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A Comparison of the Effectiveness of Share Decision Making and Standard Education for Cardiac Catheterization: A Pilot Study

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Abstract

Background: Cardiovascular diseases are the second leading cause of death in the top ten leading causes of death in 2018 in Taiwan, and coronary artery disease is one of the main causes.

Aim: To compare whether there are differences in patient knowledge, anxiety, and satisfaction between the utilization of patient decision aid for cardiac catheterization and routine health education.

Subject and methods: Between July 2020 and September 2020, subjects were recruited in the clinics of the Department of Cardiology in a Veterans hospital in northern Taiwan. An experimental design was used for the study. Subjects were divided into two different education tool groups by randomization table. Subjects filled out the questionnaires before and after the education.

Result: The patient knowledge before and after education in the RC group was improved by 2.30 points, and SDM group increased by 1.50 points (p-value<0.05). The score of anxiety decreased by 0.41 points in the RC group after the education, and the score of anxiety decreased by 0.33 points in the SDM group. The levels of satisfaction of the SDM group were all higher than the RC group, but the satisfaction score for the duration of education in both groups was relatively low.

Conclusion: Regardless of the standard or SDM education model, the knowledge level of patients can be improved, and there was a statistically significant difference (P<0.05). The anxiety of patients in both groups was reduced. The satisfactions of education in the SDM group were better than those of the RC group. The duration of education was the item with low satisfaction for both groups.

Recommendations: Both methods of education can help patients increase their knowledge. The establishment of manpower responsible for education. Allowing patients to receive education before the examination can decrease anxiety and has clinical benefits.

Keywords: patient decision making, patient decision aid, education, cardiac catheter

1. Introduction

Angina is a symptom of chest tightness and chest pain caused by myocardial ischemia. Stable angina is also called exertional angina, often occurs because of fatigue, emotional agitation, cold weather and other factors, resulting in pain symptoms. Angina can increase the chances of heart attack (myocardial infarction) and sudden death. When a patient is suspected of having coronary artery disease, cardiac catheterization is most frequently utilized as a basis for diagnosis and treatment. Balloon angioplasty or stent placement can improve and treat the uncomfortable symptoms caused by angina. When patients are facing such invasive treatment, anxiety, fear, pressure and uncertainty are emotions which likely to occur, and it might further affect the performance of examination (Chang, Peng, W & Lai, 2011). The main reasons for these emotional distress are that they have not experienced a cardiac catheterization, worry about the results of the examination and uncertainty of how to care after the examination (Gallagher, Trotter, & Donoghue, 2010; Trotter, Gallagher, & Donoghue, 2011). The study of cardiac catheterization related patient care instruction has found that near 50% of the patients hoped to know the detailed steps of cardiac catheterization including the fasting preparation before examination, bed time after

examination, potential complications and uncomfortable symptoms and so on (Chung, Chang, Lin, & Hsiao, 2017). Therefore, emphasizing the necessity of providing complete and effective nursing guidance for cardiac catheterization before patients receiving treatment. It includes pre-operative assessment and using standard contents of nursing guidance and aids to ensure that patients receive the complete knowledge of nursing guidance (Chien, Chung, Lee, & Chung, 2012).Chair et al. (Chair, Chau, Sit, Wong, & Chan, 2012) states that the contents of nursing guidance should include introduction of related diseases, other relevant examinations before catheterization, the start time of fasting, bed time after catheterization, potential complications and other notifications. Even the environment of the catheterization room and the possible situations which might occur during the whole catheterization process must be included. Hence, the anxiety of the patients can be alleviated effectively, helping the patient adjust the pressure, and having a positive effect on the patients. Empirical data show that side effects related to cardiac catheterization are quite rare, with deaths in 6 per 1,000 patients, wound hematoma in 5 per 1,000 patients, and strokes which related cardiac catheterization in nearly 2 per 1,000 patients (Dehmer et al., 2012).

