An Investigation into the Compliance of EMS Personnel Following C-Spine Clearance Protocols and Patient Documentation

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ABSTRACT

Recent spinal restriction protocol changes led to a reduction in long backboard utilization in the pre-hospital setting but still required proper patient assessment and subsequent documentation of the findings used to determine use or non-use of spinal restrictive devices. This study addressed whether proper patient spinal protection was utilized, if proper practice to clear possible spinal injuries occurred, and if proper documentation took place regarding spinal motion restriction devices within the Miami Valley Fire District. The purpose of this study was to provide research-based information that will assist the fire district in resolving any discrepancies in performance, documentation, or awareness regarding the Miami Valley EMS protocol and spinal immobilization. Methods used to extrapolate data included field observations of emergency medical crews, reviews of electronic patient care reports (ePCR), systematic cluster samplings of State of Ohio fire departments, working with Kettering Health Network's (KHN) Internal Review Board (IRB) to obtain post emergency medical services patient data, and review of data from the Southern Ohio Regional Trauma System (SORTS). The results of the research found evidence EMS personnel 1) omitted proper and complete spinal immobilization protocols and documentation, 2) completed proper protocols but inappropriately documented, or 3) documented completion of proper protocols but procedures were not observed being completed. Results of the post medical services patient data from KHN revealed 6% of patients in this sample needed spinal restriction on arrival to the hospital not previously completed by pre-hospital personnel. Data from SORTS noted 8% of un-immobilized trauma patients were positive for hospital documented spinal injuries during 2016. The results of this research will be the basis for additional education for EMS personnel in spinal restriction protocols and

documentation and for an additional research study by the multi-county trauma registry concerning non-immobilized pre-hospital transported trauma patient outcomes.

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INTRODUCTION

Statement of the Problem

The 1984 Department of Transportation (DOT) EMT curriculum introduced the standard of care for trauma patients as including full c-spine immobilization utilizing c-collar and long backboard (LBB) to prevent further potential injury to the spinal column and spinal cord (Bledsoe, 2013). Research studies from the 1980s through 2000s indicated that routine use of LBBs did not adequately immobilize a trauma patient's spine (Bledsoe, 2013) and could induce pain, patient agitation, and respiratory compromise (Totten and Sugarman, 1999; Haut, Kalish, and Efron, 2010). Studies also revealed the use of a backboard decreased tissue perfusion leading to development of pressure ulcers (Kwan, Bunn, and Roberts, 2001). The accumulation of research over the last decade led to the EMS Spinal Precautions and the Use of the LBB Position Statement published by the National Association of EMS Physician (NAEMSE) and the American College of Surgeons (ACS) in 2013. *The problems this study addressed were whether proper patient c-spine protection was used as indicated by the position paper, did EMS providers implement appropriate practices to clear possible injuries, and did proper documentation occur regarding use or none-use of LBBs.* Possible causes of members not performing the correct procedures, lacking proper documentation, or both were unknown. An informal post-transport survey was used to determine whether members knew the correct procedures as well as adding a practical check-off to the Greater Miami Valley Standing Orders protocol to determine skill and knowledge base.

In 2014, a research study evaluated 498 pre-hospital trauma patients where C-spine protocols were used to determine the need to immobilize the patient. The research determined that spinal injuries were detected and the patients immobilized appropriately when the protocols

were followed. The research revealed “compliance with the protocols would have led to appropriate cervical spine immobilization of all patients” (Hong, Meenan, Prince, 2014).

Purpose of the Study

The purpose of this study was to provide research-based information that will assist the fire district in resolving any discrepancies in performance, documentation, or awareness regarding the Miami Valley EMS protocol and spinal immobilization.

Research Questions

The following questions were answered by utilizing the evaluative research process:

1. How well do Miami Valley Fire District personnel comply with current protocols regarding assessment for use/non-use and documentation thereof for long backboard immobilization for trauma patients?
2. How well do other agencies track and monitor LLB performance issues?
3. How well do EMS personnel know and understand the protocols and rules for applying and documenting LLB use as determined by the clinical portion of the annual protocol testing?
4. What situational factors impact Miami Valley Fire District EMS personnel from complying with these protocols?

BACKGROUND AND SIGNIFICANCE

Miami Valley Fire District (MVFD) is a suburban fire department formed in 2011 with the merger of Miami Township Fire Department (MTFD) and Miamisburg Fire Department (MFD). Miami Valley Fire District is located in an area that contains several railroad systems, interstates I-75 and I-675, and the Great Miami River. Each of these areas requires the district to be trained for fire, EMS, hazardous response situations, water rescues, and auto extrications. The two departments merged to reduce duplication of resources and improve the fire and EMS services to the community, while providing fiscal stability and responsibility to both agencies. Both departments had been long-term entities in their respective communities providing fire and EMS services to their residents. Currently MVFD employs 55 career firefighters/paramedics and six part-time employees. The district operates five stations staffed with two to four personnel per shift. The five stations cover 52 square miles of rural and suburban area. The fire district serves approximately 70,000 residents during evening hours and twice that number during 9 AM to 5 PM working hours with non-resident workers. Internal education is a necessary service for district fire/EMS personnel to maintain and improve required skills. Many of the employees of the district are members of the National Urban Search and Rescue task force and can be deployed immediately in cases of national disasters (USAR). In 2015, district personnel responded to 6,200 EMS calls and 1,900 fire calls (Miami Valley, 2015).

In 2007, both Miamisburg Fire Department and Miami Township Division of Fire and EMS were using the spinal clearance protocol. Using observation, this writer witnessed several emergency medical calls involving trauma where paramedics did not assess for injuries to the spine and walked the patient to the ambulance. To further investigate, 25 electronic patient care reports were reviewed. It appeared that a number of paramedics were either not documenting

their actions to determine if a trauma patient needed immobilization or failed to immobilize a patient who met the criteria to receive spinal immobilization. Several of the reports were incorrectly documented containing the wrong National Fire Incident Reporting System (NFIRS) code. NFIRS identifies basic emergency medical calls as code 321 where as motor vehicle accidents are coded 322-324. Since the codes are incorrect, finding correct information was more time consuming. The fire district's documentation protocol requires proper NFIRS coding, recording all assessments, and tasks completed by paramedic personnel.

