Validation of The "Assessment, Diagnosis, Intervention and Evaluation" (ADIE) Nursing Care Documentation Model

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Abstract

Care documentation provides a stable means of communication among professionals to improve patient outcomes. However, proper documentation is a challenge in nursing for which models of documentation are sometimes blamed. This study validated the 'assessment, diagnosis, intervention and evaluation' (ADIE) model of nursing care documentation. A cohort study and structured retrospective review of 715 ADIE care sheets was performed for content validity, criterion validity, interrater reliability, and inter-item correlation. One hundred and forty-three nurses from two purposefully drawn hospitals in Yenagoa successfully filled the ADIE patient care sheet. A six-step validation method was employed: preparing content validation form, selecting expert review panel, conducting content validation, reviewing domains/items, providing score on each item, and calculating content validation index. Content validity of ADIE is high (S-CVI/Ave = 0.833), criterion validity is good (mean rating = 0.833), interrater reliability is strong and reliable (Intraclass r = 0.759, p < 0.05, and model inter-item correlations were average/weak. ADIE nursing care documentation model is valid and reliable and helps nurses document care. Hospitals should implement and enforce ADIE to improve documentation and care quality.

Keywords: Books, Documentation, Healthcare Delivery, Hospitals, Nigeria, Nursing Process, Patient Care Planning

1.   Introduction

Nursing care documentation is a fundamental component of a healthcare delivery system. Documentation serves as a stable means of communication among professionals and greatly influences patient safety and care outcome.[1] If care documentation is carelessly handled, patient safety may be compromised.[2] However, nursing is laden with myriads of documentation challenges, including: incomplete, incorrect or no documentation problems; discrepancies between recorded contents and intended meanings; mismatch of reality of situations and nurses' documented information, etc.[3,4] These problems are observed worldwide both in paper-based and electronic-based nursing documentation.[5,6]

Poor nursing documentation has persisted in spite of availability of relevant installations in facilities.[7,8] Adopting new forms of documentation also has not quite improved the situation.[9] In many Nigerian hospitals, anecdotal reports abound that there is a nursing care plan booklet for nurses to document their care but it is rarely used, not used at all or filled haphazardly and kept away in lockers rather than in the patient's folder. Also, the format of such booklet only provides for assessment of a stable, conscious patient on first contact in line with Gordon Marjorie's functional health patterns.[10] Subsequent problem-focused patient assessment data and continuous care documentation is not provided for thereby leaving the nurses to record their care in poorly designed and non-structured formats in the form of daily progress notes, ward report books or in continuation sheets. These situations have continued keep nursing care documentation far from the ideal.[11]

An ideal and acceptable nursing documentation: (i) should be patient-centred, (ii) must contain the actual work of nurses (interventions), (iii) should reflect the objective clinical judgment of the nurse (diagnosis), (iv) should be logical and sequential, (v) should be written as events occur, (vi) should record variances in care and (vii) should fulfil legal requirements.[12] A good nursing documentation should also be user-friendly and based on documentation models and formats which are aligned with the nursing process. However, many of these criteria are not observed.[12] Nurses do not often record vital patient's details such as assessment data, diagnosis, plan of care, implementation and evaluation[13] and the format of documentation is often blamed[14] Consequently, attempts are continually made to improve the quality of nursing care documentation through creation of new systems and re-evaluation of old systems because redesigning of existing documentation forms based on results of evaluation improves documentation practices[15].

Inferentially, after acceptance and adoption of models of documentation by agencies, such innovations should be validated to ensure that documented nursing care is fitting, real, optimal and acceptable. In this vein, the Association of Perioperative Registered Nurses (AORN) conducted validation of some practice standards for relevance and usability in hospitals. [16] Experts' opinions and clinical testing have also been adopted for validation of two models for adequacy of entities, attributes and their optionality, value set and their applicability in hospitals[17] while Delphi technique was utilised to validate contents of an instrument for assessment of nursing care product.[18]

To surmount the problem of poorly designed models of documentation, a "ADIE model" (in a client sheet) was also developed, tested and well accepted.[19] The model is intended to suit all settings and situations of care because it provides for documentation of on-the-spot and continuous assessment and management of patients. ADIE is an acronym which stands for Assessment, Diagnosis, Intervention and Evaluation which are steps in the nursing process; showing that it is premised on the nursing process as opined in literature.[20] The explanation of each component is same for the nursing process except "Intervention" in which the "planning and implementation" phases of the nursing process are merged as one in ADIE. In "Intervention", the nurse is to write down a plan of what should be done or has already been done for a patient at a given time of contact based on the obtained assessment data and identified nursing diagnosis.

