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Proposed Model

Content analysis methods for conducting research in social and administrative pharmacy

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Abstract

Background: Content analysis is a research technique used to systematically collect and analyze the makeup and exchange of communication through various visual, auditory, and print media. It has been used in health care to study communications to audiences using a broad range of media.
Objective: The purpose of this article is to introduce the methodology of content analysis and suggest some recommendations for its use.
Methods: A review of steps used in content analysis are provided and illustrated using 2 examples of pharmacy advertising research to highlight major ideas, delineate problems faced when using the methodology, and describe how issues were resolved.
Results: The quality of content analysis studies depends on using clear definitions of study constructs, explicit sampling methods, systematic analysis and reporting of data, and inferences that incorporate current research evidence. Transparent methods that permit reproducibility of results are essential.
Conclusions: Ultimately, good content analysis depends on the skill, competence, diligence, and integrity of trained researchers.

Keywords: Content analysis; Qualitative research; Research design; Marketing; Services advertising

Introduction

Many questions of interest to health care researchers deal with messages communicated by one party to another. Communications to various audiences originating from direct-to-consumer advertisers, organizations, web site designers, health care professionals, public officials, and the press can be rich sources of research questions. These communications can be explored using a psychosocial research methodology called content analysis. *Content analysis* is a technique that systematically collects and analyzes the makeup and exchange of communication through various visual, auditory, and print media. It has been used in the fields of psychology, journalism, political science, and consumer behavior to scientifically and objectively describe the content delivery of communications. It can be used with any investigation of communication content and has been used in health care to study some of the following questions:

- How well do local television station news organizations report stories about health?[1]
- Based on written self-narratives, in what negative health behaviors do pharmacy students

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engage, and what explanations are given for doing so.[2]
- How do diverse Internet pharmacy sites respond to submitted drug information questions?[3]
- How has smoking been portrayed by the 10 most popular actresses in Hollywood in various types of films?[4]
- What major legal and ethical issues related to the pharmaceutical industry have been discussed in the press over different years.[5]
- What themes and discussions arise during patient consultations with pharmacists?[6]
- How do patients perceive and evaluate health care encounters?[7]
- How was health care reform covered in major newspapers?[8]
- What images of pharmacists are presented in pharmacy newspaper advertising? What strategies and messages are emphasized?[9]
- How educational are direct-to-consumer television pharmaceutical advertisements in providing information about the causes of a disease or who may be at risk?[10]

This article describes the methodology of content analysis and suggests some recommendations for its use. Two examples—one of a published analysis of pharmacy newspaper advertising content and another of an unpublished analysis of Internet web site advertising—are used to illustrate major ideas, delineate problems faced when using the methodology, and describe some how issues were resolved. Neither is offered as a perfect example. Indeed, both highlight potential but avoidable pitfalls for beginners in content analysis research.

It is hoped that this overview will stimulate pharmacy researchers to seek ways to use content analysis to answer questions of interest to the discipline. This overview is not meant to be a definitive review of the topic given the various applications of the technique and the respective problems associated with each application. Instead, this introduction is provided to encourage individuals in the discipline to read more about the topic of content analysis. Good books are available for a more thorough discussion of the subject.[11,12]

Background

Content analysis uses the scientific process to identify messages relevant to a defined or evolving theoretical framework, recode the messages into a quantifiable form using explicit and objective processes, and analyze the messages to draw conclusions that further understanding of theory. Content analysis is considered a qualitative research technique because it is exploratory in nature and less structured than quantitative research. The value of content analysis lies in its capacity to explore questions unanswerable by more quantitative methods. However, the issue of the qualitative vs quantitative focus of the technique is somewhat muddied because it is often classified into 2 types: qualitative and quantitative content analysis. Qualitative content analysis differs from quantitative content analysis primarily in its emphasis on interpretation over quantification, subjectivity over objectivity, flexibility in process over outcome, and concern for influence of context on the research process.[13] This article recognizes the dichotomy, but feels that the debate is beyond the focus of this article and can be distractingly irrelevant for most content researchers. In consideration of the debate, the methods described in this article should be recognized to lean toward the quantitative category of content analysis. For information on the process of qualitative content analysis see Mayring.[14]