The Greater Miami Valley EMS Council 2015 Standing Orders changed to state that the use of LBBs is not necessary unless the following criteria are met. (Standing orders, 2015). Appropriate patients for LBB immobilization include those with:

- Anatomic deformity of spine
- Blunt trauma and altered level of consciousness
- Drug or alcohol intoxication
- High-energy mechanism of injury with any of the following-
- Inability to communicate
- Neurological complaint-numbness/motor weakness
- Spinal pain or tenderness (Standing orders, 2015).

Potential consequences of concern included added injury to the patient if protocols are not followed, legal ramifications from lack of documenting or completing appropriate care of the trauma patient to the MVFD, and non-compliance of paramedics to follow spinal immobilization protocol.

After the change in standing orders on the use or non-use of backboards, district personnel lessened the use of immobilization devices, which was expected. However,

documentation for the use or non-use of spinal immobilization appears to be frequently missing. The concern is whether district personnel are following the EMS protocol. As Wolfberg and Wirth (n.d.) state, “in the event of a law suit, documentation of the incident will be the first item reviewed” (para. 12). If policies, procedures, and documentation are lacking, one can be found liable and charged legally. The lack of pursuing correct procedures, following standard operations, and documentation have led to many charges of willful and wanton misconduct toward EMS and local entities.

LITERATURE REVIEW

Several resources were chosen as background material for this research project. Over the last ten to twenty years, research and EMS literature have called for a decrease, if not disuse, of long backboard immobilization. According to Bledsoe (2013), back boarding has a potential of causing more damage. Additional articles described the several types of conditions immobilization can cause. According to Totten and Sugarman (1999), the respiratory system can be impacted from lying on a LBB for several hours. Their research determined immobilization methods restricted respiration 15% on the average and respiratory restriction was more pronounced in the elderly. Additionally, Kwan and Bunn (2005) determined adverse effects of spinal immobilization included a significant increase in respiratory effort, skin ischemia, pain, and discomfort.

A review of the Greater Miami Valley EMS Council Manual (2015) was completed. The EMS Council for all EMS members practicing in the Montgomery County area prepares this manual. These standing orders provide the guidelines to determine which patients should be immobilized and which ones can be transported without immobilization. The decision making process is indicated and specifically listed in the protocol. Standing orders also require documentation of complete patient assessments. All departments using these protocols are required to pass written and practical evaluations annually.

According Tello, Braude, Fullerton, and Froman (2014), not following assessment protocols could lead to missed cervical injuries. EMS using proper protocol were correct in determining patients that did not need immobilized (2014). While the number of missed injuries were small, this indicated the missed injuries were because of not following protocol. Tello, et. al. (2014) revealed that 101 patients brought into the emergency room un-immobilized by EMS

that were following the correct protocol had no subsequent spinal injuries. However, Hong, Meenan, et.al. (2015) described EMS were missing some cervical injuries when in non-compliance with EMS protocols. A search of scholarly databases did not find any local, state, or national research specifically related to compliance and documentation of standards related to long backboard immobilization; however, research was available on legal action filed against individuals, fire departments, and insurers regarding non-compliance with established protocols.

According to Wolfberg and Wirth (n.d.), EMS should document for the following five areas and reasons: Clinically-for the record, Operationally-data drivers, Financially-the bottom line, Legally-CYA (sic), and for Compliance-following the law. Each of these items bring attention to good and poor documentation. The fire district depends on data to make changes in many different areas. Financial gain as well a good legal defense is achieved by accurate documentation. As Wolfberg and Wirth state, "in the event of a law suit, documentation of the incident will be the first item reviewed" (para. 12).

According to Hood and Considine (2015), immobilization has been a mainstay of trauma care for decades to prevent further damage from spinal injuries. Hood and Considine performed a systematic literature review of spinal injuries from 1966 till January 2015. This study involved 47 studies meeting inclusion criteria for further review. Ten studies were case series, 37 were data was extrapolated from healthy volunteers, cadavers, or multiple trauma patients. There were 15 studies that were supportive of back boarding, 13 studies that were neutral, and 19 studies opposing spinal immobilization (Hood & Considine, 2015).

Results from the research by Wampler, Pineda, Polk, Kidd, Leboeuf, Flores, Shown, Kharod, Stewart, and Cooley (2015), revealed a patient secured on a long board and placed on a stretcher would move more than a patient secured to the stretcher only. This study involved

healthy volunteers and not injured patients. Lateral movement was measured and recorded (Wampler, Pineda, et. al., 2015).

Meusch and Rahmatalla (2013), reported the U.S. has approximately 12,000 to 20,000 new spinal injuries per year with and nearly 20 per cent of these patients dying and 25 per cent extending their injuries before arriving to a medical facility. This study concluded that whole body vibration placed more stressors on the patients during transport (Meusch & Rahmatalla, 2015). This study recommended a vibration suppression system during transport (2015).

Abram and Bulstrode (2010), propose there are advantages and disadvantages of spinal immobilization in trauma patients. Abram and Bulstrode (2010) state there is growing body of evidence documenting the risks and complications from supine immobilization and improving pre-hospital criteria to determine which patients are at high risk for needing spinal protection.

According to Weber, Rauscher, and Winsett (2015), patients secured to a spine board did not move as much if secured to a padded stretcher. This study showed patients moved significantly more on a padded stretcher than spine boards.

Neubert (2016), proposes patients involving penetrating trauma should not be immobilized on a spine board but should receive a c-collar for neck stabilization. Neubert also states that transport methods of patients involving blunt trauma has not been fully determined (2016). This study recommends minimal use of spine boards with trauma patients.

A more recent article written by Cardozo and Angus (2015), suggests that electronic care reports have been the most significant change taking place in the medical field today. With the use of current technology, care givers are able to review patients past medical history. Cardozo and Angus state that patients wearing c-collars had them removed in a timely manner with quick

access to medical records. Although, concerns were found that correct documentation was lacking.

Review of several court cases disclosed more information concerning legal issues for fire departments such as Columbus, Ohio, and other cities around the country. The lack of pursuing correct procedures, following standard operations, and documentation have led to many charges of willful and wanton misconduct toward EMS and local entities. In the case Holly Herron v. City of Columbus, the courts determined employees of political subdivisions do not always have immunity from liability (Herron v. Columbus, 2016). The basis of this case is immunity for public employees and local government can be charged if circumstances warrant and evidence is available to bring doubt of proper procedures.

The literature review enforced the conclusion concerning the need for following proper procedures, proper documentation, and after incident evaluations of emergency incidents. Without this, fire departments, employees, and the government entity can be found liable if court actions are brought about. This review also brought to light the need for more information from the SORTS and the Kettering Health Network IRB data regarding patient transports by EMS and procedures performed by hospital staff.