With the way ADIE is designed, it is no doubt that nurses would document or fill out all the sections accordingly. Nevertheless, appropriateness and/or correctness of the nurses' documented contents in each column in line with the definition of each phase is another thing altogether. What is the guarantee that ADIE would actually aid nurses to document the expected ideal in conformity with the nursing process standards or definitions of nursing process domains? Would the ADIE satisfy relevant reliability and validity parameters so that it can be adopted? These questions necessitated the validation of the model in terms of certain psychometric properties which include validity (such as face, content, construct and criterion-related validity) and reliability in form of internal consistency measures, inter-rater reliability and test-retest reliability.[21] Besides, when models are validated they are strengthened.[9] Moreover, validation of nursing documentation in tertiary hospitals in Bayelsa State is important

since they are training institutions for so many students who need to know the proper way to document and practice same, which will help in theory practice integration in relation effective implementation of the nursing process through to documentation.

The specific objectives were to: establish the content validity, determine the criterion validity, establish the interrater reliability of the ADIE nursing care documentation model and determine the inter-item correlation of nursing documentation in the ADIE model.

2.   Materials and Methods

This study adopted the cohort study design using structured retrospective record review in the medical and surgical wards of two tertiary hospitals in Bayelsa State which were purposively selected, namely: Niger Delta University Teaching Hospital (NDUTH), Okolobiri and Federal Medical Centre (FMC), Yenagoa in Bayelsa State. The study involved two categories of samples. The first was all 175 nurses of the selected hospitals out of which only 143 were accessed and conveniently selected and generated the patient care nursing data that was used for analysis. The second sample was 715 copies of the documented ADIE care sheet (i.e. approximately 5 copies per nurse) which were purposively selected based on completeness in filling of domains for the validation analysis. The instruments for validation which were also used for data collection were the ADIE model (Client Care Sheet) and a questionnaire. The ADIE model (Client Care Sheet) has six columns for: date/time, Assessment, Diagnosis, Intervention, Evaluation (ADIE) and signature. The questionnaire contained items on sociodemographic data of respondents. The content and criterion validity of the instrument as well as validation of the documented nursing care were ascertained from results of analysis of the data obtained with the instruments. Likewise, the interrater reliability of the model was also ascertained from results of analysis of the data obtained from the instruments.

The procedure for data collection followed ethics committee approval which was obtained from the study centres. With these, administrative permit was obtained to collect data. Request was made on the DNS to have the nurses gathered in batches in the nurses' conference rooms for 10 to 15 minutes briefing about the instruments for data collection. The batched arrangement and time of meeting was according to their convenience in terms work realities. The researcher introduced the model to the nurses and explained it to them and requested them to start using it as they attend to their patients. Two research assistants who were intern nurses were trained to help with retrieving completely filled forms for photocopy and return to the ward. In each ward, at the end of a shift (8 hours) or before the end, documents that are filled were retrieved by the researcher and assistants. The number of client care sheets used by the nurses was 715. After filling the model, they were given the questionnaire to answer and retrieved immediately but uncompleted ones were collected later. The procedure took place simultaneously in the selected wards and was repeated throughout the three shifts in the day. The exercise lasted for three weeks in each hospital. The entire data collection period was therefore six weeks.