Content analyses can be used for making inferences about 3 general categories of questions.[15] The first category deals with the messages being communicated, and it answers questions such as "who," "what," "how," "when," and "to whom." For example, one study in the discipline of social and administrative pharmacy asked, "What claims and information are presented on the Internet for the best-selling herbal products?"[16] Researchers explored the content of these claims, and the claims were found to be misleading in many instances. A second category of questions deals with the impact of events or interventions on subsequent communications. A study from this category from health care described the relationship between press releases about health care journal articles and the publication of subsequent newspaper articles.[17] It was found that press releases have significant impact on newspaper stories. The last category of content research examines the effects of communications on some dependent variable. One example from our discipline asked how the announcement of hormone therapy risks originating from the Women's Health Initiative study influenced discussions conducted in on-line menopause message boards.[18] The analysis found that the announcement

increased the quality and quantity of on-line discussions about menopause.

Good content analyses are considered to have several common characteristics.[19] They are *objective* because they use detailed and transparent procedures that permit others to effectively judge the methods and replicate the data if desired. They are *systematic* because they use explicit rules based upon established content analysis processes to reduce personal bias of researchers. Rules are developed for the data to be analyzed, how categories of data are defined, the populations of interest, sampling, analysis of the data, and specific procedures used. Many social science researchers would agree, and it is argued here, that good content analyses are also *quantitative* because they result in data that can be counted and analyzed using statistical techniques. This permits objective and replicable results that can describe scientifically the phenomena seen in communications. Any exploration that does result in either numbers or percentages is not a content analysis; it is simply a subjective description of an observation.

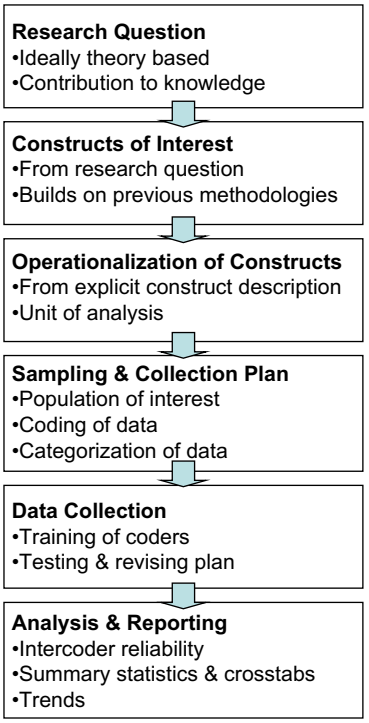

Fig. 1. Steps in content analysis.

Step-by-step procedures

The research question

Content analysis follows a process similar to any other research in that it poses one or more questions, defines constructs and measures of interest, collects and analyzes data, and draws conclusions (Fig. 1). Other schema may differ somewhat from the one presented in Fig. 1, but it captures most of the steps seen in any quantitative content analysis.

A content analysis typically begins with some research question. To illustrate, the study by Holdford and Yom[9] asked the following question about pharmacist services, "To what degree do pharmacy advertisements use strategies to make pharmacist services appear more tangible." Ideally, research question(s) such as Holdford and Yom's should have some theoretical origin, although the exploratory nature of this method allows it to be used for describing general phenomena, fostering new research, and generating new study hypotheses. Nevertheless, some basis in theory is helpful if investigators wish to use their results to add to the theoretical literature. In addition, a theoretical framework can be used to delineate choices made while conducting the research.

Holdford and Yom's[9] study examined the messages and images presented about pharmacist services in pharmacy newspaper advertising. Their research was founded upon services marketing theory which argues that services advertisements require different strategies than product advertisements, specifically, that services be communicated in a manner that make them appear more "tangible."[20,21] Tangibility can be conveyed by emphasizing the service process, the people involved (eg, pharmacists, patients), tangible objects (eg, mortar and pestle), word-of-mouth recommendations, and certifications of quality (eg, awards for service). In addition, the research explored the degree to which advertising emphasized "pharmacist services" compared with "products."