PROCEDURES

The OFE guidelines for research paper completion were followed for this project. Procedures utilized in completion of this research project included the following:

An EMS supervisor reviewing for adherence to spinal restriction protocols observed MVFD personnel during trauma patient care. The observed actions were compared with the documentation in the ePCR for complete documentation.

Additionally, a retrospective review of Miami Valley Fire District's data containing patient care reports and documentation guidelines were completed on an Excel spreadsheet formulated for data collection and evaluation. During this process of chart review and compliance evaluation, the results of the Standing Orders protocol test covering spinal restriction requirements were obtained.

The Kettering Health Network IRB was contacted and the process initiated to obtain approval to conduct research utilizing patient care charts of trauma patients transported to this Level 2 Trauma Center by MVFD. The IRB approval process took repeated submissions and contacts with the IRB representative. Information requested included data showing how many of the patients brought in non-immobilized were subsequently deemed to require spinal restriction while in the emergency department because of the initial exam. Data were requested for any fall, motor vehicle accident, or other trauma involving potential spinal injuries. IRB approval was received and data were obtained, released and evaluated.

After discussion with the Kettering Health Network IRB, the suggestion was received to contact the Southern Ohio Regional Trauma System (SORTS) to obtain any data regarding trauma patients and spinal injuries on a larger scale. Requested data included information from the entire region to add to the reliability of the project. Data were received on January 30, 2017,

that included total number of scene trauma patients both immobilized and non-immobilized for 2015 and 2016. A further breakdown of data included patients that were positive or negative for spinal injuries; however, the grade of the spinal injuries was not included.

Lastly, a survey was prepared to gain information from Ohio Fire Departments regarding spinal immobilization protocols and guidelines. A systematic approach to gain a cluster sample to include ten random departments from each of the state districts-The North Central, Northwest, Northeast, South Central, Southwest, and Southeast-was developed. A total of ten departments were chosen from each of these districts allowing a total of sixty total surveys. The process chose every third department in the list starting at one and ending at thirty. This allowed an unbiased selection giving information from around the state of Ohio from different size departments and different run volumes. The initial return of surveys was insufficient for an adequate sample and the survey was run twice more to obtain enough returns. The survey answers were tabulated and placed in graph form found in Appendix 2.

Definitions of Terms

ACS American College of Surgeons

Backboard a stiff board on which an injured person and especially one with neck or spinal injuries is placed and immobilized in order to prevent further injury during transport.

C-Collar a type of device worn around the neck for support and stabilization

DOT Department of Transportation

EMS Emergency Medical Service

ePCR Electronic Patient Care Report

IRB Internal Review Board

KHN Kettering Health Network

LLB Long Back Board

MFD Miamisburg Fire Department

MTFD Miami Township Fire Department

MVFD Miami Valley Fire District

NAEMSE National Association of Emergency Medical Service Educators

NFIRS National Fire Incident Reporting System

OFE Ohio Fire Executive

SORTS Southern Ohio Regional Trauma System

USAR Urban Search and Rescue

Wanton without regard to what is right

Willful Done on purpose

Limitations of the Study

There were several limitations to this study including small sample sizes, minimal prior research in the topic area for comparison of results, and the research was limited to Miami Valley Fire District patient care records and personnel.

Surveys were sent to 180 fire departments from all six regions in Ohio. Of the 180 surveys sent, 23 replied after three rounds of surveys. The lack of information limits the reliability of this study.

The sample size from Kettering Health Network Trauma program on patients requiring immobilization after arrival non-immobilized was also small related to the time frame of collection after IRB approval to the end of the research project. A longer timeframe for data collection may improve these numbers. The number of trauma runs and subsequent documentation examined during the course of this project was limited by the use of only one fire

department patient transports leading to a smaller sample size than if multiple departments were examined.

Another limitation was the lack of current research on the topic for comparison with the obtained results. Spinal clearance protocols were established only recently within the last decade leading to a lack of research. Numerous articles were written about back boarding causing additional injuries and complications, but two were written about missed injuries and their outcomes. The SORTS data documented the number of spinal injuries diagnosed on non-immobilized trauma patients, but the degree and type of injury were not available. No research was found concerning EMS personnel correctly completing spinal restriction protocols and documentation.

Utilizing a convenience sample of the MVFD patient reports and patient transports led to decreased reliability for the study. The SORTS data correlated with KHN's percentage of patients suspected of spinal injury, but on a larger sample which added to confidence in the study.

RESULTS

Several sources were used to collect data including direct observation, review of electronic patient care reports (ePCR), and Kettering Health Network (KHN) trauma data. The research questions were answered utilizing the data from the above sources.

1. How well do Miami Valley Fire District (MVFD) Personnel Comply with Current Protocols Regarding Assessment for Use/Non-use and Documentation Thereof for Long Backboard Immobilization for Trauma Patients?

Direct observation and review of the ePCR of 20 trauma scenes in which MVFD personnel assessed patients were used as the sample. Of these, 5 crews completed c-spine protocol completely with proper documentation. Ten completed c-spine protocols, but did not document all of their findings. Four crews documented their findings, but did not appear to complete the c-spine assessment protocol. One crew did neither assessment nor documentation. See Appendix 1.

2. How Well do Other Agencies Track and Monitor Spinal Restriction Performance Issues?

Surveys were sent initially to 60 Ohio fire departments. The returns were minimal and a second and third mailing were sent out trying to increase the sample size. A total of 23 surveys were returned by the deadline. The question asked was, ‘Does your department use an internal quality improvement or assessment program?’ Survey results revealed 16 departments have internal quality improvement and four do not. Three skipped the question. Another question asked ‘Do you have an external quality improvement program?’ Thirteen replied ‘yes’, seven replied ‘no’, and three skipped the question. In summary, department heads reported using observation and review of documentation to evaluate if protocols were followed. However, a

number of the responses indicated that the supervisors knew there were inaccuracies in the documentation of protocol compliance. See Appendix 2.

3. How Well do EMS Personnel Know and Understand the Protocols and Rules for Applying and Documenting Spinal Restriction use as determined by the Clinical Portion of the Annual Protocol Testing?

