Student Projects on Statistical Literacy and the Media

Andrew Gelman and Deborah Nolan*
with Anna Men, Steve Warmerdam, and Michelle Bautista

August 16, 1996
Revised June 10, 1997

Abstract

An important theme in an introductory statistics course is the connection between statistics and the outside world. We describe here some assignments that have been useful in getting students to learn how to gather and process information presented in the newspaper articles and scientific reports they read. We discuss two related assignments. For the first kind of assignment, students work through prepared instructional packets. Each packet contains a newspaper article that reports on a scientific study or statistical analysis, the original report on which the article was based, a worksheet with guidelines for summarizing the reported study, and a series of questions. In the second kind of assignment, each student is required to find a newspaper article themselves, track down the original report, summarize the study using our guidelines, and write a critique of the article. Here, we describe the guidelines we developed to help the student in reading the newspaper article and original source, and the procedures we used for each type of assignment. Examples of handouts and assignments appear as appendices.

Keywords: instruction, newspaper articles.

1 Introduction

Every year we teach one-semester introductions to probability and statistics. One thing we like to do is hand out clippings of newspaper articles such as "Yes, People are Right. Caffeine is Addictive," that describe the results of scientific studies or statistical analyses. These articles often lead to interesting class discussions, which led us to wonder (1) How good are the scientific studies reported in the press?, and (2) How comprehensively and accurately do the newspaper articles summarize the findings and implications of the studies?

*To appear in *The American Statistician*. Andrew Gelman is Associate Professor, Department of Statistics, Columbia University, New York, NY 10027. Deborah Nolan is Associate Professor, Department of Statistics, University of California, Berkeley, CA 94270. Anna Men, Steve Warmerdam, and Michelle Bautista were students at the University of California, Berkeley. We thank Jason Chan and Inchul Hong for their help on this project, Keay Davidson of the *San Francisco Examiner* for useful general information, the Undergraduate Research Apprentice Program of the University of California, Berkeley, and the National Science Foundation for Young Investigator Award DMS-9457824.

We embarked on a project, with the help of three students, of clipping newspaper articles and tracking down the scientific reports on which they were based. In the process, we created a set of guidelines to help the students summarize relevant information on the scientific study, and using these guidelines as a base, we developed two kinds of classroom assignments, which focus on understanding the issues in presenting quantitative findings. These assignments are described in Sections 2 and 3. The first kind of assignment, taking less instructor effort, requires the students to work through instructional packets that we have prepared; each packet contains a newspaper article, the original report on which the article was based, guidelines for summarizing the article and report, and a series of questions for them to answer. In the second kind of assignment, each student is required to find a newspaper article and track down the original report themselves, and then summarize the study using the guidelines. As a resource for instructors, we include in an appendix the material from one of the packets, complete with a list of questions and answers. We also include in a second appendix the instruction sheet given to the students for the individual project. The instructional packets for the eleven articles listed in Table 1 can be found on the website `http://www.stat.columbia.edu/~gelman/`.

Through these assignments, students connect in-class statistical knowledge to current events, and they learn how to think critically about the information found in the newspaper. An important component of these assignments, which sets them apart from other projects that use current newspaper articles, is the inclusion of the original source in the analysis. We have found that the students are better able to evaluate the merits of the study and the quality of the reporting when given the original reports, even though the reports are often quite technical. They also feel a great sense of accomplishment when they are able to apply their statistical knowledge to the primary source.

This type of assignment nicely complements a wide range of statistics courses including those using the increasingly popular teaching tools based on hands-on work with data and news clippings (e.g., Chaterjee et al, 1995, Finn and Snell, 1992, Pearl and Stasny, 1992). For general discussion of statistical literacy and education, see Bessant (1993) and Wallman (1992).

2 Assignment based on instructional packets

From September 12 through November 13, 1994, three undergraduate research assistants read the *New York Times* and the *San Francisco Examiner* and clipped out every article that reported a scientific study or a statistical analysis, including medical and health studies, economic analyses ("Feds, Wilson Dispute Illegal Immigration Costs") and social statistics ("Alarming Report on Worldwide Smoking Total"), but excluding highly technical studies, such as reports of a new gene being located. Newspapers report a large number of opinion polls; we selected only those with unusual methodological features. For example, "Poll: More Lawyers See O.J. Walking," reports on a survey conducted by the National Law Journal, rather than one of the leading polling firms.