Data obtained (i.e. contents of ADIE model that the nurses completely filled) was analyzed using analysis of variance in order to establish the validity of the model in line with the nursing process in terms of content validity, response process, internal structure and relation to other variables

and consequence. The results were presented in tables. The validity of the model followed the six steps of content validation proposed in literature.[22]

2.1. Step 1: Preparation of Content Validation Form: This provided the panel of experts with clear expectation and understanding about the task they had to perform. A rating scale of relevance (1-4) was used to score individual domains (i.e. the columns of the model: A,D,I,E). Definition of domain to facilitate the scoring process by the experts was also done as follows: 1 = the column is not relevant for documentation of nursing care; 2 = the column is somewhat relevant for documentation of nursing care; 3 = the column is quite relevant for documentation of nursing care; 4 = the column is very relevant for documentation of nursing care.

2.2. Step 2: Selection of a Review Panel of Experts: This panel was based on expertise of members in documentation of patient care. They were six in number because it has been established that the more the members in the expert panel the better the content validation index (CVI).[23] Specifically, it is stated that the content validation index (CVI) is equal to 0.82 if the members are up to six. Hence the choice of six members which included 2 medical-surgical nurses in the clinical area with a Masters degree; 4 members of faculty (lecturers in nursing department and school of nursing) who are also Masters degree holders and have been involved in instrument validation at other times;

2.3. Step 3: Conduction of Content Validation: Face-to-face approach of expert panel meeting was organized which the researcher facilitated based on the content validation process through Step 4 to Step 5.

2.4. Step 4: Reviewing of Domains/Items: The experts were requested to critically review each domain/item before providing score on each item. The experts were also encouraged to provide any verbal or written comment that would improve the relevance of the items which will be taken into consideration to refine them.

2.5. Step 5: Provision of Score on Each Item: Upon completion of reviewing the items, the experts were requested to provide score on each item independently based on the relevant scale provided. They were further requested to provide rationale or justification of their responses (i.e. the scores and review details) to the researcher after scoring.

2.6. Step 6: Calculation of CVI: Prior to the calculation of CVI, the relevance rating was graded as 0 (for relevance score of 1 or 2) and 1 (for relevance score of 3 or 4). After this, calculation was done for the I-CVI (item-level content validity index), S-CVI/Ave (scale-level content validity index based on the average method) and S-CVI/UA (scale-level content validity index based on the universal agreement method). These helped to determine the validity of the model.

The reliability was determined via a checklist (that is, audit form) as contained in literature.[24] It was designed by the researcher to grade the usage or degree of completion of documentation of the various components and contents of the model. Proper usage was graded (3), improper usage was graded (2) and non-usage was graded (1) and means and standard deviation of the grades in the checklist were used to ascertain the reliability of the model instrument.[19] The results obtained were used to ascertain the reliability of the model. Responses in the questionnaire were also analyzed using simple descriptive statistics.

The study was approved by the Research Ethics Committee of the hospitals. Also, since patients' information was collected in the document, the patients were informed of the purpose of the study and assured of confidentiality, and verbal consent was obtained from them. Verbal consent was also obtained from the nurses and willingness to participate further affirmed implicit consent.

3. Results

3.1. Socio-demographic data of respondents

Table 1 shows that various cadres of nurses participated in the study including: nursing officers (NO), senior nursing officers (SNO), principal nursing officers (PNO), assistant chief nursing officers (ACNO), chief nursing officers (CNO), and assistant director of nursing services (ADNS). Majority are lower cadre nursing officers where 44.7% are NO II, 33 (23.1%) are NOI and 21 (14.6%) are SNO. The middle cadre has PNO with 9% and 4.2% respectively while the top ranks, including ACNO, CNO and ADNS in the study were 4.2%, 3.5% and 0.7 respectively. Also majority of the respondents were females (89.5%) and the rest 15 (10.5%) were males. On the educational and professional qualification, majority of the respondents are RN, RM holders (44.1%). This was followed by holders of only RN (23.8%) and RN, RM plus other Post Basics (22.4%). The fewest respondents were degree holders: BNSc holders (9.1%) and MSc (0.7%).

