

November 21, 2008

Councilman Michael Hancock

Dear Councilman Hancock, I wanted to share with you some serious concerns I have about what appears to be the hospital trying to justify their failure to provide an adequate number of Paramedic ambulances with misleading information. Denver health has been arguing that “outcome measures” i.e. survival rates should be used to evaluate their performance as Denver’s EMS provider. Denver Health has provided questionable information about their trauma and cardiac arrest survival rates and has then been misleading about how these findings are applicable to evaluating Denver’s EMS system. I have included explanations of why this information is misleading and how it has been used out of context to manipulate the discussions about Denver’s EMS system. I will be sending this same information to the rest of City Council and the Mayors office. I am sure that Denver Health will soon have the information as well. In the event that Denver Health should question what I have presented please feel free to contact me. I am willing to meet with you and anyone from Denver Health at any time to clarify the meaning and application of any information provided by myself or Denver Health. In recent discussions with members of Denver’s print and broadcast media it is clear that they are aware of and understand the misleading nature of Denver Health’s “outcomes” arguments. They share our concerns about transparency and accountability in fixing Denver’s EMS system. I look forward to working with you to develop the best EMS system for the citizens of Denver, Thanks again for all you have done.

Sincerely

Robert Petre.

Why Denver Health's Reported Trauma Survival Rate Is Not an Accurate Indicator of the Quality of Denver's EMS system.

By: Robert Petre

Denver Health has used their reported trauma survival percentage rate as evidence that Denver Health has provided an adequate number of Paramedic ambulances for the City. This "survival percentage rate" has been used to justify Denver Health's continued provision of EMS for the City. This rate reported as high as 95% for blunt and penetrating trauma survival has been sighted in statements such as "if Denver doesn't have a great pre-hospital system then how could our trauma survival percentage rate be so high?" The answer to this question is that Denver Health's trauma survival percentage rate is a measure of only the hospitals performance in treating trauma patients if they arrive with vital signs at Denver Health. No consideration is given to the patient's pre-hospital response or care only the patient's condition on arrival is used to determine which patients are in the reported survival percentage rate. Denver's Pre-Hospital 911 system has no effect on Denver Health's reported trauma survival percentage rate. To be included in the survival statistics the patient must go to Denver Health and must have a pulse or signs of life on arrival at Denver Health. In addition to this large numbers of critical and fatal trauma patients are excluded from the "survival Percentage". It is also not a measure of the likelihood for survival of any given individual who suffers critical trauma somewhere in the City and County of Denver.

Denver Health excludes patients that may have died as a direct result of their own systems prolonged response times. The trauma survival statistics only include patients that come to Denver Health. The data only includes patients who arrive with some detectable vital signs. This means that if a patient arrives at Denver Health after their heart has stopped due to a prolonged response time to their critical injury they are excluded from the statistics.

There is another way that the trauma survival rate is skewed not to reflect the EMS systems performance. This issue involves the protocols for destination of trauma patients and the geographical location of Denver Health. Denver Health sits close to downtown and is surrounded by a number of outlying level 1 and level 2 trauma centers. Under the destination policy set by Denver Health patients with trauma that appears critical or that may become critical are to be transported to Denver Health regardless of the calls location. This is not the case when trauma patients are in cardiac arrest or profound shock and appear to be about to suffer cardiac arrest. In the case of cardiac arrest or profound shock and near cardiac arrest from trauma the patient is to be transported to the closest Level 1 or Level 2 Trauma center. This means that the patients who are most likely to die are taken to the closest level 1 or level 2 trauma center while those who have the greatest likelihood of survival are taken to Denver Health. Patients that do arrive at Denver Health in traumatic cardiac arrest are also eliminated from the survival rate statistics because they arrive at Denver Health "without signs of Life".

That Denver Health's trauma survival rate is not a measure of the adequacy of the number of ALS ambulances on the streets of Denver is further shown by the following. If we reduced the number of paramedic ambulances to only one ambulance to cover the entire City and County of Denver 24/7 there would be no change in Denver Health's survival percentage rate for trauma patients that arrive at Denver Health with signs of life. We would also not see a change in their survival percentage rate if we put 50 Paramedic ambulances on the streets. This is because the survival percentage rate is based on the patient's condition when they arrive at Denver Health. (Have "signs of life" or "any vital signs") What we would see if we had only 1 Ambulance is a smaller absolute number of trauma patients with "any vital signs" arriving at Denver Health. The actual number of survivors would go down but the survival percentage rate would not change. Having 50 Paramedic ambulances would result in a larger number of trauma patients arriving with vital signs but again no change in the survival percentage rate. A greater number of lives would be saved but not a greater percentage of patients who arrive at Denver Health with vital signs.