Annual protocol testing for MVFD employees showed 100% knowledge of the application and documentation for c-spine and long backboard use. Areas reviewed for documentation ruling in/out the use of spinal restriction included mental status, numbness, neck pain, disability, age requirement, and drug or alcohol use per the protocols. However, the review of the ePCR resulted in the following. Out of 92 trauma charts reviewed over the last quarter of the year, 50 reports did not have the proper documentation. Correct and complete documentation was found in 42 cases. Backboards were utilized in 10 of the 92 cases. Eight out of the 10 of these cases had proper complete documentation of the c-spine clearance exam that necessitated long backboard usage. The 50 reports without proper documentation included those with partial exam documentation but were determined deficient because components of the exam were incomplete. See Appendix 3 and Appendix 7.

4. What Situational Factors Impact Miami Valley Fire District EMS Personnel from Complying with these Protocols?

The observing officer performed an informal post-run debriefing of crewmembers observed during trauma runs. Crew members were asked what the c-spine clearance protocol was, why they did not complete the protocol, why they did or did not c-spine restrict their patient, and after a chart review of the completed ePCR why required items of documentation were omitted? All crewmembers could recite the proper c-spine restriction protocols. Answers

for why they did not follow the protocol varied but all included the following: “We don’t backboard anymore; it takes too long; we’re too close to the hospital; I did follow the protocol, I guess I just didn’t document it.”

5. Do patients brought to a Level 2 Trauma Center by MVFD EMS not immobilized require spinal restriction applied after initial exam in the emergency Department?

This research question submission into this project was dependent upon obtaining approval by the IRB. After approval was granted and the data obtained, the following results were compiled. Thirty-five trauma patients were taken to KHN without spinal restriction. Two of these patients were placed in spinal restriction after initial trauma assessment by trauma team staff. Data revealed 6% of patients in this sample needed spinal restriction on arrival to the hospital not previously completed by pre-hospital personnel. See Appendix 4.

In addition to the above data, SORTS gathered data regarding scene trauma victims. This data was available on January 30, 2017, and incorporated into this project at that time. Data were divided into immobilized on scene and not immobilization on scene. Patients were then diagnosed as positive or negative for spinal injuries; however, no injury severity or grading was included in the data. In 2016, a total of 3903 scene traumas were admitted into area hospitals participating in SORTS. Of these 3903 patients, 1066 were immobilized at the scene and 2837 were not. Of the 1066 immobilized patients, 165 were diagnosed with spinal injuries. Of the 2837 non-immobilized patients, 228 were diagnosed with spinal injuries. This number constituted 8% of the non-immobilized patients who had spinal injuries and correlated with the percentage obtained from non-immobilized patients from MVFD taken into KHN. See Appendix 5 and 6.

DISCUSSION

The literature review noted multiple articles on complications of long backboard spinal restriction use by EMS personnel, but no research was found concerning EMS personnel following spinal restriction protocols to determine use or non-use of spinal restrictions. Research was found by Tello, Braude, Fullerton, and Froman (2014), stating not following assessment protocols could lead to missed cervical injuries. EMS personnel using proper protocol were correct in determining patients that did not need immobilized (2014). While the number of missed injuries was small, this indicated the missed injuries were caused by not following protocol. Tello, et. al. (2014) revealed that 101 patients brought into the emergency room un-immobilized by EMS that were following the correct protocol had no subsequent spinal injuries. However, Hong, Meenan, et.al. (2015) determined EMS providers were missing some cervical injuries when they were in non-compliance of EMS protocols. A search of scholarly databases did not find any local, state, or national research specifically related to compliance and documentation of standards related to long backboard immobilization. The lack of research in this area but this writer's perception of non-compliance following protocols and documentation of actions derived from quality assurance reviews provided the impetus for this research project.

The results of the project data collection and research mirrors the MVFD Quality Improvement impressions that were the basis for this project. The results of the observations of crewmembers' compliance with protocols to rule in or out the use of spinal restriction in trauma patients revealed that personnel do not consistently follow the protocols or do not document the required information into the ePCR. The results of the post transport survey and the annual protocol testing revealed that MVFD personnel do know and can recite the protocols for both spinal restriction protocol and documentation guidelines. Reasons varied for non-compliance, but

lack of knowledge of the protocols was not a verified reason. Lack of understanding of the potential consequences to patients when protocols were not followed was the most concerning followed by the potential of liability consequences and negative public impression.

Survey responses came from a varied spectrum of paid/unpaid/rural/ and city departments. The surveys to State of Ohio fire departments indicated that while an internal QI process does exist for the majority of the 23 departments returning surveys, there is no evidence that the majority of the departments in the state do include this process in their operations because of lack of response to the survey. Of great concern were the survey responses to how departments ensure the protocols were followed. Responses indicated that even while being observed some personnel did not follow the protocols but documented that the actions were taken to appear as if the protocols were followed. Even though the survey response was small, this can indicate a larger problem within the EMS community.

The KHN trauma data only showed 6% of the non-immobilized trauma patients required spinal restriction after arrival to the Emergency Department. When this 6% is extrapolated to a larger sample size, this could involve larger numbers of patients potentially incurring unrecognized spinal injuries when protocols are not followed. The SORTS data below adds reliability to this data as it correlates with a larger sample size.

Data obtained from SORTS indicated that the majority of scene trauma patients in 2016 were brought to the Emergency Department non-immobilized- 72% (2837 out of 3903) versus 27% (1066 out of 3903) immobilized. There was no data available to denote how many trauma patients arrived non-immobilized annually prior to the implementation of the Spinal Restriction Protocols. In the non-immobilized group 8% (228 out of 2837) were diagnosed in the hospital as having spinal injuries while 15% (165 out of 1066) of the immobilized patients were diagnosed

with spinal injuries in 2016. These results were an improvement over 2015 when 12.5% of the non-immobilized patients were diagnosed with spinal injuries. The SORTS results did not include data on the degree or permanence of the spinal injury the patient acquired. No data were received concerning EMS personnel performing and/or documenting use of the Spinal Restriction Protocol's rule in/out of parameters. These data indicated that 8% of the non-immobilized trauma patients had a 'missed' spinal injury that was later diagnosed at the hospital.

Obtaining data from supervisor observation, patient care report evaluations, Kettering Health Network trauma records, and data from the Southern Ohio Regional Trauma System have brought attention to lack of protocol compliance and following proper documentation guidelines. As Wolfberg and Wirth (n.d.) state, "in the event of a law suit, documentation of the incident will be the first item reviewed" (para. 12). If policies, procedures, and documentation are lacking, one can be found liable and charged legally. The lack of pursuing correct procedures, following standard operations, and documentation have led to many charges of willful and wanton misconduct toward EMS and local entities. In the case Holly Herron v. City of Columbus, the courts determined employees of political subdivisions do not always have immunity from liability (Herron v. Columbus, 2016). Some MVFD personnel do not seem to grasp the potential ramifications of non-compliance with protocols and/or documentation requirements to their patients, department, and ultimately themselves.