3.2. Content Validity of ADIE nursing care documentation model

Table 2 shows that the number of items considered relevant by all the panelists = 1; number of items measured = 6, and number of experts = 6. The S-CVI/Ave (Average of I-CVIs) = 0.833 while S-CVI/UA = 1 / 6 = 0.167. The decision rule is: if I-CVIs ≥ 0.8, the item is appropriate; if 0.7 ≤ I-CVIs < 0.8, the item needs revision and if I-CVI < 0.7, the item is eliminated. The interpretation from the foregoing is that the content validity of ADIE nursing care documentation model is high since S-CVI/Ave is 0.833.

3.3. Criterion validity of ADIE nursing care documentation model

Results from Table 3 show that 4 validators (validators 1, 3, 5 and 6) out of the 6 validators, had a mean rating score of 1 for the ADIE nursing care documentation model, validator 2 had a mean rating score of 0.33 while validator 4 rated it 0.67. The overall mean rating is 0.833 for the ADIE nursing care documentation model. Comparing this against the benchmark of 0.82,[23] this indicates that the criterion validity of the ADIE nursing care documentation model is good. Hence, it should be accepted.

3.4. Mean Validation Scores of ADIE Nursing Care Documentation

Table 4 revealed that mean validation scores of the various validators range from 2.64 to 2.97 (for Date/Time), 2.49 to 2.79 (for Assessment), 2.69 to 2.87 (for Diagnosis), 2.82 to 2.95 (for Intervention), 2.44 to 2.76 (for Evaluation) and 2.51 to 2.79 (for Signature). With the overall mean values of the various items being greater than 2.5, it is concluded that the validators are of the view that the nurses properly documented the information pertaining to the various items.

3.5. Interrater reliability of the ADIE nursing care documentation model

From Table 5, based on the average measures of the validators scoring on the various items, the Intraclass Correlation coefficient is 0.759. This indicates a strong correlation. With p-value (0.007) < 0.05, this correlation is significant. Therefore, interrater reliability of the ADIE nursing care documentation model is strong. Hence, the ADIE nursing documentation model is reliable.

3.6. Inter-Item Correlation Matrix for Nursing Documentation in the ADIE Model

The inter-item correlation matrix shown in Table 6, indicates that an average correlation exists between Diagnosis and Intervention (0.686), Diagnosis and Evaluation (0.583), and Intervention and Evaluation (0.484). The table also reveals that Assessment has a weak correlation with Diagnosis (r = 0.329), Intervention (r = 0.279) and Evaluation (r = 0.191), and a negative correlation with Signature (r = -0.61). However, date/time barely has correlation with the other items (r - values < 0.062); and Signature also barely has correlation with the other items (r - values < 0.029).

Table 1: Sociodemographic data of respondents *n = 143*

Variable		n	%
Rank	NOII	64	44.7
	NOI	33	23.1
	SNO	21	14.6
	PNO	13	9.0
	ACNO	6	4.2
	CNO	5	3.5
	ADNS	1	0.7
Gender	Female	128	89.5
	Male	15	10.5
Education	RN	34	23.8
	RN,RM	63	44.1
	RN,RM+ other Post Basics	32	22.4
	BNSc	13	9.1
	MSc and above	1	0.7

Table 2: Content Validity of ADIE nursing care documentation model

Items	Relevant (3 or 4 = 1)	Not Relevant (1 or 2 = 0)	I-CVIs	Interpretation
Date/Time	5	1	0.833	Appropriate
Assessment	6	0	1.000	Appropriate
Diagnosis	5	1	0.833	Appropriate
Intervention	5	1	0.833	Appropriate
Evaluation	5	1	0.833	Appropriate
Signature	4	2	0.667	Eliminated

Table 3: Validation scores of validators showing criterion validity of ADIE nursing care documentation model

Validator	Date/Time	Assessment	Diagnosis	Intervention	Evaluation	Signature	Mean
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	.00	.00	.00	.00	0.33
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	.00	1.00	1.00	1.00	1.00	.00	0.67
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mean	0.833	1.00	0.833	0.833	0.833	0.667	0.833