The share decision making (SDM) is based on evidence-based medicine, combining the medical profession and the preferences of patients, discussing together and choosing the treatment options (Wendler, 2017). The interactive process and input of opinions from both sides are emphasized in order to reach the purpose of decision making (Chou, Liang, Sun, & Sun, 2017). After Chang et al. (Chang, Chen, & Kuo, 2019) using patient decision aid (PDA), they found that the level of anxiety was 57.1% before the utilization and dropped to 28.6%. It also affected effectively on the decision making of treatment, helped increase health awareness and improve the communication between health professionals and patients. The promoting experiences from Chou et al. (Chou et al., 2017) found the two items that were quite satisfactory were ‘decision aid helps understand the things that are most concerned about when facing various medical options’ and ‘aid helps make the most suitable medical choice’. The level of anxiety before and after using aid decreased significantly as well (2.7±0.7vs. 2.2±0.5, $p = < 0.001$). It shows the positive experiences of patients using aid and can decrease the anxiety. However, the research also found the frequently occurring difficulties for executing SDM which is mainly lack of awareness (87%) followed by lack of resources. Stacey (Stacey et al. 2014) systematically analyzed 115 studies and 34,444 cases. By comparing SDM and routine nursing care, strong evidence showed that it can increase the subject’s understanding of decision and reduce decision-making conflicts related to unknowing and unclear personal values. In comparison with routine nursing care, intermediate evidence demonstrated that decision aid can sufficiently stimulate people to be more proactively as an effect during decision-making and enhance the understanding of the risk. Weak evidence showed that decision aid can raise the consistency of choices and value of patient. Hence, the advantages are that subjects have more accurate expectations, increasing the participation of decision making and enhancing the patient’s knowledge. Besides, the factors affecting the success of medical decision making are consideration of the background knowledge that subject has had, the severity of the impacts on the subject’s life quality causing by medical options, and a discussion can be difficult if the subject’s emotional state is in a painful sate (Joseph-Williams et al., 2019). The rate of the performing a surgery can be reduced by 20% through the discussion of medical decision making (Ryan & Vaughan, 2014). Stacey et al. (Stacey et al., 2017) included 105 studies involving 31,043 participants, compared to usual care, decision aids increased knowledge (95%CI 11.17 to 15.51; n = 42). Lower decisional conflict related to feeling uninformed (95% CI -9.73 to -4.78; n = 22) and feeling unclear about personal values (95% CI -8.50 to -3.67; n = 18); reduced proportions of people who remained undecided post-intervention (95% CI 0.47 to 0.72; n = 18). For satisfaction with the decision (n = 20), decision-making process (n = 17), and/or preparation for decision making (n = 3), were either more satisfied. Coylewright et al. (Coylewright, O'Neill, Dick, & Grande, 2017) found knowledge was higher among patients receiving the PDA compared with usual care (P=0.034), and patients felt more informed (P=0.043).

1.1 Significance of the Study

According to Taiwan Ministry of Health and Welfare (2019), heart disease was ranked the second for the top ten leading causes of death in 2018 in Taiwan. The death of heart disease increased 4.5 % compared with 2017. Heart disease is the second leading cause of death for people over the age of 45, and coronary artery disease is one of the leading causes. Angina is a common symptom of coronary artery disease. When angina affects daily activities, balloon angioplasty and stent placement through cardiac catheters can help patients maintain a better quality of life. Cardiac catheterization is an invasive treatment with the risks of side effects; education can be used to assist patients in evaluating and selecting proper methods of treatment. The biggest obstacle for medical personnel to implement SDM is the time it takes (Cheng, Hsu, Lee, Chang, Huang, Sheu, & Chiu, 2020). Therefore, comparing the differences between the effects of routine education methods and PDAs can be used as

a reference for policies of promoting health education models in the future.