Holdford and Yom's findings helped formulate a new question for an unpublished follow-up study, "What image is presented of pharmacists in retail pharmacy web sites?" Holdford and Yom found that pharmacy advertising in newspapers practically ignored pharmacists and pharmacist services, possibly because newspapers as media were not a good way of influencing perceptions of image. It was decided that a second study should

look at a media that was more engaging and flexible for communicating the professional image of pharmacists—pharmacy web sites. Originally, the plan was to duplicate the exact methodology used for examining newspaper ads, but as with most research, things did not work out as intended.

Constructs of interest

Consequently, theory and previous literature from marketing and pharmacy helped drive much of the research, including the definitions of constructs used in the research question. This is an example of ''directed content analysis'' where theories are used to define the constructs to be studied.[22] This differs from ''conventional content analysis'' where coding categories are derived from the data. In this directed content analysis, definitions of the constructs ''tangibility'' and ''services'' came from previous research from the services marketing literature,[23] and many of the choices made by researchers relating to measures, sampling, and data classification were driven by the literature.

Holdford and Yom[9] faced a problem when defining their construct of interest, ''pharmacist services,'' when evaluating newspaper advertisements. Originally, the construct to be studied was ''pharmacy services,'' but that term could comprise verbal or visual depictions of cosmetic, photo, and other nonprofessional services. Therefore, the construct ''pharmacist services'' was chosen and defined as, ''any picture, word, or phrases relating to a pharmacist, pharmacy department, or prescription products.'' Health-related products, such as over-the-counter and complementary medicines, were ignored unless they were linked in the advertisement with a pharmacist or the pharmacy department. Explicit definitions of constructs originated from both the marketing and pharmacy literature, and they were essential for ensuring that findings about ''pharmacist services'' were not confounded by nonprescription products or nonpharmacist services.

The follow-up study of pharmacy web sites faced a different construct definition problem. Duplicating the construct definition for ''pharmacist services'' used in the newspaper advertisement study was not feasible in this case because a short timeline was set for completing the research, and problems occurred with classifying the text that significantly complicated the research. One difficulty occurred in categorizing words presented as hypertext, text on navigational buttons, flashing messages, scrolling advertisements, and the other dynamic forms of text existing in a web environment. Furthermore, additional categories would need to be defined to deal with text relating to the provision of services (eg, links to having prescriptions filled), the directing of patients to other web sites for education or information, and the cross-promoting of nondrug products. Consequently, a compromise was made to limit the construct definition to just ''images of pharmacists, pharmacy departments, or prescription drugs.'' All web site text was excluded from analysis. This compromise was in line with the research question asking about the image of pharmacists on web sites. Although text can also present an image, it was felt that pictures more powerfully conveyed the overall image presented on the web sites about pharmacists.

Operationalization of constructs

Once constructs are defined for a content analysis, they must be operationalized into units of data analysis. In an analysis of text, investigators can use key words, word phrases, sentences, paragraphs, page sections, pages, or multiple-page inserts as units of analysis. The decision of what unit of analysis to use is important because content analyses are based upon the assumption that important issues in messages are mentioned or portrayed more frequently than inconsequential ones. Thus, the choice of one analysis unit over another can have significant impact on the frequency a construct is mentioned. Consider the sentence, ''We are friendly, fast, and low priced.'' It will generate different results when *sentence* is the unit of analysis (ie, there in only one sentence) in comparison to using *key words* or *phrases* (ie, there are at least 3 key words or phrases.). Other decisions for investigators relating to text include how to regard different types of text. Should text in bolded titles be considered differently to text within paragraphs? Should large font text count more than smaller font text? Should the area in square inches associated with text messages be considered? Should images that include text (eg, a picture of mortar and pestle with text across it) be considered in the text analysis? The answers to all of these questions can be critical to the final conclusions of the study.

In the pharmacy newspaper advertisements study, information was grouped into 3 classifications of content; ''title,'' ''text,'' and ''image.'' The

unit of analysis in both text and titles was the sentence, requiring an interpretation of each sentence's main message even when several messages were present. Titles were defined as "leading text in an advertisement with different font (eg, larger, bolder, italicized) from other text copy." Title information was further divided into 4 categories based upon the message's appeal—if it presented a benefit, a provocative statement, information, or command for a desired action. Text information was "any copy not classified as title" and was subdivided into additional appeals relating to price, quality, performance, availability, special offers, education, and other appeals. Images were defined as "any nontextual visual portrayal of information" and were grouped into the 4 categories labeled visualization, association, physical representation, and other. The 4 category image classification worked equally well for both newspaper and web site images.