RECOMMENDATIONS

The recommendations for the Miami Valley Fire District include additional training for personnel in the areas of documentation and legal liability and an external and internal quality improvement and assessment process related to spinal restriction protocols. The internal process should include the medical director, line personnel, company officer, and a chief officer.

Also recommended are peer review audits by all line personnel of the previous shifts runs following a form that is changed quarterly to target areas of documentation and protocol deficiencies. If fiscally possible, an overall external quality assurance assessment is recommended every two years to give a baseline for the internal QI process. Being involved with the QI process may assist line personnel in developing an understanding of the required documentation as well as the standing operating procedures.

The last recommendation is to implement a training by a risk assessment attorney utilizing submitted charts from the last year. This training should focus on the importance of following protocols and complete and accurate documentation to prevent or diminish negative litigation toward the department and/or individual caregivers.

It is also recommended to add the spinal restriction protocol evaluative steps to the ePCR check boxes. This addition will promote added reminders for personnel to complete these steps as well as improve documentation. Frequent observation by supervisory personnel will be required to ensure staff are actually performing the steps with counseling given as needed for omission.

The research data collected for this project will be forwarded to the head of the trauma program at Kettering Health Network and to the Southern Ohio Regional Trauma System. While 8% of non-immobilized trauma patients being diagnosed with spinal injury was a relatively small

number, when the sample is expanded to include all non-immobilized traumas across the country, the significance for missed potential spinal injuries is increased. Additional research is needed to determine if EMS providers follow and document Spinal Restriction Protocols appropriately.

A recommendation for addition research in the degree and type of injuries among patients that were not placed in spinal restriction by EMS will be given as well as an expansion of this project. An Investigation into the Compliance of EMS Personnel Following C-Spine Clearance Protocols and Patient Documentation, to include a larger sample size should be continued.

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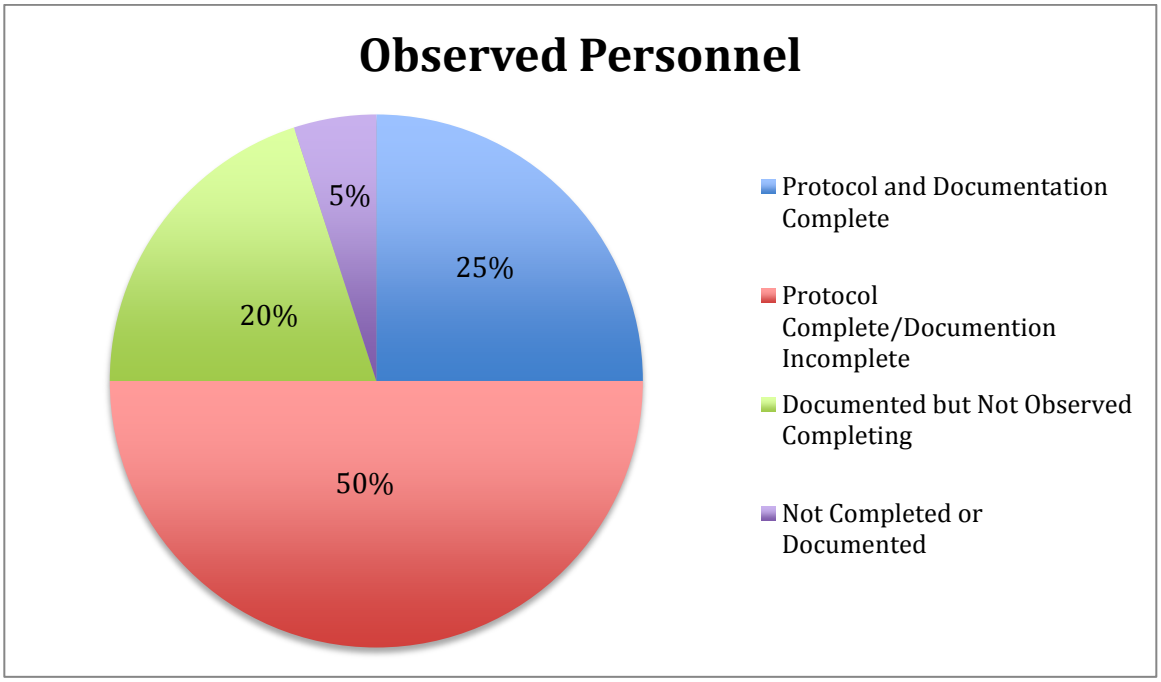
APPENDIX 1 - DIRECT OBSERVATION OF MVFD PERSONNEL ON TRAUMA SCENE



APPENDIX 2 - SURVEY QUESTIONNAIRE AND RESULTS

1. Address

Name

Company

Address

Address 2

City/Town

State/Province

ZIP/Postal Code

Country

Email Address

Phone Number

2. What is the make up of your department?

- ◯ Paid
- ◯ Combination (Paid/ part-time)
- ◯ Part-time
- ◯ Volunteer

3. How many personnel does your fire department employ?

- ◯ 1-100
- ◯ 101-200
- ◯ 201-300
- ◯ 301-400
- ◯ Greater than 401

4. Does your department run both fire and EMS?

- ◯ Yes
- ◯ No

5. On an annual basis, how many EMS calls for service does your department respond?

- ◯ 0-2000
- ◯ 2001-4000
- ◯ 4001-6000
- ◯ 6001-8000
- ◯ 8001-10,000
- ◯ 10,001-more

6. Does your department have a c-spine clearance protocol?

- ◯ Yes
- ◯ No (If your answer is no, you have finished this survey and I want to thank you for your time.)

7. If the answer above is yes, please check all the criteria your protocol includes.

- ☐ Age minimum
- ☐ Neuro assessment
- ☐ Level of consciousness
- ☐ Mechanism of injury
- ☐ Absence of drugs and/ or alcohol

Other

8. EMS/ Fire crews follow the c-spine clearance protocol

- ◯ All the time
- ◯ Most of the time
- ◯ Occasionally

9. Do crews document rule-in or rule-out spinal clearance criteria? (Age, pain, disability, or drug or alcohol presence)

- ◯ Yes
- ◯ No

10. Some crews do not follow the c-spine clearance protocol, but document as though they did?

- ◯ Yes
- ◯ No

11. How do you know crews are following the c-spine protocol?

- ◯ Observation
- ◯ Documentation
- ◯ Neither

12. Does your department use an internal quality improvement or quality assessment program?

- ◯ Yes
- ◯ No

13. Does your department use an external quality improvement or quality assessment program?

- ◯ Yes
- ◯ No

14. Does your fire department use the information from quality improvement or assessment program to make changes in department operations?

