



Announcer: Welcome to CRR Radio from the Vision 2020 Project.

Ed Comeau: Hi, this is Ed Comeau, the host and producer of CRR Radio. Before we get into today's show, I want to take a minute to thank you all for listening to CRR Radio and let you know that we have hit a very special milestone. Since launching CRR radio, it has been listened to over 8,000 times, which is a huge amount of plays for a podcast like this. During this time, we've CRR topics such as the opioid crisis, active-shooter standard, data, CRR around the world, and much, much more. Our listening audience is growing, and I hope that you are all finding the conversations I'm having with our guests as interesting and as informative as I am. So, thanks to all of you for listening and subscribing, and please help spread the word about CRR Radio, and now onto today's show.

On today's episode, we are going to be talking about using GIS to help combat the opioid epidemic as part of CRR. Rich, could you take a minute and introduce yourself to our listeners?

Rich Llewellyn: Sure. Good Morning Ed. My name is Rich Llewellyn. I'm the Assistant Chief of Administration for the Everett Fire Department, which is a city that's approximately 30 minutes north of Seattle in Western Washington state. I'm new to the Everett area. I've moved over from the Spokane Valley Fire Department where I was previously the Division Chief of Emergency Medical Services and worked there since 2000. Part of the responsibilities that I had were monitoring our performance in the EMS arena and identifying issues that were emerging and trying to come up with solutions to address those issues. And that kind of led me into a project at the National Fire Academy through the Executive Fire Officer Program a Year Three which was Emergency Management. I wanted to take a look at our opioid use and experience in the Spokane Valley.

Ed Comeau: Well, you wrote an interesting paper on it that I sat down and went through. Thanks for sending that to me. Can you kind of fill us in on what you did in what you learned?

Rich Llewellyn: Sure. I figured out that we really didn't have a great understanding of the scope or nature of opioid use in the Spokane valley. Anecdotally, we knew we were administering Narcan. We've been doing that throughout my career, but just didn't have a good feel for where the department was relative to the rest of the country or relative to how we had been over the course of the previous 10 to 15 years. Wanted to develop some data that was usable and actionable and allowed us to look at the information in a way that would create some understanding.

One of the things that I found or methods that I found to do that was by creating mapping products that allowed a visual representation of what the problem was and allowed us to take a look at what the information was telling



us that might not be as apparent when it's just a bunch of numbers on a page or on a screen.

Ed Comeau: So I mean, we were talking about data visualization, and maybe take a step back from it. Can you describe what your jurisdiction was like, Spokane Valley?

Rich Llewellyn: Sure. The Spokane Valley was a 10-station fire department covering approximately 75 square miles with three incorporated municipalities and some unincorporated chunks of Spokane County, approximately 18,000 calls of servers per year with 75 to 85% of those being EMS related on any given year as is typical for most people. Some affluent areas and not so affluent areas depending on which part of the jurisdiction you're in, and some fairly rural areas and suburban or more urbanized areas the closer you got to the city of Spokane.

Ed Comeau: So it sounds like a real cross section. You kind of had it all.

Rich Llewellyn: It was, and stations develop a flavor as you know, in the fire service so people could end up working in a fairly urban area with a lot of wild land, urban interface and farm lands and barn fires all the way up to heavy industrial and where you're pulling a whole first alarm into a building to extinguish a fire inside.

Ed Comeau: So, getting back to your research paper there, so it sounds like what you're working your way towards was data visualization, but even before you can go there, you have to get the data in the first place. How did you acquire that? Where did you pull your data from?

Rich Llewellyn: One of the challenges that we faced was having good data or access to the data that we are entering into the system. Prior to 2016, we used an FDM product, and didn't really have a good ability to pull data out of it or actionable data. In 2016, we switched to the ESO Suite of EMS products that allowed us to develop electronic health records. Really nice in terms of being able to search data, pull data out, and export it into whatever format we needed to work with it in. Really allowed us to take our EMS management process to a new level.