If we look at a possible trauma case we can see how Denver Health's trauma survival statistics don't reflect the EMS systems performance. In this case a patient is critically injured at Federal and Yale in southwest Denver. If the paramedics have a quick response time and they find the patient with critical trauma he is transported emergency (lights and siren) to Denver Health. If the patient arrives at Denver Health and is not in cardiac arrest then he is placed in the trauma survival statistics. Now lets see what happens if there is a prolonged response time. If the Paramedics are delayed and arrive after the patient has gone into profound shock or cardiac arrest then he is transported to Swedish Hospital. (The closest level 1 trauma center) This patient was not transported to Denver Health and therefore is not included in the trauma survival rates reported by Denver Health. This same situation happens in any part of the city that is not in that relatively small area that is closest to Denver Health. The frequency of these events is dramatically increased by the fact that prolonged response times are most likely to occur in the parts of the city that are not closest to Denver Health.

Further evidence that Denver Health's trauma survival rate is not indicative of the adequacy of Denver's EMS system is the fact that Denver Health's "trauma survival rate" includes patients that arrive at Denver Health by private car who never access Denver's pre-hospital care system. This "survival rate" also includes patients that arrive by helicopter and from other cities and jurisdictions. According to Denver Health's "White Paper" 25% to 30% of the patients in Denver Health's trauma survival percentage rate never have contact with Denver's EMS system.

There is another group of trauma patients that can die as a direct result of a prolonged paramedic ambulance response time and not be included in Denver Health's "trauma survival rate". This group includes patients that die while waiting for an ambulance and are then declared dead at the scene by the paramedics. This group doesn't arrive at Denver Health with "vital signs or signs of life" and are therefore also not

included in their survival rate. The survival rate for patients who arrive at Denver Health with vital signs or signs of life is in fact not evidence of the adequacy of the EMS system provided by Denver Health.

Validity of the pre-hospital Cardiac Arrest Survival Rate Comparison Presented by Denver Health on a Map of the USA.

By: Robert Petre

One of the key pieces of information that Denver Health states is evidence of the adequacy of Denver Health's Paramedic services is their reported medical cardiac arrest survival rates. This information is presented on a map of the USA with an explanation table in Denver Health's "White Paper"(Appendix D) This information is purported to show the cardiac arrest survival rates in several major cities including Denver. The survival rates on the map range from less than 1% to 40%. This map is clearly not an "apples to apples" comparison. Different cities excluded different groups of patients. Different cities also defined survival differently. Age of the comparison data is also a concern ranging from 2 years old to over 30 years old.

There are some other issues with the cardiac arrest survival numbers reported by Denver Health. One of these issues is the combining of cardiac arrests handled by street ambulances with those treated by the paramedics at DIA. The reason that this is vital is that Denver really has 2 separate types of EMS systems. Denver has one type of EMS system on the streets and another type at DIA. On the streets, Denver has a 2 tiered response system. This two tiered system starts with a basic life support first response by Denver Fire. Denver Fire usually arrives first and provides basic care including oxygen, bleeding control and automated defibrillation. The second street tier is the ALS response by Denver Health's Paramedic transport ambulances. The ALS paramedics provide a full complement of advanced procedures, medications and patient transport to the Emergency Department. Response times for street operations are measured from the time a fire truck or ambulance is assigned to the time that the unit (BLS or ALS) arrives at the reported address. The responders may not actually reach the patients side for several minutes after dispatch records indicate that a unit has arrived at the reported address.

DIA has a totally different response model. DIA has a rapid response/ALS (paramedic) first response. At DIA the first response is by Denver Health Paramedics stationed in the terminal and concourses. The Paramedics respond in a modified suburban or a fully equipped EMS cart. Denver Fire is the second response tier at DIA. DIA also has proportionately more Paramedic response units and response times are shorter at DIA than on the street DIA also uses a different way of recording on scene time for the ALS first response. The Paramedics are already at the airport so in most cases they have already arrived at the address. When a DIA paramedic reports he is at the scene what it means is that the Paramedic is at the patient's side. Reports suggest that many more cardiac arrests are saved at DIA than they are on the streets. This is also the shared opinion of most all of the Paramedics that work at DIA. This is consistent with the findings from Denver Health and other systems that report better survival rates with faster ALS response times. When Denver Health reports their cardiac arrest survival rate

without separating, or at least identifying, the DIA cardiac arrests it makes the survival rate for cardiac arrests in the City appear to be better than it actually is. This also hides the fact that the first response ALS system at DIA saves more lives than the BLS (DFD) first response system in the City.