1.2 Operation Definitions

Patient Decision Aid (PDA): Patient decision aids take a variety of forms, spanning everything from simple one-page sheets outlining the choices, through more detailed leaflets or computer programmers, to DVDs or interactive websites that include filmed interviews with patients and professionals, enabling the viewer to delve into as much or as little detail as they want. (Angela Coulter, 2014)

Routine care (RC): Using conventional education forms, the contents include the recognition of the disease, introduction of the disease, other related examinations before the examination, and starting time of fasting, time in bed after examination, potential complication and other precautions.

2. Aim of the Study

The aim of the study was to compare the differences before and after using PDA and RC including

1) The differences in knowledge

2) The difference in level of anxiety

3) The differences in satisfaction of education.

3. Research Hypothesis

The research hypothesis is that the patient's knowledge level, willingness of medical choice, anxiety level, and satisfaction for the use of PDA through the SDM process will be better than RC methods ($p<0.05$).

4. Methods and Subject

4.1 Research Design

The study design was an experimental study, two-group pretest-posttest, double-blind design. Recruitment is performed by using randomization table.

4.2 Setting

The data was collected from the outpatients of the Department of Cardiology at a Veterans Hospital in northern Taiwan. The patients who were diagnosed with coronary artery disease and stable angina, and the balloon angioplasty or stent placement through cardiac catheters was recommended by doctor.

4.3 Participants

The subjects were outpatients over the age of 40 from clinics of the Department of Cardiology. The recruitment period was from July 1 to September 30, 2020. Inclusion criteria: diagnosed with coronary artery disease and stable angina, patients who were recommended to have a balloon angioplasty or stent placement by doctor, agree to receive health education guidance and questionnaires after orally instructed by doctor. Exclusion criteria: unstable angina, there is no need for balloon angioplasty or stent placement, unable to communicate in Mandarin and Taiwanese, individuals who were unwilling to accept health education guidance and questionnaire.

4.4 Measure Tools

1) The experimental group (SDM) education tool: used the PDA tool "I have stable angina. Do I need cardiac catheterization?" developed by the Joint Commission of Taiwan. The content includes: introduction, applicable objects/applicable conditions, introduction of diseases or health issues, introduction of medical options, the method you prefer to choose at present, comparison of options, the items and the level of concern of the options, understanding of information, confirmation of medical methods and more information.

2) Control group (RC) education tools: use 2 health education contents of a Veterans hospital, (1) "Care of coronary artery disease" includes: what is coronary artery disease, treatments of coronary artery disease, precautions for daily life. (2) "Cardiac catheterization" includes: what is a cardiac catheterization, preparations before cardiac catheterization, the day of the cardiac catheterization and precautions after the cardiac catheterization.

3) The contents of the questionnaire include 3 parts: basic information (including identity, gender, age, diagnosis, education level), cognitive questions (cognitive questions from PDA of the Joint Commission of Taiwan and the contents of Internet Nursing Guidance were integrated into 14 cognitive questions), and the health education satisfaction questionnaire. A 5-point scale was used for the satisfaction questionnaire, including "How satisfied are you with the content of education?" "How satisfied are you with the education materials?" "How satisfied are you with the duration of education?" "How is your overall satisfaction with health

education?", and 2 questions to understand the anxiety before and after health education. "Before education, how anxious are you when facing the medical issues you are having?" "After the education, how anxious are you when facing the medical issues you are having?"

4.5 Methods and Phase of Data Collection

4.5.1 Validity and Reliability

1) Expert validity was used for the questionnaire, and the content validity was performed by 3 experts. The CVI value was 0.80, and the questionnaire reliability Cornbrash's α value was 0.70.