Sampling and collection plan

The sampling and collection plan in a content analysis should permit the accumulation of representative data with minimal bias. The sampling plan can result in biased data if it excludes subjects of interest to the research. Bias can occur also in the selection of the medium (newspaper vs television), medium outlet (New York Times vs the Wall Street Journal), or time period of the analysis (1 week vs 1 year collection of data). Any potential trade-offs relating to representativeness and bias must be made explicit to the readers.

Holdford and Yom's[9] newspaper advertisement study had several limitations associated with sampling and data collection. Advertisements were collected over a 5-week period resulting in a cross-sectional design that was subject to seasonal and situational influences. Originally, there was a plan to analyze 5 different weeks of advertisements randomly selected throughout the previous year, but newspapers do not typically keep historical records of *insert ads*, the color advertisements found in Sunday and midweek sections of newspapers where most pharmacy ads are found. Another limitation resulted because analysis was narrowed to a major local newspaper in a single town restricting the external validity of conclusions in other locations. In addition, independent pharmacies or small chains were excluded from the analysis because their advertisements only appeared in neighborhood newspapers.

To address concerns that findings from the newspaper study were limited because of the specific medium examined, pharmacy web site content was examined, although this analysis had its own issues of bias. It was felt that Internet advertising could generate greater levels of attention in consumers than newspaper advertising, and it was further believed that pharmacy advertisers would have greater freedom to positively present and enhance the image of pharmacists in such a vivid and dynamic medium. With this additional freedom, it was hypothesized that pharmacist services would be more common on pharmacy web sites. Thus, pharmacy web sites from members of the National Association of Chain Drug Stores were analyzed over a single period of 3 days to collect photographs and visual representations presented on the pharmacy web pages of the National Association of Chain Drug Stores members. Once again, the limited time used for sampling was subject to seasonal and situational influences, and the sampling frame excluded most independents and small chains. Plus, text information was not included in the analysis. Nevertheless, the sampling frame did capture pharmacies serving the vast majority of patients in the United States.

An unexpected sampling issue arose when deciding the sampling frame of web pages to be included in the analysis. Web sites from pharmacy providers are collections of web pages, often unrelated to pharmacy services and products, and connected by hyperlinks. A grocery store home page might have links to groceries, photo developing, gifts, and pharmacy web pages. Therefore, the sampling frame was restricted to pharmacy web pages, defined as "the primary web page dedicated to pharmacy products and services." Typically, the pharmacy page was a specific link originating from the home pages of pharmacies, mass merchandisers, and grocery store chains. Additional web pages leading from the primary pharmacy web page (eg, links to fill or refill prescriptions) were not considered in the analysis.

Data collection

Using the rules and procedures established to operationalize the measures, a codebook and a coding form must be developed for collecting data. The purpose of the codebook is to explicitly define and describe all variables to be collected for analysis. It lists all variables, detailed variable

descriptions, the methodology for classifying variables, and references to any literature used to develop the codebook. This information is helpful in training data coders and for resolving questions relating to coding and classification if needed.

From the codebook, a coding form is designed to permit the collection of variables that can be later tabulated in a spreadsheet or database. The actual makeup of the coding form varies depending on the study of interest but typically includes the following:

- Coder's name.
- Name of the variable (eg, image).
- Description of the variable (eg, any photograph, drawing or other image).
- Reference to document or location of variable (eg, ad 61, quadrant 2).
- Classification (eg, visualization—depiction of service performance by a pharmacist).
- Notes to clarify any decisions made in the selection or classification (eg, the Image was a photograph of a pharmacist who appeared to be speaking to an unseen patient).

Collected data may not always fit easily into the categories originally specified in the codebook, especially for innovative research. Therefore, it is a good idea to pretest the coding form on a similar but unrelated sample of data to identify any needed changes. Even after the pretest, it may be necessary to adapt some elements of the analysis to the data. In those cases, the codebook should be used to drive any decisions. For example, it can be difficult to differentiate a Title that provides ''information'' vs another that describes a ''benefit'' without the aid of a clear definition from the codebook.