Another issue is Denver Health's failure to separate out or at least identify patients who suffer cardiac arrest in front of the EMS providers. According to the internationally recognized Utstein Template for reporting pre-hospital cardiac arrest survival the survival rate of patients who suffer cardiac arrest in front of EMS should be reported separately from patients who are found in cardiac arrest. This is because the survival rate of patients who arrest in the presence of EMS is a measure of a different dynamic than measuring the overall EMS systems response to Cardiac Arrest in the community. The table from Denver Health's "White Paper" (Appendix D) explaining the cardiac arrest survival rate map states that Denver Health used the Utstein template but the information on EMS witnessed arrests is omitted.

The next issue is the failure of Denver Health to separate out or at least report separately Pts who were resuscitated prior to Denver's EMS system contacting the patient. These would be patients resuscitated on aircraft prior to arriving at DIA and Pts resuscitated PTA at clinics and public areas with AEDS. This group of patients is never under the care of Denver's EMS system while in cardiac arrest and including them in the survival rate makes the reported rate deceptive.

The final issue is the group of patients that the Paramedics get to after a prolonged response time and are declared dead at the scene. This group of patients is not included in the survival calculations because no resuscitation is attempted.

Questions to clarify the validity of Using “outcome measurements” (Reported trauma survival) to evaluate Denver’s EMS system.

By: Robert Petre

Question: Is the trauma survival rate reported by Denver Health a measure of the performance of Denver’s Paramedic system or is it a measure of the survival of patients who arrive at Denver health in a certain medical condition (“Pts with detectable vital signs or signs of life”)?

Answer: Denver Health’s reported trauma survival rate is a measure of the survival of patients who arrive at Denver health in a certain medical condition (“Pts with detectable vital signs or signs of life”) it only takes into account the patient’s condition when they arrive at Denver Health.

Question: Is the trauma survival rate reported by Denver Health a measure of the survival of all critical trauma patients injured in the City and County of Denver that are cared for by Denver’s 911 system?

Answer: NO Denver Health’s reported Trauma survival rate is not based on the total number of trauma patients cared for by Denver’s 911 system. All patients taken to other trauma centers are excluded. All patients that arrive at Denver Health in cardiac arrest from trauma are also excluded. (An extended response time may be responsible for the Pt being in cardiac arrest on arrival at Denver Health or may be the reason that the patient was pronounced dead at the scene but this will not be reflected in Denver Health’s reported trauma survival rate.) In addition to this according to Denver Health 25% to 30% of the patients in Denver Health’s reported survival statistics are from outside jurisdictions or arrive in private cars and are never treated by Denver’s 911 system.

Question: If we had only one Paramedic ambulance running 911 calls in the whole City and County of Denver would we expect to see a change in the trauma survival percentage rate reported by Denver Health?

Answer: No because Denver Health’s Trauma survival rate is only based on the survival of patients who arrive at Denver Health in a certain condition. (“Pts with detectable vital signs or signs of life”) We would expect to see a much smaller absolute number of trauma patients arriving at Denver Health with vital signs but would expect no change in the trauma survival percentage rate reported by Denver Health. We would expect greater loss of life but no change in the reported survival percentage.

Question: If we had 50 fully staffed paramedic ambulances 24/7 responding to 911 calls in the City and County of Denver would we expect to see a change in the trauma survival rate reported by Denver Health?

Answer: No because Denver Health's Trauma survival rate is only based on the survival of patients who arrive at Denver Health in a certain condition. ("Pts with detectable vital signs or signs of life") We would expect to see an increase in the absolute number of patients arriving at Denver Health with vital signs but would expect no change in the trauma survival percentage rate reported by Denver Health. We would see more lives saved but no change in Denver Health's reported trauma survival rate.

Question: If a trauma patient dies waiting for an ambulance with a prolonged response time and is declared dead at the scene is this patient reflected in Denver Health's reported trauma survival rate.