2) The experimental group used a PDA tool which was developed by the professionals and experts from the angina working team, the SDM promotion plan, Ministry of Health and Welfare. They empirically compiled "I have stable angina. Do I need cardiac catheterization?" The content include: introduction, applicable objects/applicable conditions, introduction of diseases or health issues, introduction of medical options, the method you prefer to choose at present, comparison of options, the items and the level of concern of the options, understanding of information, confirmation of medical methods and more information. For comprehension and professional appropriateness, the medical staff scored an average of 3.72 points for each section. Based on the full score of 4, the score percentage was 93%. The average score percentage for help and practicality were 85%. The public marked the comprehensibility of each section. The average score for each section was 3.28 points. Based on the full score of 4, the score percentage was 82%.

3) The control group (RC) used 2 health education contents of a Veterans hospital, which were edited and finalized by the research and development committee of the hospital.

4) The reliability of the researcher was that the educations were provided by two nurses, and consistent exercises were provided before the study to obtain a common illustration. The health education space was a cardiology outpatient clinic with a private space to ensure that the education process was not disturbed.

4.5.2 Administrative Approach

Recruitment advertisements were posted in the waiting area of the cardiology clinics. After the cardiologist explained the purpose and process of the recruitment to the eligible patients, the patient was asked for the consent, and the patient is referred to a quiet and private education space. The subjects were assigned to the experimental group or the control group by using the randomization table, and then the medical staff conducted a one-on-one professional consultation for about 20-30 minutes and completed the questionnaire.

4.5.3 Ethical Considerations

This study followed research ethic and obtained the IRB number 2020-03-007A from the Institutional Review Board. The study commenced with information the purposed to be impaired by completion of the study.

4.5.4 Statistics and Data Analysis

The data were keyed in using Excel with an anonymized encoding process. The statistical software SPSS 20.0 (IBM SPSS Inc. Chicago Illinois) frequency, percentage, average score, Standard Deviation. Fisher's Exact Test. The differences in knowledge, anxiety, and satisfaction of subjects before and after the education were compared by using Pair T test.

5. Results

5.1 Baseline Data

Demographics (Table 1)

There were 14 people participated in total, 8 people were in the RC group, and 6 people were in the SDM group. 60% of them were male. 73% of them were over 65 years old. The education level was mostly high school educated which was 60%. There is no statistical difference in the distribution of gender, age and education level for both groups.

Table 1. Basic characteristics (N=14)

	RC(n=8)		SDM(n=6)		P-value
Variable	No.	%	No.	%	
Gender					1.00

Males	5	62.5	4	66.7	
Females	3	37.5	2	33.3	
Age					1.00
50-59 years	2	25.0	1	16.7	
Over 65 years	6	75.0	5	83.3	
Education level					1.00
High school or less	5	62.5	4	66.7	
College degree or higher	3	37.5	2	33.3	

Note: Fisher's Exact Test

5.2 Differences in Cognitive Scores

There were 14 cognitive questions, 1 point for correct answers, 0 points for incorrect answers. The average cognition score before education was 12.29 points, and the cognition score after education was 14.29 points. There was an improvement of 2 points. The average time spent by the RC group was 18 minutes, and the average time spent by the SDM group was 25 minutes. Before and after health education, the RC group improved by 2.30 points (from 11.38 points to 13.75 points) and the SDM group improved by 1.5 points (from 13.50 points to 15.00 points). There was a statistically significant difference in the improvement of the cognitive scores for both groups (Table 2). It showed that both methods of health education had effects on improving the patient's cognition (p-value<0.05).

Table 2. Comparing the cognitive scores of 2 groups before and after health education (N=14)

Items	Total (n=14)			RC(n=8)			SDM(n=6)		
	Mean	(SD)	p-value	Mean	(SD)	p-value	Mean	(SD)	p-value
Total scores before health education	12.29	(1.89)	0.001**	11.38	(1.92)	0.021*	13.50	(1.05)	0.017*
Total scores after health education	14.29	(1.72)		13.75	(2.19)		15.00	(0.00)	
The difference (after-before)		+2.00		+2.3	0		+1.50		