- ◯ Yes
- ◯ No

15. Are your EMS reports electronic or paper?

- ◯ Electronic
- ◯ Paper

16. Would you like a copy of this research paper?

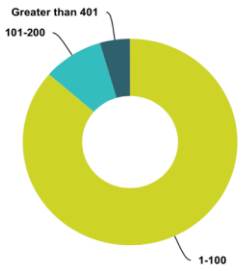
- ◯ Yes
- ◯ No

17. May I contact you with follow-up questions?

- ◯ Yes
- ◯ No

How many personnel does your fire department employ?

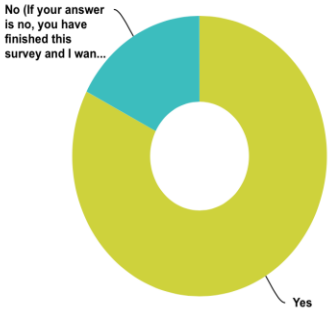
Answered: 22 Skipped: 1



Answer Choices	Responses	
1-100	86.36%	19
101-200	9.09%	2
201-300	0.00%	0
301-400	0.00%	0
Greater than 401	4.55%	1
Total		22

Does your department have a c-spine clearance protocol?

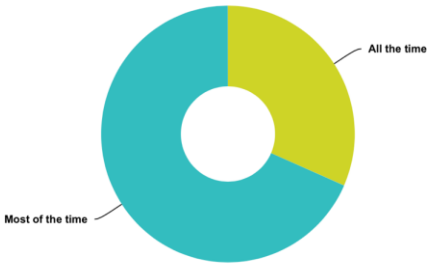
Answered: 23 Skipped: 0



Answer Choices	Responses	
Yes	82.61%	19
No (If your answer is no, you have finished this survey and I want to thank you for your time.)	17.39%	4

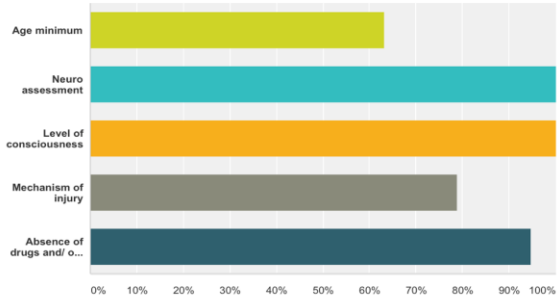
EMS/ Fire crews follow the c-spine clearance protocol

Answered: 19 Skipped: 4



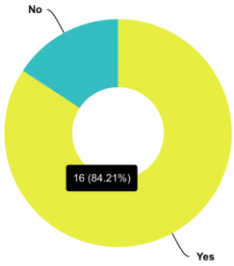
If the answer above is yes, please check all the criteria your protocol includes.

Answered: 19 Skipped: 4



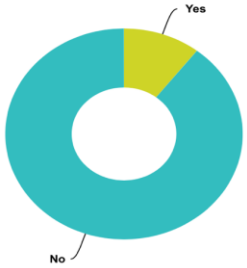
Do crews document rule-in or rule-out spinal clearance criteria? (Age, pain, disability, or drug or alcohol presence)

Answered: 19 Skipped: 4



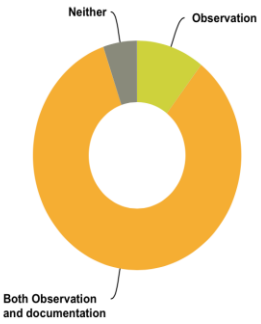
Some crews do not follow the c-spine clearance protocol, but document as though they did?

Answered: 19 Skipped: 4



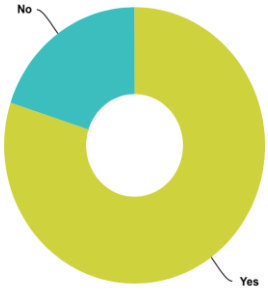
How do you know crews are following the c-spine protocol?

Answered: 19 Skipped: 4



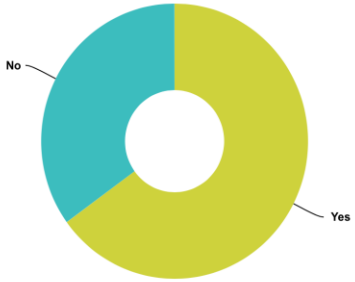
Does your department use an internal quality improvement or quality assessment program?

Answered: 20 Skipped: 3



Does your department use an external quality improvement or quality assessment program?

Answered: 20 Skipped: 3



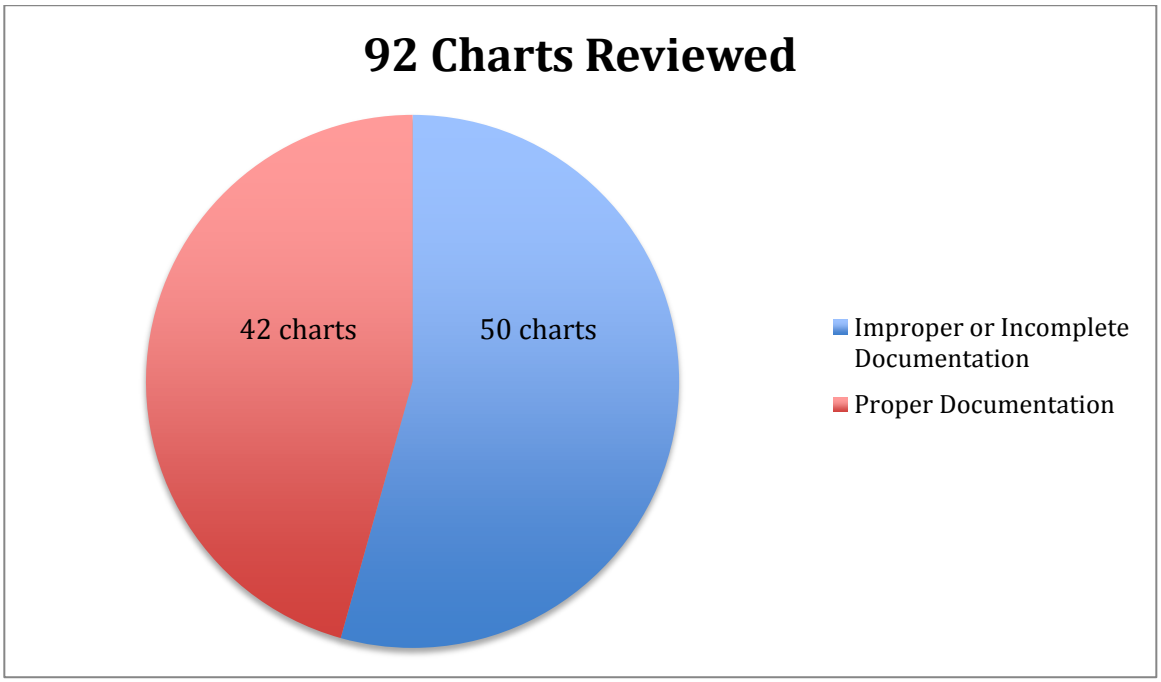
Does your fire department use the information from quality improvement or assessment program to make changes in department operations?