With the codebook and coding form, training of coders can begin. Ideally, no coder should be a primary investigator in the study to ensure objectivity in judging. Training should consist of a review of the codebook and coding sheet and then some practice on a nonstudy sample. Coders should first work together to ensure they understand the process, then separately, to compare their answers and clarify any issues. When the primary investigator is confident that coders are able to classify data reliably, analysis of study data can commence.

It is recommended that all coding of data be duplicated by at least 2 different coders to examine the degree to which their classifications agree. With high levels of agreement, there is greater confidence that study results are not affected by biases of judges, inadequate training of judges, or poor research design. Agreement is assessed by calculating interrater agreement (or reliability) coefficients.

There are several interrater reliability coefficients in common use. The simplest gives the percentage of agreements between judges (eg, 80% of ratings between judges were the same). A criticism with this method is that it does not take into account the likelihood of chance agreement between judges. For instance, the chance that 2 raters will agree in a ''yes-no'' choice will be 50%. Consequently, several alternative reliability methods adjust for the impact of chance in their analyses; the most common being Cohen's kappa, Scott's pi, and Krippendorff's alpha.[24] These can be calculated laboriously by hand or more easily with the assistance of a computer. Interrater reliability calculations can be completed using dedicated content analysis software (there are over 50 available) or as macros—customized programs that accompany standardized statistical packages (eg, SAS, SPSS). Fig. 2 provides an illustration of how the percentage agreement and the commonly used Cohen's kappa reliability measures compare. A conservative approach when reporting interrater reliability is to provide calculations of 2 different reliability indices. In addition, reliability measures should be calculated for both the overall sample and any important sample subcategories.

In addition to calculating reliability, computer programs are available to facilitate repetitive processing of data.[25] Computers can be used to count words and symbols, group data into categories, or assist with statistical analyses. They are especially useful when dealing with large amounts of data. However, researchers must still provide intellectual input, and there can be a significant learning curve when using software. Sometimes it is just as easy to conduct the analysis manually.

All content analyses should be independently and objectively verifiable by other researchers. Thus, data must be organized and indexed in a manner that permits them to be traced to their original sources. In addition, the methods section should provide sufficient detail to permit replication. A good methods section should permit readers to answer the question, ''Do I have sufficient information to assess the degree to which this research answers the research question?''

Unit of Analysis	1	2	3	4	5	6	7	8	9	10
Rater A	Y	N	Y	Y	Y	Y	Y	Y	Y	N
Rater B	N	N	Y	Y	N	Y	Y	Y	Y	Y

		Rater B	
		Yes	No
Rater A	Yes	YY	YN
	No	NY	NN

		Rater B	
		Yes	No
Rater A	Yes	0.6	0.1
	No	0.2	0.1

$$\text{Percent Agreement} = \frac{YY + NN}{YY + NN + YN + NY} = \frac{0.6 + 0.1}{0.6 + 0.1 + 0.2 + 0.1} = 70\% \text{ Agreement}$$

In the example above, using percent agreement, 70% of ratings agree. The problem with using percent agreement is that it does not take into account agreement by chance. In the example above, Rater A says "Yes" 80% of the time and Rater B says "Yes" 70% of the time. They agree with "Yes" 56% of the time on average (0.8×0.7), and agree with "No" 6% of the time (0.2×0.3) meaning that by chance, they will agree 62% of the time regardless of what they are measuring. Cohen's Kappa accounts for chance with its calculation.

$$\text{Cohen's Kappa} = \frac{\text{Probability agreement observed} - \text{Probability chance agreement}}{1 - \text{Probability chance agreement}}$$

$$\text{Cohen's Kappa} = \frac{(0.70 - 0.62)}{(1 - 0.62)} = 0.21 \text{ agreement}$$

Kappa should be 0.70 or more for inter-rater reliability to be acceptable.

Example adapted from www.uclan.ac.uk/psychology/bully/files/kappa.pdf Accessed March 9, 2007.

