: (can choose more than one answer):

a. Refer to the chemotherapy protocol or guideline
b. Order to conduct CTR-test
c. Increase the dose of the chemotherapy drug when there is no adequate response
d. Change the dosing interval of the drug (frequency of administration)
e. Change medication altogether and switch the patient to an alternative drug
f. Keep the same drug, but You change the brand (bioavailability issue)

g. Order measurement of plasma level of the chemotherapy
h. Add hormonal therapy to the chemotherapy treatment
i. Stop chemotherapy treatment, and use an alternative option (like herbal treatment)

Knowledge items

Knowledge items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. I know what chemotherapy resistance is	.219	.723
2.I am aware that chemotherapy resistance can exist among cancer patients.	.135	.726
3.I am aware that chemotherapy resistance can happen at any stage of cancer disease	.217	.723
4.I have sufficient knowledge about how to use chemotherapy appropriately for my current practice	.266	.720
5.I am aware of the activities and lifestyle habits that should be avoided to counter chemotherapy resistance.	.493	.701
6.I have sufficient knowledge about Chemotherapy-Resistance-Test (CRT-test)	.369	.712
7.I used to ask for CTR-test prior to chemotherapy administration	.342	.714
8.When CTR-test result showed slight resistance (SR), this means the treatment plan most likely would not lead to an effective chemotherapy	.318	.717
9. When CTR-test result showed extreme resistance (ER), a new chemotherapy treatment should be planned	.313	.718
10. When CTR-test result showed medium resistance (MR), this means the probability of therapeutic failure is low	.154	.726
11. Chemotherapy resistance is a critical health issue worldwide	.007	.738
12. Chemotherapy resistance can be transmitted from one cancer patient to another	.183	.725
13. Every cancer patient treated with chemotherapy is at high risk of chemotherapy resistance	.228	.722
14. Misuse of chemotherapy can lead to chemotherapy resistance	.231	.722
15. Chemotherapy resistance occurs when cancer cells become resistant to chemotherapy, and they no longer work as well	-.054	.738

16. Chemotherapy resistance occurs because of a gene-mutation happened in the cancer tissue	.286	.719
17. Chemotherapy resistance occurs because of cancer cells may pump the drug out of the cell as fast as it is going in using a molecule called p-glycoprotein	.137	.727
18. Chemotherapy resistance occurs because of cancer cells may stop taking in the drugs because the protein that transports the drug across the cell wall stops working	.361	.716
19. Chemotherapy resistance occurs because of the cancer cells may learn how to repair the DNA breaks caused by some anti-cancer drugs.	.305	.718
20. Chemotherapy resistance occurs because of cancer cells may develop a mechanism that inactivates the drug	.113	.741
21. Chemotherapy resistance occurs because of some of the cancer cells that are not killed by the chemotherapy mutate (change) and become resistant to the drug.	.237	.722
22. Delaying chemotherapy plays a major role in incidence of chemotherapy resistance.	.163	.726
23. Reducing chemotherapy dose plays a major role in incidence of chemotherapy resistance.	.448	.710
24. Using of mono-chemotherapy rather than combination-chemotherapy plays a major role in incidence of chemotherapy resistance	.087	.730
25. Chemotherapy resistance is associated with the use of specific types of chemotherapy	.251	.721
26. The use or administration of multiple types of chemotherapy treatments can cause chemotherapy resistance	.276	.719
27. Long duration (i.e., number of cycles) of chemotherapy can cause chemotherapy resistance	.270	.719
28. High dose of chemotherapy can cause chemotherapy resistance	.176	.726
29. Route of chemotherapy administration can play role in incidence of chemotherapy resistance	.345	.715
30. Anemia plays a major role in incidence of chemotherapy resistance.	.309	.717
31. Hormonal factors contribute to chemotherapy resistance in breast cancer.	.368	.714
32. Age is a determinant of chemotherapy resistance.	.303	.718

j. Attitude items

k.

Attitude items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. Chemotherapy resistance is the patient's fault.	.375	.702
2.Chemotherapy resistance is the oncologist's fault.	.427	.694
3.If proper steps are taken, chemotherapy resistance can be combated.	.537	.679
4.I am confident that we can still beat cancer disease successfully after incidence of chemotherapy resistance.	.343	.706
5.If a patient receives proper information about the risk of chemotherapy resistance, it can be avoided	.233	.723
6.Oncologists should fully assess factors that cause chemotherapy resistance in patients before commencing chemotherapy treatment	.362	.704
7.I am satisfied with the current treatment guideline to treat chemotherapy resistance	.398	.699
8. Rapid and effective diagnostic techniques are required for diagnosis of chemotherapy resistance	.343	.709
9. Personalizing chemotherapy treatment will help to prevent and/or overcome chemotherapy resistance problem	.337	.707
10. National and healthcare policies are impractical against chemotherapy resistance	.488	.688
11. Some chemotherapy resistance stems from genetic factors and it cannot be rectified.	.267	.714
12. The patients' coping mechanisms have a bearing on their ability to overcome drug resistance.	.453	.693
13. Chemotherapy resistance decreases the chance of survival	.026	.748

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m. **Practice items**

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Practice items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. Chemotherapy protocols should be improved.	.451	.691

2.I have easy access to guidelines I need on managing chemotherapy resistance	.463	.689
3.I have easy access to the materials I need to give advice on prudent chemotherapy use and chemotherapy resistance	.499	.682
4.In the last 12 months, I received sufficient information about chemotherapy resistance	.365	.697
5.On the basis of information I receive, I change my practice on prescribing and/or administering of chemotherapy	.159	.719
6.my country has a national action plan on chemotherapy resistance	.093	.725
7.Chemotherapy resistance is very common in my practical settings	.332	.701
8. I usually consult my colleagues about any case of chemotherapy resistance	-.001	.737

9. When there is chemotherapy resistance, alternative treatments, which are equally effective to chemotherapy, should be used	.184	.714
10. The sharing of information with patients on how to self-monitor and self-manage during chemotherapy resistance could be improved.	.204	.713
11. I treat a patient with chemotherapy resistance similarly to those who do not have chemotherapy resistance	-.088	.740
12. Incidence of chemotherapy resistance is more common in specific types of cancers than others.	.315	.702
13. Cross-resistance in chemotherapy can be detected and rectified in patients.	.458	.690
14. Chemotherapy should be stopped immediately when it shows no signs of efficacy.	.443	.688

15. Physicians, nurses, and healthcare personnel should be trained in detecting chemotherapy resistance.	.416	.693
16. Oncologists should clearly explain to their patients about the consequences of chemotherapy resistance	.637	.671
17. Therapeutic privilege among oncologists should be revised to allow more transparency.	.417	.692
18. While facing a case of chemotherapy resistance, I will refer to chemotherapy protocol , order to conduct CTR test, order measurement of plasma level of chemotherapy.	.000	.719