Ed Comeau: So, what were some of the indicators you were looking at? You know, you were focusing on opioid and you kind of using Narcan as a proxy, weren't you for opioid usage?

Rich Llewellyn: That's exactly correct. Part of the project that I had through the Executive Fire Officer Program was answering the question, what is a good way to identify opioid use and track it? All we really had was Narcan administration as the indications of when our crews came across to opioid use. I needed to validate that. I did find a couple of studies that showed there was a correlation of Narcan administration to emerging patterns of opioid use. More Narcan administrations in the field or were related to more opioid hospitalizations.

So, the temporal nature of those studies confirmed that Narcan administration is a good proxy indicator for opioid use. So, that's really what I focused on, and that's one of the things that we had available to us in the data was the administrations of Narcan. Our providers document that, and we're able to pull that documentation out and use it for patient identification or incident identification.

Ed Comeau: And where you're trying to correlate any other data from other sources as part of this as well?

Rich Llewellyn: That was really what we were looking at. We have police officers carrying Narcan now. We didn't reach out to the police department to see what their experience was. We really wanted to focus on SBF D data or Spokane Valley Fire Department data. We do have or did have a response environment that was multi-jurisdictional with automatic aid coming from regional response partners. Hadn't reached out to them to grab any of their data that was inside the city limits or the jurisdictional boundaries of the department. We did find some incidents where our members traveled outside the jurisdiction and administered Narcan, so we had to filter those out just so we could focus on data inside our jurisdiction.

Ed Comeau: So, you started acquiring all this data, the raw data. What did you do with it?

Rich Llewellyn: Well, I first exported it into Excel so I could manipulate it a little bit. I wanted to look at some of the temporal patterns, see if I could find anything that was emerging. The first thing I looked at was kind of a monthly usage of Narcan or monthly administration of Narcan. Found that the summer months were higher for administration of Narcan. I think that was probably a supposition I would have had prior to looking at the data.

Also found that Mondays and Tuesdays were lower in administration. So, apparently people aren't using opioids as much on Mondays and Tuesdays.

Ed Comeau: That's kind of interesting. Now, and again, I think you kind of alluded to it, was this ... Did it validate a lot of what you already perhaps anecdotally knew by looking at this data or did anything really jump out at you?

Rich Llewellyn: You know, it was interesting. Just looking at the temporal patterns, I probably would have guessed that just based on my supposition that people are using drugs more in the summer, but that was just an uneducated guess or based on historical knowledge. What really started to pop out as unexpected results was when we translated the data we had on usage of Narcan and put it into a graphical format using the ARCGis product from [inaudible 00:08:53]. Really started to find some interesting information emerging when we could visualize the data in a way.



Ed Comeau:

And what did you see when you were looking at it? Oh, I guess obviously being a podcast, can't really show people what you created, but can you kind of describe it and tell what did pop out at you?

Rich Llewellyn:

Sure. I'll describe it as best I can. Wanted to use maps that we were able to de-identify the data. It's important for us to share this information with our response partners and other public health agencies, but we do have to maintain that patient confidentiality as required ethically and legally. So, what I did is I took the information that we had and compared it to population densities over a number of census block groups and anonymized it that way.

Some of the kind of striking things that popped out were usage in a higher socioeconomic area of the jurisdiction that had approximately nine contiguous, what I call census block groups or what are referred to a census block groups, that had no instances of Narcan administration over the course of the study period.

When I pulled the information from that area out of the map or out of the data and ran the data for the rest of jurisdiction, we came up with a usage or experience of about 80 instances of Narcan administration per 100,000 in population.

Then I took the information from those nine census block groups and plugged it back in and figured out that we should have seen approximately 12 instances of Narcan administration over the course of the year.

One of the things that I starting to look at, as far as the potential root cause of that or I guess root cause of the missing data or missing administrations, is that that was a higher socioeconomic area, and there may have been a some type of diagnosis bias, and I did find some information in the literature that supported that. If people don't have kind of a root suspicion that there's an opioid involved, patients are less likely to receive Narcan when indicated. Without indications of illicit drug use, patients aren't likely to get Narcan or are less likely to get Narcan.