For each article, we attempted to track down the report or reports on which the article was based. Of the articles for which we had gathered reports, we selected a subset of eleven to use for instructional packets. The articles were chosen for their diversity in statistical methods and subject matter (see Table 1). For each study, one of our research assistants prepared a summary, a list of questions, and answers to the questions. Each of these was reviewed by us and revised by the student until it was in acceptable shape, while still keeping the essence of the student's original input. This procedure resulted in the creation of the guidelines for summaries presented at the end of this section.

The eleven instructional packets can be used in the classroom in a variety of ways. Most simply, the students can be given an article and the associated original report (or can choose an article/report of interest to them from among our eleven packets), and then be required to summarize the report and article using the guidelines below and answer additional questions in the packet (see Appendix A for the questions supplied for a sample packet). If the students need additional help, they can be given a complete packet, with the worksheet filled in and the questions answered, as an example.

Summary Guidelines

Source of newspaper article wire-service, in-depth article, feature story, etc.
Kind of report: medical/technical journal, press release, book, etc.

Newspaper article	Source	Kind of study
Giving IV fluids to trauma victims found harmful (NYT)	*New Eng. J. Medicine*	non-randomized expt
Yes, people are right. Caffeine is addictive. (NYT)	*J. Amer. Med. Assoc.*	observational study; randomized expt
Over-control of eating leads to fat children (NYT)	*Pediatrics*	randomized expt
Illegal aliens put uneven load on states (NYT); Feds, Wilson dispute illegal immigrant costs (SFE)	Office of Gov. of Calif.; Urban Institute	model-based analyses
1 in 4 youths abused, survey finds (NYT)	*Pediatrics*	sample survey
Monster in the crib (SFE)	*Science News*; *Pediatrics*	observational study
Runners are far ahead in aging healthfully (NYT)	*Ann. Internal Medicine*	observational study
Surgeons may operate better with music (SFE)	*J. Amer. Med. Assoc.*	randomized expt
Walnuts add a happy crunch to life (NYT)	*New Eng. J. Medicine*	randomized expt
Panel finds no major risk from 'yo-yo' dieting (NYT)	*J. Amer. Med. Assoc.*	meta-analysis
Working women say bias persists (NYT)	U.S. Dept. of Labor	sample survey

Table 1: Articles from the *New York Times* (NYT) and *San Francisco Examiner* (SFE) for which we created course packets. In selecting these from an original set of 107 articles clipped out of the newspapers over a two-month period in 1994, we sought a diversity of kinds of studies (experiments, surveys, economic analyses, etc.) and also of topics (that is, not just medical studies). More information on these articles appears in the website `http://www.stat.columbia.edu/~gelman/`. Course packet materials for the first article appear in Appendix A.

Summary of article: One-sentence summary of the newspaper article.

Background as taken from the original report.

Objective of the study, as taken from the original report.

Type of study: (a) *randomized experiment*: treatments under the control of the experimenter and assigned randomly; (b) *non-randomized experiment*: treatments under the control of the experimenter and assigned non-randomly (for example, the healthy-looking patients get treatment A and the sick-looking patients get treatment B); (c) *observational study*: treatments not under the control of the experimenter (for example, the patients choose whether to smoke); (d) *sample survey*; (e) *model-based analysis* (for example, an estimate of the economic effects of immigration); (f) *meta-analysis*: an examination of several earlier studies.

Study protocol. This should include: the setting of the study, a description of the experimental subjects or survey participants, the population to which the results are generalized, the outcome measurements or responses, control variables, summary of nonresponse.

Also, as appropriate, include: treatments used and the method of treatment assignment (if experiment, observational study, or meta-analysis), blindness (a study is blind if the subjects do not know which treatment they are receiving and double-blind if the experimenters do not know which subjects receive which treatments), how the survey was conducted (if a sample survey).

Statistical methods. These should include graphs and tables (which the students should be expected to understand) as well as more formal methods such as t-tests and regressions (which the students may just have to mention without understanding).

Stated conclusions. Taken from the original report.