Answered: 20 Skipped: 3

Are your EMS reports electronic or paper?

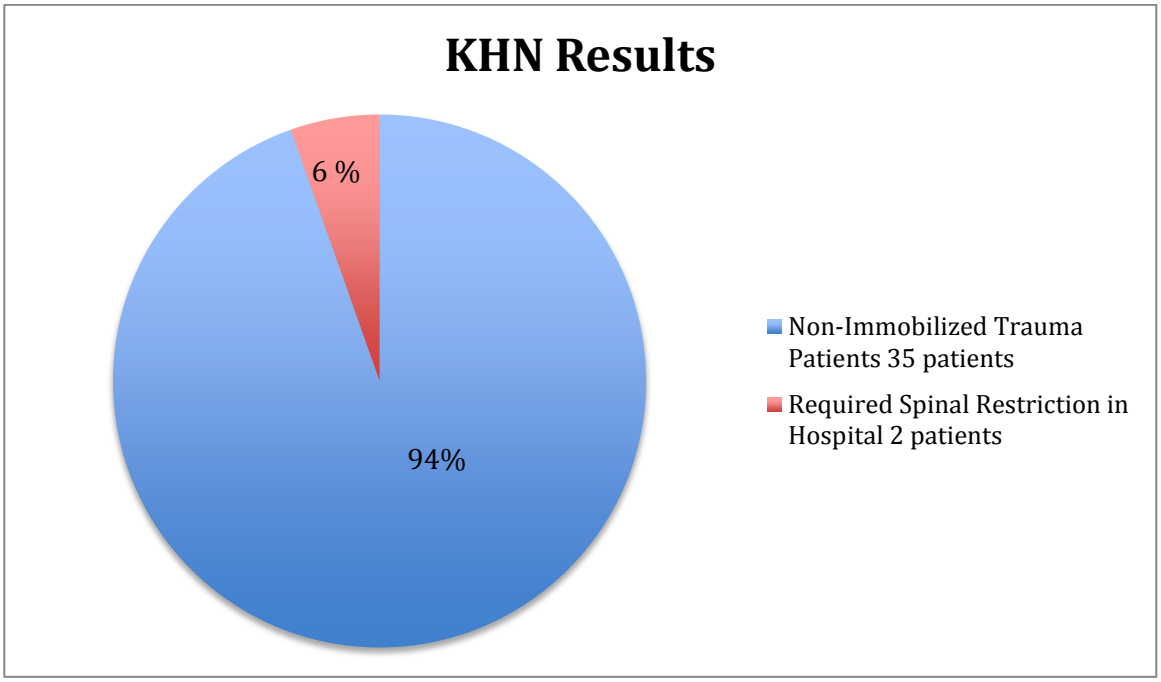
Answered: 18 Skipped: 5

APPENDIX 3 - EPCR CHARTS REVIEWED

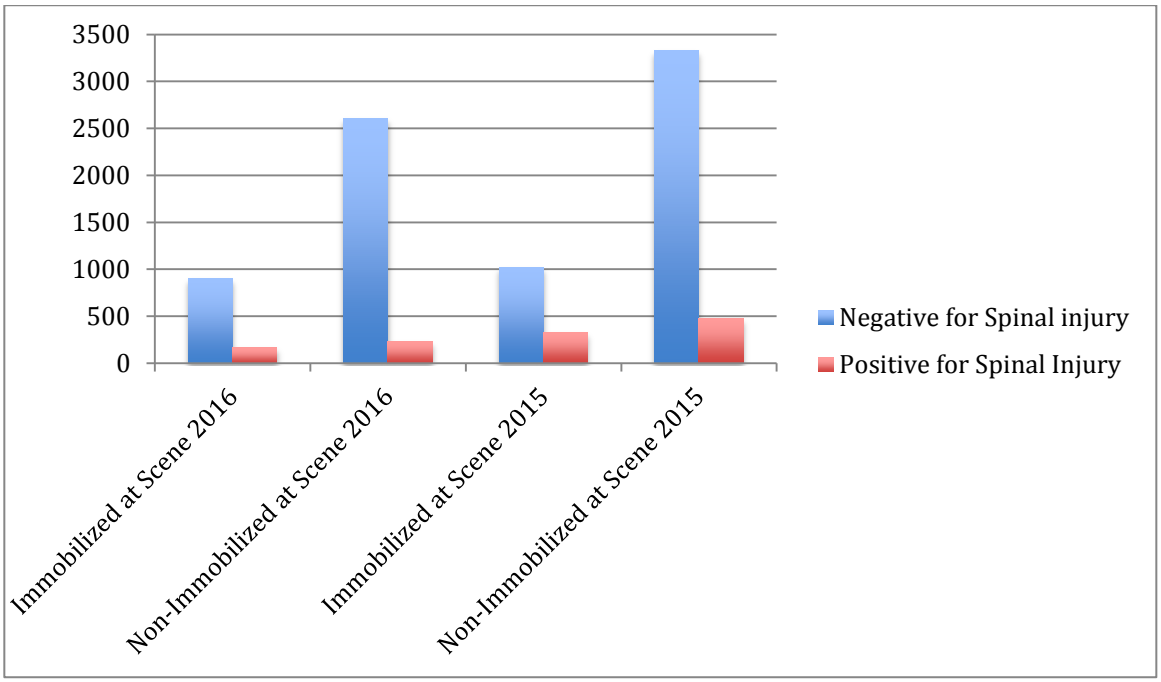


APPENDIX 4 - NON-IMMOBILIZED PATIENTS TRANSPORTED BY MVFD

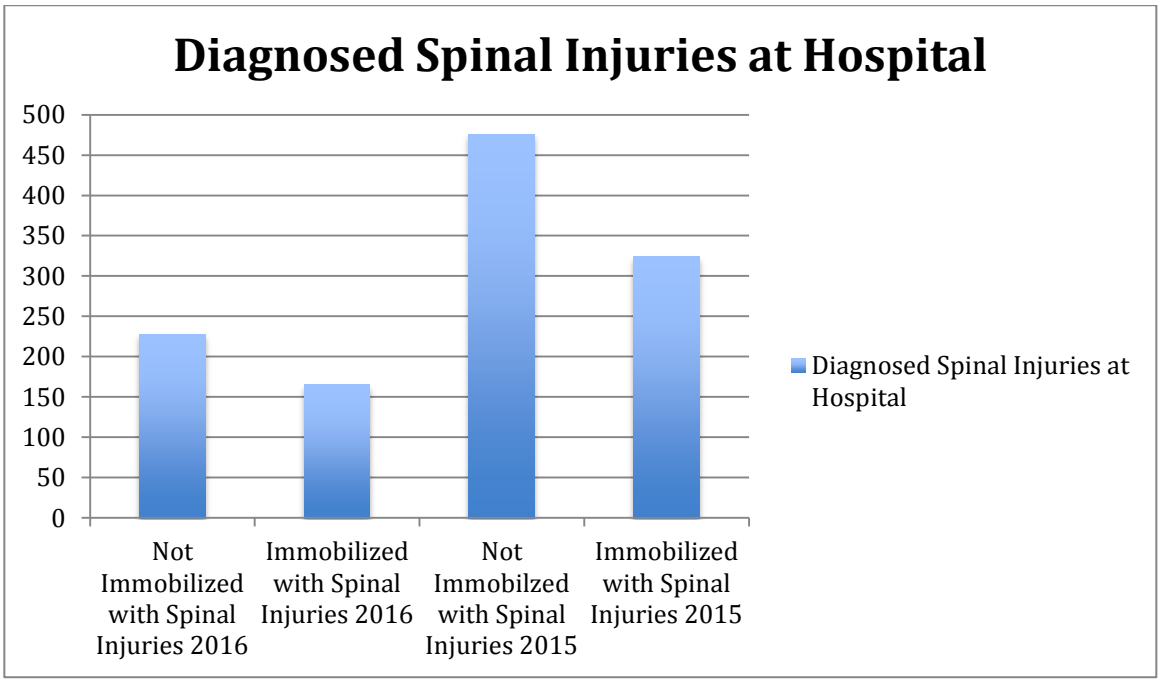
Requiring Spinal Restriction on Arrival to Emergency Department



APPENDIX 5 - SOUTHERN OHIO REGIONAL TRAUMA SYSTEM RESULTS



APPENDIX 6 - SORTS DATA OF DIAGNOSED SPINAL INJURIES



APPENDIX 7 - DATA COLLECTION SAMPLE FORM

Ohio Fire Executive Research Project Spinal Immobilization 2016								
Run Number		Type of Call	Was Type of Call Correct Yes/No	Trauma Yes/No	Spinal Clearance Completed	Use of LLB Yes/No	Use of C-Collar Yes/No	Documented C-spine Clearance
5748	09/12/16	322	no	yes	yes	no	no	no
5755	09/12/16	321	yes	yes	no	no	no	no
5953	09/21/16	322	No	yes	no	no	no	no
5958	09/21/16	322	yes	yes	yes	no	no	yes
5965	09/22/16	322	no	yes	NO	no	yes	no
5995	09/23/16	322	yes	yes	yes	no	yes	no
5995	09/23/16	322	yes	yes	yes	no	no	yes
5995	09/23/16	322	yes	yes	yes	no	no	yes
6015	09/24/16	321	yes	yes	yes	yes	yes	no
6031	09/24/16	321	yes	yes	yes	no	no	yes
6142	09/30/16	322	yes	yes	no	no	no	no
6142	09/30/16	322	yes	yes	yes	no	no	Yes
6142	09/30/16	322	yes	yes	yes	no	no	yes