Pair t test: *P<0.05, **p<0.01

5.3 Difference in Anxiety Scores

Anxiety scores were 0-4 points. The anxiety of the RC group after health education decreased by 0.41 points (from 2.50 to 2.08 points), and the anxiety after SDM health education reduced by 0.33 points (from 2.67 to 2.33). However, there was no statistical difference between the two groups (Table 3). It indicates that both methods of education can reduce the anxiety of patients. Of the 14 patients who received health education, 5 people (36%) completed cardiac catheterization within 3 months, of which 3 patients in the RC group accounted for 38%, and 2 patients in the SDM group accounted for 33%. It indicates that there was no difference in the impact level of treatment after health education.

Table 3. Comparison of anxiety scores before and after health education in 2 groups (N=14)

Items	RC(n=8)			SDM(n=6)		
	Mean	(SD)	p-value	Mean	(SD)	p-value
Anxiety before education	2.50	(1.62)	0.317	2.67	(1.44)	0.157
Anxiety before education	2.08	(1.38)		2.33	(1.07)	
Difference in anxiety score	-0.41			-0.33		

Note: Pair t test

5.4 Health Education Satisfaction Difference

Satisfaction score were 1-5 points, 4 items were "contents of education", "health education material", "duration of education", "overall satisfaction". SDM group had higher scores than RC group. Except for the satisfaction score for the duration of education for the SDM group was 4.83 points which is slightly lower, the other three items all got a satisfaction score of 5. It shows that the satisfaction level of the SDM group is higher than the RC group, but the satisfaction score degree for the duration of education for both groups are lower (Table 4).

Table 4. Comparison of health education satisfaction in 2 groups

Items	RC(n=8)	SDM(n=6)
	Mean(SD)	Mean(SD)
How satisfied are you with the content of education?	4.50(0.76)	5(0)
How satisfied are you with the education materials?	4.50(0.76)	5(0)
How satisfied are you with the duration of education?	4.50(0.76)	4.83(0.41)
How is your overall satisfaction with health education?	4.63(0.74)	5(0)

6. Discussion

In the United States, the prevalence of coronary artery disease is 20% among individuals aged 65 and over, 7% among individuals aged 45-64, 1.3% among individuals aged 18-45. The incidence of men is higher than women (CDC, 2011). In this study, 79% of the cases were 65 years old and above, and 64% were males which was higher than females. Because this hospital is a Veterans hospital, the age group is higher, and the majority of patients were males which are consistent with the features of the hospital.

Research showed that providing education of cardiac catheterization for patients before the surgery can help reduce the patient's anxiety before the cardiac catheterization (Chair, Chau, Sit, Wong, & Chan, 2012). Chang et al. (Chang, Chen, & Kuo, 2019) used PDA and found that the level of anxiety reduced from 57.1% to 28.6%. It can also effectively influence the choice of treatment, help improve health literacy and promote communication between medical professionals and patients. Chou et al. (Chou et al., 2017) used PDA and it significantly reduced anxiety before and after the utilization (2.7±0.7vs. 2.2±0.5, $p = < 0.001$). It demonstrated the patient's positive experience of using PDA and it can decrease the anxiety. Stacey (Stacey et al. 2014) systematically analyzed 115 studies and 34,444 subjects. By comparing SDM and routine nursing care, strong evidence showed that it can increase the subject's comprehension of decisions and reduce decision-making conflicts related to unknowing and unclear personal values. Moderate evidence demonstrated that PDA can stimulate people to be more active during decision-making and increase awareness of risks by comparing with routine nursing care. Low-level evidence showed that PDA can improve the consistency between the options and the patient's value. Therefore, the benefits are that the subject have more correct expectations, improves decision-making participation, and increases patient knowledge. Chair et al. (Chair et al., 2012) indicated that complete nursing guidance can effectively reduce the anxiety of the patient, help the patient adjust the pressure, and have a positive effect on the patient. Chien (chien et al., 2012) and the co-workers compared multimedia and traditional paper-based health education methods. It was found that both methods can reduce anxiety and there was no statistically significant difference. This study also found that different health education methods can help reduce anxiety, and there is no statistically significant difference. It might be the health education tools we used that both have detailed introduction of cardiac catheterization. The improvement of knowledge allowed patients to have a basis for choice and achieved the effect of reducing anxiety. Coylewright (Coylewrightet al., 2017) found knowledge was higher among patients receiving the PDA compared with usual care. Chang et al. (Chang, et al., 2019) investigated the use of PDA by medical staffs. The items which can help "patients consider the pros and cons of each option" "patients identify the question that they want to ask to medical staff "and "improve the health literacy of patients" had the highest scores (4.8 points). In addition, through SDM method, the items such as "can promote doctor-patient relationship" and "willing to share this decision-making process with other medical staffs" had the highest degree of agreement (4.8 points). It means that PDA can increase the satisfaction of medical service. In this study, the PDA group spent more time than the RC group, had higher degree of satisfaction and had the same outcomes. Stacey (Stacey et al., 2017) found decision aids increased knowledge and more satisfaction with the decision. For the barrier of SDM, 41% believed that "not enough time to discuss with patients" is the biggest barrier for system. This study was conducted in the clinics and it took 15-30 minutes