Generalization. Difficulties of generalizing to the real world and other problems and potential problems of the study. How do the results relate to the rest of the scientific literature? These questions are generally addressed in the report itself, but the students are encouraged to use their own critical thinking to discuss problems not mentioned in the report.

Discussion. The students are asked to consider questions of the sort: How accurately did the newspaper article summarize the report? Did the newspaper article overstate the conclusions of the report? Did the newspaper article point out potential flaws in the study not noted in the report?

3 Assignment based on students finding their own articles

A longer assignment, which takes more careful management but can be more rewarding, has each student working with a newspaper article of their own choosing. Below, we describe the steps involved in the assignment. The handout for the assignment appears in Appendix B.

The newspaper article. Each student must find a newspaper article; no two students in a class are allowed to use the same article. We remind the students that scientific and statistical studies on health, public policy, and lifestyle issues appear in all sections of the newspaper and are not just covered by science reporters. Some students use the World Wide Web (e.g., `http://www.examiner.com`) to search for news clippings that interest them; we also save the *New York Times* and the *San Francisco Examiner* for a month before the assignment and make them available to the students. Often it is hard for students to judge the appropriateness of the article. For example, they may choose an article that contains a single summary statistic for their the assignment. So, we require that the students receive instructor approval for their article before proceeding with their search for the original source.

The original source. When the students choose an article that interests them, they can be very resourceful in searching for the background material and have less difficulty reading the source (in comparison to reading on a subject not of their choosing). Nonetheless, it is useful to provide some guidelines on what kinds of reports are relatively easy to obtain, along with strategies for tracking down hard-to-find sources. We discuss these further in Section 4.

Some of the reports cited in newspaper articles are in widely-circulating journals (mostly in medicine and public health) and can be found in the library or a reprint can be obtained from the author. In other cases, articles in other news publications are cited, and the student will need to go further to track down the scientific reports. To obtain such reports, it is best to make telephone calls to the persons cited as sources in the newspaper articles. Phone numbers can be obtained from the web, or from directory information. Most reports will be 5–20 pages long, but in a few cases, a book-length study may be obtained.

At the time the student receives approval for the article, we outline a course of action for obtaining the original source. We may help identify the journal that contains the source and the library where it can be found, or we may help look up a phone number and make contact with the person cited in the article.

The write-up. The student prepares a summary of the study using the general guidelines in Section 2. They are asked to keep track of the information on the study that was available from the news article alone. This helps them learn how to carefully read the newspaper. Students are often misled by claims made in the paper, and are surprised when a closer reading shows that the journalist has been quite careful in choice of wording. From their summary, they write a one to two page report that describes the study and critiques the newspaper article. For the assignment, they hand in the newspaper article, background source, summary, and two-page report.

The grade. In grading, we look for a thorough summary of the study, an accurate description of which study details were reported in the newspaper article, and a responsible critique of the news article. We try not to confuse the quality of the researcher's study with the quality of the student's report. For example, articles in the *Journal of the American Medical Association* are structured so that a student can concisely summarize the study from the abstract alone, and we look to see that the student has described the study in their own words and has included details not available in the abstract. Additionally, students do not get full credit if they merely try to punch holes in the study or the newspaper reporting without appreciating its strengths.

Because of the time it takes to track down the source, we allow six to eight weeks to complete this project, and we set an intermediate deadline for selecting the newspaper article. The students also find it helpful, if we offer to comment on the summary of the study in advance of the final due date.

We find these projects serve as a great source for class examples, review problems, and exam questions. The students enjoy seeing their projects used this way in the course. They also enjoy discussing them in class.

4 Guidelines for finding and evaluating sources of scientific reports

Here, we present some of the difficulties we had in finding the sources of newspaper articles; students find these accounts very useful when tracking down their own studies.

Science-related newspaper articles come from a variety of sources, ranging from in-depth studies by local reporters featuring many references and interviews, to ten-paragraph summaries of just-released scientific studies in publications such as the *Journal of the American Medical Association* (which send advance copies of newsworthy findings to major newspapers), to press releases and interviews. Nearly all newspaper articles identify the organization sponsoring the original study and the publication in which it appeared, or the name and affiliation of a contact person, such as the author of the study.