Fig. 2. Example illustrating the role of chance in calculating inter-rater reliability.

For Holdford and Yom's[9] content analyses, simple interrater agreements were calculated. In hindsight, an alternative reliability index should have been provided, despite the fact that overall simple agreement between coders was 93%. Still, this may be considered adequate in this study—coefficients of 0.90 or above are nearly always acceptable, those of above 0.80 are acceptable in most instances, and coefficients as low as 0.70 are acceptable for exploratory research.[24] Reliability indices for subcategories (ie, title, text, and image) should also have been reported for the newspaper ads because reliability within categories may have differed from the overall reliability. Ideally, coders other than the primary researchers should have been used, but tight deadlines and limited resources made this impractical.

The primary reason that the follow-up pharmacy web site content analysis was never submitted for publication was because of reliability issues. Interrater reliability was not acceptable because raters were unable to classify consistently web site images into mutually exclusive and exhaustive categories. The problem arose from inadequate definitions of the constructs in the research codebook and discrepancies in data records. The only option for correcting the problem would have been to repeat the analysis

from the beginning. This demonstrates the importance of clear definition of constructs before data collection and the need for keeping meticulous records after data are collected.

Analysis and reporting

Analysis and reporting of the results should be grounded in evidence—flowing from the research data and what is already known from the literature.[26] Analysis that is thoughtful and evidence based can help establish construct and criterion validity. When the results of a content analysis are triangulated with similar research using different methods (eg, surveys), validity is enhanced. Research conclusions that are consistent with the literature or vary in theoretically predictable ways are more useful than results with no link to past research. In illustration, most advertising content of prescription services in newspapers was found to stress customer convenience and drug cost issues, a finding consistent with literature that describes convenience and price as major determinants of pharmacy choice.

Depending on the research question, statistical analysis of content can be a simple tabulation of single variables, cross-tabulations, or even complex multivariate analyses. Most content data will be nominal but when combined with other data, complex statistical analyses can be conducted. Reports of trends are also common for data collected over time. Holdford and Yom's[9] study presented data summarized according to each type of message category and compared them using percentages. An analysis of pharmaceutical industry web site content used analysis of variance and Fisher's post hoc tests to compare classification scores for various web sites.[27] A study of health plan advertising used Wilcoxon rank-sum tests and simple regression analyses to examine relationships between ads and health plans.[28]

The analysis and reporting section of content analysis should aim to make sense of findings for readers in a way that is meaningful and useful. Anecdotes and examples from the collected content can be used to illustrate points in a way that is often more vivid than that of numbers. Sometimes the absence of content can be significant, such as when the newspaper advertising analysis reported that, "For every square inch of advertising devoted to prescription services, more than 200 square inches are devoted to photo services, cosmetics, groceries, nonprescription medications, and an assortment of other nonprescription products and services."[9] In this instance, the results are more meaningful and visual for readers than a straight summary of numbers or percentages.

Conclusion

Content analysis is probably underused as a research method in the discipline of social and administrative pharmacy. It can be used to answer many questions about communications between patients and health care providers, marketers and health care consumers, educators and students, and the media and public. Significant insight can be gained through content analysis of web sites, conversations between individuals, advertisements, broadcast media, publications, and any presentation of ideas. Nevertheless, relatively few pharmacy content analyses have been conducted compared with other methodologies such as survey research. This article attempts to stimulate the use of content analysis of drug related communications by providing an introduction to the technique and illustrating its application to problems in pharmacy.

The quality of content analysis studies depends on a concise research question using clear definitions of study constructs, explicit sampling methods, systematic analysis and reporting of data, and inferences that incorporate current research evidence.[29] A greater level of detail and transparency is needed when compared to more objective research such as experiments and surveys because the details provided can help readers identify and judge the sources and degree of bias. Bias is unavoidable in content analysis as with any research, so unambiguous details are necessary to assess the validity and applicability of results.

Good content analysis can be laborious and time consuming. Time deadlines can force researchers to make compromises that reduce the utility of results. Researchers should never underestimate the time required to use this technique. Computer programs can assist with clerical tasks but investigators are essential for providing intellectual input. In the end, good content analysis relies on the skill, competence, diligence, and integrity of researchers.

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