for each patient which affects the normal services. Hence, insufficient time for discussion with patients truly reflects the dilemma of clinical staffs. The hospital should recruit enough manpower to fulfill the SDM policy promoted by the government.

7. Limitation of the Study

The study is a pilot study. Both education groups required approximately 15-30 minutes. Two nursing staffs were responsible for other clinical works. The patient's satisfaction for the duration of education is quite low. It is the limitation of the study. The clinical staffs are busy and dedicated staffs responsible for education should be arranged in the future which can increase the quality of education.

8. Conclusion

Regardless of conventional or SDM education models, both models can raise the cognition of patients and had statistically significant differences. Both methods can reduce the anxiety in patients. The increase of cognition and the decrease of anxiety scores in the conventional educational method were higher than the ones in the SDE group. However, the satisfaction scores of educations in the SDM group were all higher than the RC group. The duration of education was the item with low satisfaction for both groups. This study found that no matter which education method is used, both can reach clinical effects.

9. Recommendation

According to the findings of this study, it is recommended that

1) Both methods of education can increase patients' knowledge, and there is a statistically significant difference and have clinical benefits.
2) Regardless of SDM or routine care, each patient takes about 15-30 minutes. Striving for dedicated health education manpower and providing adequate health education are the direction we must strive for in the future.
3) Both education methods are effective in decreasing anxiety in patients. Medical units can make their choices based on the manpower and resources of the hospital.

References

CDC. (2011). Prevalence of coronary heart disease--United States, 2006-2010. *MMWR Morb Mortal Wkly Rep, 60*(40), 1377-1381.

Chair, S. Y., Chau, M. Y., Sit, J. W., Wong, E. M., & Chan, A. W. (2012). The psychological effects of a videotape educational intervention on cardiac catheterization patients. *Contemp Nurse, 40*(2), 225-233. https://doi.org/10.5172/conu.2012.40.2.225

Chang, H. K., Peng, T. C., Wang, J. H., & Lai, H. L. (2011). Psychophysiological responses to sedative music in patients awaiting cardiac catheterization examination: a randomized controlled trial. *J Cardiovasc Nurs, 26*(5), E11-18. https://doi.org/10.1097/JCN.0b013e3181fb711b

Chang, T. T., Chen, Y. C., & Kuo, S. C. (2019). Applying a patient decision aid to facilitate decision making in women with pelvic organ prolapse. *VGH Nursing, 36*(4), 353-360. http://doi.org/10.6142/vghn.201912_36(4).0003