The studies we managed to track down varied greatly in quality. Generally we found the studies in the *Journal of the American Medical Association* and the *New England Journal of Medicine* to be thorough and convincing. Articles in other scientific journals were mostly excellent but varied somewhat in quality. The press releases also varied in quality: for example, "Working Women Count," put out by the U.S. Department of Labor, presents the results of two surveys along with fairly comprehensive details of sampling design (and only a little bit of that overly-dramatic press-release style of writing). At the other extreme, a brief press release from the A. C. Nielsen Company provided too few details about their procedures for sampling television viewers to determine how the sample was chosen.

An example of an informative private-industry report is “Potential Impact of a Nationwide Workplace Smoking Ban on International Travel to the U.S.,” by Price Waterhouse LLP, which was used as source material for the *San Francisco Examiner* article, “Report: Smoking Curbs May Drive Visitors Away.” This report, sponsored by the San Francisco Hotel Association, is an economic analysis of what might happen to tourism in San Francisco in the event of a ban on smoking in hotels and restaurants. The report goes into great detail about the economic analysis and its assumptions. Unfortunately, the assumptions seem simplistic to the extent of discrediting the conclusions: claims of the potential impact on tourism are based on an opinion poll of travel agencies and tour operators throughout the United States, who were asked to estimate by what percent a smoking ban would increase or decrease the number of foreign visitors to the U.S. It seems questionable to base an economic analysis (claiming billions of dollars in lost sales in San Francisco) on the results of these sorts of speculations.

Other times, we could only obtain a press release or an oral description, without enough details to fully understand the studies or their results. For example, the newspaper article, “O.J. will be Cleared, Lawyers Tell Poll,” referred to the National Law Journal, where we found the article, “O.J. Will Walk, Says 61 Percent in Lawyers’ Poll,” which presented the results of a “poll of 311 attorneys, conducted Sept. 23–26 [1994] by Penn + Schoen Associates Inc, a New York polling company.” We called both the National Law Journal and Penn + Schoen Associates, but neither would provide information on how the poll was conducted.

In some cases, the persons who performed the studies were very helpful, but the studies were too idiosyncratic to be useful for inclusion in this project. For example, to track down the source for “Restaurants in New York Show Signs of a Boom,” we called Fred Sampson, president of the New York State Restaurant Association, obtaining the phone number of the association from 1-

800-CALL-INFO. After playing phone tag for awhile, we finally made contact and talked about the numbers quoted in a recent article about the rise in the restaurant business in New York. Asked how he obtained those numbers, Sampson nicely replied that he got those figures informally through everyday conversations with members of his association. He said he typically receives about 50 calls a day (which we believe, since he was always on another line when we kept trying to reach him) from his members. Whenever he talks to them, he would always casually ask how well their businesses are doing and jot down the responses, usually percentages, on a little note pad. Often approached by the media, he would then, from his note pad, estimate the status of the restaurant business in New York. No explicit analysis or formal surveys were done, although he answered this question with some advanced statistical terminology. Therefore, all the numbers reported in the article came from his own discretion.

In summary, journal articles are by far the most reliable sources: generally easy to track down, and with comprehensive descriptions of the studies. However, some of the most interesting reports come from other sources—here, more effort must be put into tracking down the source, and even then there is not always enough information to fully understand the study. Despite this difficulty, we do not recommend relying only on journal articles, because the students who gathered material from alternative sources found it quite educational and because these reports offer a greater variety of topics.

5 Discussion and student reactions

We asked the three students who prepared the instructional packets what they had learned. Their responses are similar to the reactions students in a class might have to the assignments.

They felt that all of the studies used in this project had good objectives, but some were so flawed that their results became unbelievable and misleading. Many of the erroneous studies were actually harder to obtain because of the reluctance of the researchers and sponsors to provide information. The students also noted that the results of studies can depend strongly on the definitions of what is being counted or observed, as in the illegal immigration study and the abused children study.

About what gets reported, one student noted that, looking through a journal's table of contents, there are many studies that seem equally interesting as those reported on in papers, yet they aren't given the same press coverage. It appears as if the studies reported on in newspapers are selected haphazardly, and this can be seen to an extent from the fact that most studies reported on in the *New York Times* were not reported on in the *San Francisco Examiner* (and vice versa).