Table 4: Mean Validation Scores of ADIE Nursing Care Documentation

Validator		Date/Time	Assessment	Diagnosis	Intervention	Evaluation	Signature
1.00	Mean	2.6410	2.6923	2.8718	2.8462	2.6667	2.6410
	Std. Deviation	.58432	.46757	.40907	.36552	.57735	.70663
2.00	Mean	2.8205	2.6154	2.7692	2.8974	2.4359	2.6154
	Std. Deviation	.45142	.54364	.53614	.30735	.71800	.74747
3.00	Mean	2.8205	2.7436	2.7949	2.8718	2.5128	2.6154
	Std. Deviation	.38878	.49831	.52212	.33869	.72081	.78188
4.00	Mean	2.7949	2.4872	2.6923	2.8205	2.5641	2.5128
	Std. Deviation	.52212	.64367	.61361	.45142	.68036	.85446
5.00	Mean	2.7895	2.7895	2.8421	2.9474	2.6842	2.7895
	Std. Deviation	.41315	.47408	.36954	.22629	.52532	.62202
6.00	Mean	2.9737	2.6053	2.8421	2.9737	2.7632	2.6842
	Std. Deviation	.16222	.59455	.43659	.16222	.54198	.66191
Total	Mean	2.8060	2.6552	2.8017	2.8922	2.6034	2.6422
	Std. Deviation	.44756	.54421	.48741	.32438	.63627	.73061

Table 5: Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.344[a]	.051	.806	4.146	5	25	.007
Average Measures	.759[c]	.245	.962	4.146	5	25	.007

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Table 6: Inter-Item Correlation Matrix for Nursing Documentation in the ADIE Model

	Date/Time	Assessment	Diagnosis	intervention	Evaluation	Signature
Date/Time	1.000	.062	-.078	-.085	-.134	.012
Assessment	.062	1.000	.329	.279	.191	-.061
Diagnosis	-.078	.329	1.000	.686	.583	-.103
Intervention	-.085	.279	.686	1.000	.484	-.017
Evaluation	-.134	.191	.583	.484	1.000	.029
Signature	.012	-.061	-.103	-.017	.029	1.000

4. Discussion

The present study investigated the validity of ADIE nursing care documentation model based on structured retrospective records review by a cohort. The study investigated the content validity of the model because it is the ability of selected items to reflect the variables of the construct in what is being measured and a prerequisite for other validity; consequently, it is opined to receive the highest priority when instruments and models are developed.[25] In this study, content validity was therefore computed and the findings revealed a scale-level content validity index based on the average method (S-CVI/Ave) that is 0.833 which reflects a high content validity for ADIE nursing care documentation model. This finding is in consonance with other related studies. First, the finding of this study surpassed those in another where experts' panel opinions was calculated to yield an accepted I-CVI of 0.82.[26] The I-CVI score in this study is also higher than the 0.78 which is reported as ideal and acceptable if the number of experts judging the tool is six or more in number.[27] Similarly in a different study, an assessment tool was evaluated for content validity using the scale-level (S-CVI) and item-level (I-CVI) which yielded values greater than or equal to 0.78 and was concluded as high validity.[28] Furthermore, another study also determined the content validity of an instrument that yielded an accepted S-CVI/UA = 0.63 and S-CVI/Ave = 0.91. [29] In all these related studies, the procedures utilized to ascertain the content validity of the respective tools were akin to the approach adopted for ADIE in this study. The similarity in procedural approach may be responsible for the like findings as well. In any case, content validity of the ADIE model is procedurally and statistically satisfactory as found in this study.

The study equally determined the criterion validity of the model which is the comparison of a measure against a particular single measure that is supposed to be a direct measure of a concept under investigation. In this study, the findings revealed an overall mean rating of 0.833 for the ADIE nursing care documentation model which represents the model as good according to CVI benchmark of 0.82.[23] The result of 0.833 in this work is also similar to findings elsewhere which obtained CVI scores of 0.56 to 0.87 as acceptable.[30] The finding also further meets the assertion that a correlation coefficient of 0.20 or greater (or -0.20 or smaller) with a 95% confidence interval (0.05 p-value) is considered statistically significant.[31] Procedurally too, the utilization of different validators scores to compute criterion validity in this study is similar to another where criterion validity of new scoring categories was evaluated using counter-posed groups approach that yielded varying scores such as 0.30, 0.11 0.05 which informed a recommendation

to revalidate those aspects of the instrument that had scores less than 0.20.[31,32] The discourse shows that the criterion validity of ADIE nursing documentation model meets the established acceptance having satisfied criteria of determination as found in similar works on development and validation of instruments or models.