6156	09/30/16	321	yes	yes	no	no	no	no
6227	10/03/16	321	yes	yes	yes	no	no	yes
6295	10/06/16	322	yes	yes	no	no	no	no
6297	10/06/16	322	yes	yes	yes	no	yes	no
6293	10/06/16	321	yes	yes	no	no	no	no
6343	10/09/16	322	yes	yes	yes	yes	yes	yes
6352	10/09/16	321	yes	yes	no	no	no	no
6408	10/12/16	321	yes	yes	yes	no	no	yes
6366	10/10/16	322	yes	yes	yes	no	no	no
6558	10/18/16	321	yes	yes	yes	no	nno	no
6658	10/23/16	322	no	yes	no	no	yes	no
6658	10/23/16	322	no	yes	no	no	no	no
6707	10/24/16	321	yes	yes	no	no	no	no
6708	10/24/16	322	yes	yes	yes	yes	yes	yes
6837	10/30/16	321	yes	yes	no	no	no	no
6953	11/5/16	322	no	yes	no	no	no	no
6958	11/5/16	322	yes	yes	yes	no	yes	yes
6958	11/5/16	322	yes	yes	yes	yes	yes	yes
7014	11/8/16	322	yes	yes	yes	no	yes	yes
7014	11/8/16	322	yes	yes	no	no	yes	no
7075	11/11/16	321	yes	yes	yes	no	no	yes
7088	11/11/16	322	no	yes	no	no	no	no
7088	11/11/16	322	no	yes	yes	no	no	yes
7088	11/11/16	322	no	yes	no	no	no	no
7300	11/22/16	322	yes	yes	no	no	no	no
7317	11/23/16	322	no	yes	yes	no	no	yes
7317	11/23/16	322	no	yes	yes	no	yes	yes
7317	11/23/16	322	no	yes	no	no	yes	no
7509	12/2/16	321	yes	yes	yes	yes	yes	yes
7526	12/2/16	321	yes	yes	yes	no	yes	yes
7530	12/2/16	321	no	yes	no	no	no	no
7688	12/11/16	321	yes	yes	yes	no	no	yes
7633	12/16/16	322	yes	yes	yes	no	yes	yes