The students were generally impressed with the quality of the newspaper reporting, given the shortness of most of the articles. However, they commented that the newspapers tend to make the research findings more convincing than they actually are, often not mentioning potential flaws or limitations of the study that are actually mentioned in the original report. Newspaper reporters have the difficult task of reading a report and writing an article that (1) retains enough important facts for the reader to understand the significance of the study, (2) is interesting, and (3) is the right length for the space provided. At times, (2) and (3) dominate over (1) as a priority.

On the whole, we have found that these assingments provide a framework for the students in an introductory statistics class to combine their statistical knowledge with their general powers of critical thinking. This is more than just criticizing newspaper articles; it is about understanding the limitations of scientific studies and the role of statistics in making conclusions and presenting them. In these assignments, the students learn much more about issues of data collection and design, and also about the relevance of statistical methods to real-world problems. This nicely complements a wide range of statistics courses and instructional techniques. We have successfully used the assignments in laboratory courses based on studying real data and in theory courses for social science majors, applied math majors, and life science majors at the sophomore and junior levels.

References

Bessant, K. C. (1992). Instructional design and the development of statistical literacy. *Teaching*

Sociology **20**, 143–9.

Chaterjee, S., Handcock, M. S., and Siminoff, J. S. (1995). *A Casebook for a First Course in Statistics and Data Analysis.* Wiley, New York.

Finn, J., and Snell, J. L. (1992). A course called chance. *Chance* **5**, 12–16. Also see the website, `http://www.geom.umn.edu/docs/snell/chance/`.

Pearl, D. K., and Stasny, E. A. (1992). *Experiments in Statistical Concepts.* Kendall/Hunt, Dubuque.

Wallman, K. K. (1993) Enhancing statistical literacy: enriching our society. *Journal of the American Statistical Association* **88**, 1–8.

A Example of a course packet

The summary, questions, and answers were written by a student, but we discussed and revised them together. So what you see here is more of an idealized than an expected student assignment. The course packet can be used as teaching material in two ways: giving students the entire packet to read as preparation for the classroom assignment (see Appendix B); or giving students the article, report, and questions, and requiring them to make a summary and answer the questions.

Summary

"Giving IV fluids to trauma victims found harmful," *New York Times*, 28 Oct 94, p. A9.

One-sentence summary of the newspaper article: Bleeding trauma patients are usually given fluids in order to keep their blood pressure up, but this practice may actually be harmful.

Scientific report: "Immediate versus delayed fluid resuscitation for hypotensive patients with penetrating torso injuries," W. H. Bickell et al., *New England Journal of Medicine* **331**, 1105–1109.

Background: Giving IV fluids to trauma patients before their bleeding is controlled may be detrimental. This procedure has been standard for the past two decades because it was proven successful for severe hypotension due to hemorrhage.

Objective: To determine the effects of delaying fluid resuscitation until the time of operative intervention in hypotensive patients with penetrating injuries to the torso.

Kind of study: Non-randomized experiment.

Subjects: 598 adults with penetration torso injuries with a pre-hospital systolic blood pressure less than or equal to 90 mm Hg.

Setting: City (Houston) with a centralized system of pre-hospital emergency care and a single receiving facility for patients with major trauma.

Treatments: Immediate-resuscitation group and delayed-resuscitation group. The difference between the two is that the first group received fluid resuscitation before they reached the hospital and the others didn't receive it until they reached the operating room.

Treatment assignment: Depended on whether the person was injured on an odd-numbered or even-numbered day.

Outcome measurements: Survival of patients.

Blindness: Patients knew how they were treated, but it probably didn't alter their will to survive. Physicians were not blind.

Population: People aged 16 and over with a gunshot or stab wound to the torso and with a blood pressure less than 90 mm Hg. Pregnant women were not enrolled in the study. Patients were also measured for the Revised Trauma Score to see if they were to be included in the study; those with a score of 0 were not included, as well as those with fatal gunshot wounds to the head and patients with minor injuries not requiring operative intervention.

Statistical methods used: A comparison of different characteristics to check that the two treatment groups were similar (Table 1). Comparisons between treatments were made using two-way tables and binomial P-values for comparison of proportions.