Also determined in this study was the interrater reliability of the ADIE nursing care documentation model. This was done because evaluation of inter-rater reliability (IRR) either as a primary or a secondary component of a research in which raters or observers are used as a method of measurement is common in various disciplines.[33] In one study, inter-rater agreement of items in the instrument by independent judges was utilized, and then Intraclass Correlation Coefficients (ICC) between them were computed to arrive at values ranging between 0.71 and 0.92 which were considered accepted as reliable. [33. In this study also, an Intraclass Correlation coefficient of 0.759 was derived which portrays the ADIE model as reliable. This study finding is further similar to others in which reliability of temperature measurement ranged from moderate to excellent based on intrarater, ICC values between 0.661 and 0.990. [34] The concordance of the findings in this study with others is likely due to methodological similarities among the studies. However, the important thing is that ADIE nursing care documentation model is reliable having fulfilled reasonable criteria for adoption for utilization.

This study also determined the Inter-Item Correlation of nursing documentation in the ADIE model. This was undertaken because literature suggests that to further estimate reliability of an instrument, the intercorrelation of the items or components of the instrument or model should be determined.[35] Specifically, inter-item correlation is a way of analyzing internal consistency reliability in which individual items on the instrument or model is measured to give consistent and appropriate results.[36] In this study, the Inter-item correlation values (0.191 to 0.686) indeed show that correlations exist between the various components of ADIE model without redundancy. These findings are similar to reports in another study where Inter-item correlations ranged from 0.37 to 0.76 indicating no item redundancy.[37] On a general note, literature reported that Inter-item correlation values between 0.15 to 0.50 represents a good result; values lower than 0.15 imply not quite a good correlation,[38] while values higher than 0.50 mean that the items are correlated to a greater extent with a possibility that the contents might be repetitive thereby practically making the items the same, which implies a redundancy.[39]

In this study, while the inter-item connection values (0.484 to 0.686) show averagely moderate connections amongst Diagnosis, Intervention and Evaluation; relatively weak correlations were also identified between Assessment and Diagnosis, Intervention and Evaluation (r = 0.191 to r = 0.329). The weak correlations found in this study may be suggesting that the nursing assessment data are not fitting enough or quite apt for the diagnoses, interventions and evaluations respectively and this implies poor documentation of nursing care which does not reflect the true state of patients' conditions. Similar report is found in literature where the information nurses document often do not match the actual reality of situations.[4] Likewise, it is noted that some information in nurses' documentation was differing in meaning from the contents that are documented.[14] Nevertheless, for the fact that the nursing documentation (that is, contents of care) in ADIE are averagely correlating, it can be asserted that the ADIE model does not

inherently mislead nurses into documenting patient care incorrectly as reported in literature.[14] Any fault in the documented contents is therefore attributable to the documenting nurses.

Be that as it may, the identified weak correlation between assessment data and the contents in the other components in the model raises some concerns of threat for the patient based on the importance of nursing documentation in clinical practice. It is widely noted in literature that a clinical document containing nurses' input in patient care is crucial to patient's safety and outcome because it greatly influences decisions and interventions.[1,21] From a professional perspective too, a weak correlation of documented contents portends that inter-professional communication as well as proper implementation of the nursing process is compromised. In any case, the findings of weak correlations tend to corroborate the report that nursing documentation was challenging, problematic and requires improvement.[6]

5.   Conclusion

This study concluded that ADIE nursing care documentation model is valid and reliable, and it offers nurses an opportunity to properly document their care thereby effectively implementing the nursing process and ultimately improving nursing care. The researchers recommend that hospital managements should enforce the use of ADIE through regular clinic audit in order to promote documentation practices.

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