Cheng, H. M., Hsu, H. F., Lee, C. Y., Chang, H. D., Huang, H. C., Sheu, M. J., … Chiu, H. H. (2020). Clinical application and efficiency analysis of shared decision making (SDM) in the treatment of stable Angina. *International Journal of Studies in Nursing, 5*(2), 41-50. https://doi.org/10.20849/ijsn.v5i2.751

Chien, Y. S., Chung, Y. C., Lee, S. H., & Chung, C. R. (2012). Effectiveness of cardiac catheterization patient education using multimedia compact disc to reduce anxiety and increase satisfaction. *Yuan-Yuan Nursing, 6*(2), 29-38. https://doi.org/10.6530/YYN.2012.6(2).05

Chou, C. Y., Liang, H. W., Sun, P. C., & Sun, J. S. (2017). The practical experience of introducing shared decision making for patients with coronary artery disease in a medical center. *Journal of Healthcare Quality, 7*(1), 52-63.

Chung, K. C., Chang, Y. C., Lin, H. M., & Hsiao, P. C.(2017). Exploring the effectiveness of multimedia videos on the knowledge of patients and anxiety receiving cardiac catheterization. *Yuan-Yuan Nursing, 11*(1), 35-43. http://doi.org/10.6530/yyn/2017.1.2

Coylewright, M., O'Neill, E. S., Dick, S., & Grande, S. W. (2017). PCI Choice: Cardiovascular clinicians' perceptions of shared decision making in stable coronary artery disease. *Patient Educ Couns, 100*(6),

1136-1143. https://doi.org/10.1016/j.pec.2017.01.010

Dehmer, G. J., Weaver, D., Roe, M. T., Milford-Beland, S., Fitzgerald, S., Hermann, A., … Brindis, R. G. (2012). A contemporary view of diagnostic cardiac catheterization and percutaneous coronary intervention in the United States: a report from the CathPCI Registry of the National Cardiovascular Data Registry, 2010 through June 2011. *J Am Coll Cardiol, 60*(20), 2017-2031. https://doi.org/10.1016/j.jacc.2012.08.966

Gallagher, R., Trotter, R., & Donoghue, J. (2010). Preprocedural concerns and anxiety assessment in patients undergoing coronary angiography and percutaneous coronary interventions. *Eur J Cardiovasc Nurs, 9*(1), 38-44. https://doi.org/10.1016/j.ejcnurse.2009.09.001

Joseph-Williams, N., Williams, D., Wood, F., Lloyd, A., Brain, K., Thomas, N., … Edwards, A. (2019). A descriptive model of shared decision making derived from routine implementation in clinical practice ('Implement-SDM'): Qualitative study. *Patient Educ Couns, 102*(10), 1774-1785. https://doi.org/10.1016/j.pec.2019.07.016

Ministry of Health and Welfare. (2019, June). *2018 death statistics*. Retrieved from https://www.mohw.gov.tw/cp-16-48057-1.html

Ryan, P., & Vaughan, D. (2014). Confronting evidence: individualized care and the case for shared decision-making. *Ir Med J, 107*(10), 331-332.

Stacey, D., Legare, F., Col, N. F., Bennett, C. L., Barry, M. J., Eden, K. B., … Wu, J. H. (2014). Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev, 1*, Cd001431. https://doi.org/10.1002/14651858.CD001431.pub4

Stacey, D., Légaré, F., Lewis, K., Barry, M. J., Bennett, C. L., Eden, K. B., … Trevena, L. (2017). Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev, 4*(4), Cd001431. https://doi.org/10.1002/14651858.CD001431.pub5

Trotter, R., Gallagher, R., & Donoghue, J. (2011). Anxiety in patients undergoing percutaneous coronary interventions. *Heart Lung, 40*(3), 185-192. https://doi.org/10.1016/j.hrtlng.2010.05.054

Wendler, D. (2017). The theory and practice of surrogate decision-making. *Hastings Cent Rep, 47*(1), 29-31. https://doi.org/10.1002/hast.671