Stated conclusions: Of the 289 patients who received delayed fluid resuscitation, 70% survived and were discharged from the hospital. In the other group, 62% of 309 patients survived (this difference between the two percentages is statistically significant at P=0.04). Among the 238 patients in the delayed-resuscitation group who survived to to post-operative period, 23% had one or more complications. Among the 227 patients in the immediate-resuscitation group who survived to the post-operative period, 30% had complications (the difference is statistically significant at P=0.08). In addition, the duration of hospitalization was shorter in the delayed-resuscitation group.

Nonresponse: None (for all the patients that met the initial eligibility requirements).

Difficulties of generalizing to the real world: This study only found the effects of specific types of wounds. Also, those with blood pressures below 40 mm Hg, which rarely survived, were not included in the study, and so this cohort should also be examined in a different study.

How does this relate to the rest of the scientific literature: These findings are similar to conclusions of studies done on animals.

Questions

1. (a) What were the two treatments in the study?
   (b) Who were the subjects? How many subjects were there?
   (c) What pre-treatment characteristics were recorded?
   (d) What were the main outcome measurements?
2. Describe the method of treatment assignment. Why do you think they did not assign treatments randomly?
3. Was the treatment assignment blind to the subjects? The doctors?
4. The report gives details on how the sample size was chosen. Describe what they did and what reasoning they used to decide the sample size.
5. Seeing the results, do you think the sample size turned out to be too small or too large?
6. Given the information in the report, do you think the article title, "Giving IV Fluids to Trauma Victims Found Harmful," is a reasonable claim?
7. Among the 238 patients in the delayed-resuscitation group who survived to the post-operative period, 55 (23%) had one or more complications. Among the 227 patients in the immediate-resuscitation group who survived to the post-operative period, 69 (30%) had complications. This comparison does not take into account the patients who died right away. How does this adjustment affect this comparison?
8. If you have covered p-values in your statistics courses, explain how the p-value in the first row of Table 5 was determined. What does the p-value of 0.04 tell you?
9. Why do you think pregnant women were excluded from the study? What about car accidents?
10. If you could add one paragraph to the newspaper article to give more information from the study, what would you say?

Answers to questions

1. (a) The two treatments were the immediate-resuscitation group (in which intravascular fluid resuscitation was given before surgical intervention in both the prehospital and trauma-center settings) and the delayed-resuscitation group (in which intravenous fluid resuscitation was delayed until operative intervention). (p. 1106, "Methods: Study Interventions")
   (b) The subjects were patients over 16 years of age who were transported to Ben Taub General Hospital with gunshot or stab wounds to the torso and a systolic blood pressure less than or equal to 90 mm Hg. They also did not have a Revised Trauma Score of zero at the scene of the injury, a fatal gunshot wound to the head, or minor injuries not requiring operative intervention. There were 598 patients. (pp. 1105–06, "Methods: Study Subjects" and p. 1107, "Results: Characteristics of the Patients," second paragraph)
   (c) Pre-treatment characteristics that were recorded were blood pressure; the Revised Trauma Score (calculated from the Glasgow Coma Scale, systolic blood pressure, and respiratory rate); times at which emergency vehicles were dispatched, arrived at the scene, departed from the scene, and arrived at the trauma center; Injury Severity Score. (p. 1106, "Methods: Main Measurements and Secondary Outcome Variables")

(d) The main outcome measurements were survival of patients and assessment of six defined postoperative complications (wound infection, adult respiratory distress syndrome, sepsis syndrome, acute renal failure, coagulopathy, and pneumonia). (p. 1106, "Methods: Main Measurements and Secondary Outcome Variables")

2. Patients injured on even-numbered days of the month were assigned to the immediate-resuscitation group, while those injured on odd-numbered days were enrolled in the delayed-resuscitation group. The researchers did not assign the treatments randomly probably because of the difficulty and confusion to choose which protocol/treatment to use on each patient where time was a factor and each patient was unique. (p. 1106, "Methods: Study Interventions")

3. The treatment assignment was blind to the subjects because they did not know that they were in an experiment. The treatment assignment was not blind to the doctors because they have to know what to give in the pre-hospital phase. (p. 1106, "Methods: Study Protocol")

4. The sample size was calculated on the assumption that death would occur in 35% of patients receiving standard preoperative fluid resuscitation for penetrating torso injuries. On the basis of experimental data and past clinical experience, an estimated 10–15% improvement in survival was predicted if fluid resuscitation was delayed until operative intervention. With an alpha value of 0.05 and a beta value of 0.2 for a hypothesis test, approximately 600 patients are needed. (p. 1106, "Methods: Statistical Analysis," first paragraph)