Answer: No because the patient was pronounced dead they would not arrive at Denver Health with vital signs so the patient would be excluded.

Question: If a patient is in cardiac arrest or near arrest from trauma in the outlying areas of the city and is transported by protocol to the closest level 1 or level 2 trauma center(not Denver Health) is that patient included in the trauma survival rate reported by Denver Health?

Answer: No only patients that arrive at Denver Health in a certain medical condition ("Pts with detectable vital signs or signs of life") are included in Denver Health's reported survival percentage rate.

Question: Is the trauma survival percentage rate reported by Denver Health a measure of the survival of all patients that suffer critical trauma in the City and County of Denver?

Answer: No it is a measure of only the hospitals performance in treating trauma patients if they arrive with vital signs at Denver Health. No consideration is given to the patient's pre-hospital response or care only the patient's condition on arrival is used to determine which patients are in the reported survival percentage rate. Denver's Pre-Hospital 911 system has no effect on Denver Health's reported trauma survival percentage rate.

Question: Are all of the patients in the trauma survival rate statistics reported by Denver Health patients that were treated by Denver's 911 system?

Answer: No according to Denver Health 25% to 30% of the patients in Denver Health's reported survival statistics are from outside jurisdictions or arrive in private cars and are never treated by Denver's 911 system.

Questions to clarify the validity of Using “outcome measurements” (Reported cardiac arrest survival) to evaluate Denver’s EMS system.

By: Robert Petre

Cardiac Arrest survival rate map comparison.

Question: The cardiac arrest survival rate comparison map shows a very large difference in the reported survival rate for the cities listed (less than 1 % to 40%), is this an “apples to apples” comparison of survival for the EMS systems in the cities listed?

Answer: NO, according to the explanation of the map in Denver Health’s “White Paper” (Appendix D) many of the cities used different criteria to decide which patients to include and also used different definitions for survival. The reported results are also for a wide range of time periods. The time frames for the data provided ranged from just 2 years old to over 30 years old.

Question: Is this reported survival rate from cardiac arrest a good indicator of the overall performance of Denver’s EMS system for cardiac arrests?

Answer: NO, this is because the survival rate is such a small percentage of the total number of cardiac arrests. The result of this is that even if the system was failing to get to a large number of cardiac arrests, and they died as a result, this would not show up as a substantial change in the survival percentage rate. This is also shown by the fact that Denver Health’s EMS system has recently been shown to have seriously deficient resources (running out of paramedic ambulances on a daily basis) yet Denver Health has not reported a significant change in their cardiac arrest survival rate.

Question: To non-medical people, “cardiac arrest survival” implies the survival rate for all patients in cardiac arrest from any reason is this what is reflected in the data?

Answer: NO according to Denver Health’s “White Paper”, Denver health included only those patients who suffered cardiac arrest from a primary cardiac event. Denver Health excluded all patients that suffered a cardiac arrest from other causes. Denver Health excluded all cardiac arrests caused by respiratory emergencies, choking, all shootings, stabbings, electrocutions, smoke inhalation, hypothermia, auto accidents, motorcycle accidents and all other trauma, drowning, suffocation, poisoning, hanging, strangulation, suicide attempts, over doses, and Denver Health also excluded virtually all pediatric cardiac arrests.

Question: Is Denver Health's reported cardiac arrest survival rate of 5.9 % an accurate indicator of the cardiac arrest survival rate for people who suffer cardiac arrest in the City and Denver's EMS system responds?.

Answer: NO, Denver Health included survivors that should have been excluded or at least reported separately to comply with Utstein guidelines. Denver Health included patients that suffered cardiac arrest in front of the paramedics and patients that are resuscitated before contacting Denver's EMS personnel. To be an accurate measure of the 911 system's response to cardiac arrest in the community these patients would need to be separated out and or reported independently. In addition to this cardiac arrest patients that are resuscitated at DIA would need to be taken out or reported separately. This is because DIA has a paramedic level first response. This system has much faster response times and is a completely different type of EMS system.. This system has a much better resuscitation rate than the street ambulances and combining both systems makes the survival rate for street responses appear better than it is.

Question: Did other cities on the map report all persons suffering cardiac arrest?

Answer: YES, some cities reported what appears to be this group of patients. These cities had similar survival rates for this group (1.4 to 2%). Other cities eliminated groups of patients from the data and had very different reported survival rates.(up to 40%)