That was kind of some interesting information. Provided us with a a training opportunity for our paramedics and EMTs to kind of provide some introspection and talk about what patients should be getting Narcan and when.

Some other information that I found were kind of some areas of high Narcan usage that were unexpected. In one of those areas, we found a facility that ended up being responsible for about 9% of Narcan administrations over the course of the year, and once we looked at patients or individual patients who had multiple usages, we were able to find another patient who was associated with that facility but had a couple of Narcan administrations in different census block groups. So, he wasn't exactly associated with them immediately in the

data. Once we associated him with that facility, we found the facility was responsible for more than 10% of our Narcan administrations.

In that case, that became a potential regulatory issue, and I reached out to the agencies in Washington State that that handle facilities or manage those facilities and let them know what I had seen, and we met and discussed that.

Another thing that I found that was quite interesting was that areas of the highest usage seem to correspond with areas that had more transient housing such as apartments. In fact, one area that I had previously looked at when we were working on some community risk reduction projects in apartments had a turnover of approximately a hundred percent over the course of a year. So, people are coming into the apartment and moving out, and those were areas of fairly high usage and presented us some opportunities as we reached out to those apartment managers in order to develop programs for them to recognize or at least provide information as far as what their tenants could be looking for or some opportunities for their tenants to get help.

Ed Comeau: And you've mentioned a couple of examples here. I mean for example, you gave some additional training to your paramedics based on the information that came out of your research. Were there other changes in operations or deployment or anything that you did as a result of the information you were able to put together?

Rich Llewellyn: Not per se. The real changes were in our understanding of what was going on and our ability to tell the story of opioid use in the Spokane valley and in particular reach out to other agencies that have the opportunity to help us out with those problems. The public health agency was one of those. They have an opioid reduction program, and reached out to them to assist with developing some information that could be presented to apartment managers. And, in conjunction with an apartment fire safety program that the department had developed, we added in some information on opioid use and what to look for and resources that tenants could receive to help them out.

Ed Comeau: Now, I know you're not there anymore, but do you know if they've seen any changes in opioid use over the past few months, few years?

Rich Llewellyn: I don't believe that data has been run again in this manner, so I really couldn't tell you.

Ed Comeau: Have you seen anybody else doing this kind of research and using it in this way to visualize what's going on?

Rich Llewellyn: As far as opioid use, I have not come across any in the fire service, any other departments that are using visualization in this way. I'm excited to apply the same process here in the City of Everett, and I'm working on getting some



software up and running in order to do that. So, we'll be looking at that here in Everett as well.

Ed Comeau: And your paper got an award too, didn't it?

Rich Llewellyn: It did, yeah, it was selected as the Outstanding Research Award for the third year students at the National Fire Academy. So, I'm going back next weekend to present the paper at the Alumni Association meeting.

Ed Comeau: Well congratulations. That's excellent.

Rich Llewellyn: Thank you.

Ed Comeau: Well, we will certainly have a link to the paper on the show notes here. And Rich, I really appreciate you taking the time to fill us in what's going on and what you put together on your EFO Applied Research Project, looking at the use of Narcan and using GIS to visualize it. Thanks a lot for joining us today, Rich.

Rich Llewellyn: You bet, Ed. Thanks for calling.

Ed Comeau: Well, we are in our third season of CRR Radio, and you can find all of our past episodes at www.strategicfire.org/crrradio and on Apple Podcast where you can also subscribe and get each episode as it comes out.

CRR radio is edited by Rich Palmer, hosted and produced by me, Ed Comeau and is a production of the Vision 2020 Project. Thanks for listening, and we'll see you next time.

Announcer: Thanks for joining us on CRR Radio from the Vision 2020 Project. For more information on community risk reduction, please visit us at www.strategicfire.org.