5. The sample size seems reasonable, but a larger sample might be good, considering that the main results are close to the cut-off p-value of 0.05. (p. 1108, Table 5)

6. The title does not seem reasonable because it implies that all trauma victims were considered and studied, whereas the the study only pertains to those with penetrating torso injuries. Also, the title implies that IV fluids do not work at all, but the results show some indication that the fluids can help (i.e., not all of the immediate-resuscitation group died). (p. 1105, "Abstract: Results" and "Abstract: Conclusions")

7. The numbers may be higher if those who died right away were accounted for. In fact, the percentage for the delayed-resuscitation group could be bigger because death or complications may be the results of not getting any fluids immediately. (p. 1109, Table 6)

8. The null hypothesis is just a comparison of proportions (193/309 to 203/389). The question is if this difference occurred by chance. The observed difference is 8%. Finding the SD of the difference [$\sqrt{(.62 * .38/309) + (.70 * .20/289)} = 0.035$] and dividing this from 8% [$.08/.035 = 2.28$] give a result that the difference is 2.28 SD's away from zero. The Z-test is performed (two-sided) to give a p-value = 0.04. (p. 1106, "Methods: Statistical Analysis")

9. Pregnant women were excluded in the study to make the sample and the results representative and general to the whole population. Plus, there are outside complications that occur during pregnancy that might confound the study. Also moral issues could be involved (risk the life of the baby?) Those in car accidents were excluded because they are more likely not to get penetrating wounds or more likely received wounds that are not serious enough to get IV fluids. (p. 1105, "Methods: Study Subjects," first paragraph)

10. A possible paragraph: Despite indications that the delayed-resuscitation group appeared to have fewer complications, there was not enough done to study this issue. People who died immediately after operative intervention were not included in these calculations. Complications might had come from not getting fluids, which could result in death; but these patients were not accounted for in this analysis of the existence of complications. (p. 1109, Table 6)

B Classroom Assignment

To start this assignment, find a newspaper article that reports some scientific finding of interest to you. Then track down the primary source for the article and write a synopsis of the study including information on the kind of study performed, the scientific protocol, general applicability and limitations of the study, and a summary of the findings. Finally, revise the clipped newspaper article to add findings or other information not in the article and which you thought relevant to the story and to correct any inaccuracies in reporting.

- Read the newspaper and clip out an article that reports a scientific study or statistical analysis. The article may be a medical study of a clinical treatment, an observational study, an economic analyses, or social statistics. Do not clip out reports of highly technical studies. Also skip opinion polls, unless they have some unusual methodological feature.

- For your article, determine the source of the scientific or statistical study and attempt to track down the report or reports on which the article is based. Science-related newspaper articles come from a variety of sources, ranging from in-depth studies by local reporters featuring many references and interviews, to ten-paragraph summaries of just-released scientific studies in publications (which send advance copies of newsworthy findings to major newspapers), to press releases and interviews. Of course, scientific and statistical studies on health, public policy, and lifestyle issues appear in all sections of the newspaper and are not just covered by science reporters.

  Some of the reports cited in the newspaper articles are in widely-circulating journals and can be found in the library. In other cases, articles in other news publications may be cited, and you will have to go further to track down the scientific reports. For some, you may need to send away for a report, or telephone a person cited as a source in the newspaper article.

  The goal is to find a primary source that has technical details on how the study and data analysis were performed, along with numerical summaries (tables and graphs) of the results.

- Use the primary source to create a synopsis of the scientific findings. The examples in the appendix can be used as a model.

The Write-up. Use the worksheet as a guide in writing a one- to two-page description of the study. Make it clear which information was reported on in the newspaper article (or could be inferred from the information provided in the article), and which was solely available from the primary source.

Critique and revise the newspaper article as follows:

- How accurately does the title reflect the findings of the study?

- If you could change one sentence in the article, which sentence would you change, how would you change it, and what are your reasons for changing it?

- If you could add one paragraph to the newspaper article to give more information about the study, what would you say? Explain your reasons for choosing the information you did.

- If there were any graphs of figures, comment on their usefulness. Do you think additional figures or graphs in the article would be helpful?