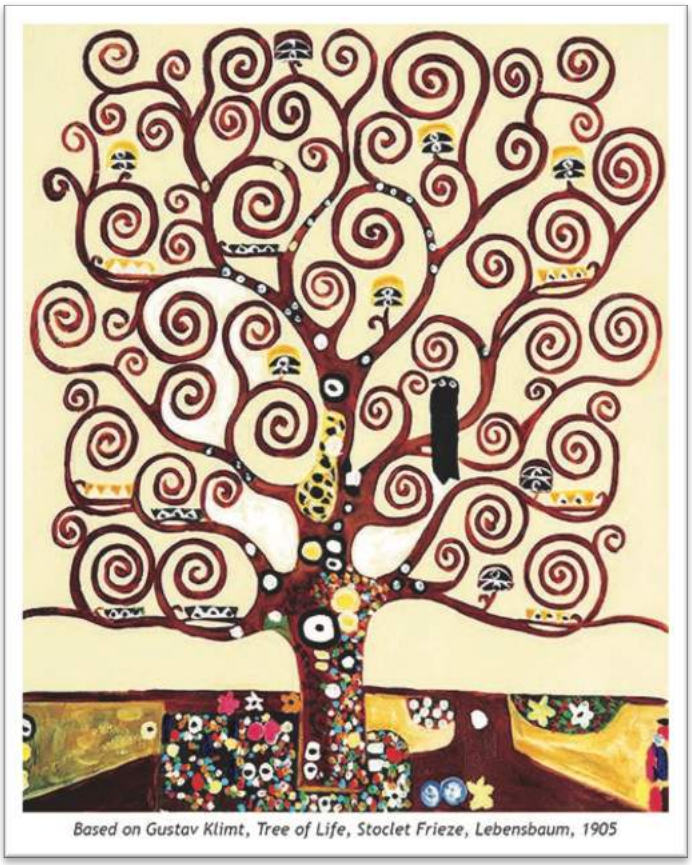
Call9: Disrupting Emergency Medicine and Palliative Care in Skilled Nursing

Interview with Timothy Peck, XiaoSong Mu, and Garrett Gleeson



Based on Gustav Klimt, Tree of Life, Stoclet Frieze, Lebensbaum, 1905

By Jean Galiana
ACCESS Health International
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Background

Call9 provides emergency medical care, follow up care, and ongoing palliative care to residents in skilled nursing and rehabilitative homes. They offer an alternative to an ambulance ride, emergency department visit, and, often subsequent, hospital admission. The preliminary outcomes have saved nursing homes eight million dollars in health spending annually.

The Call9 model is both high tech and high touch. The Call9 engineers designed user friendly patient boards, physician dash boards, and electronic medical record systems that enable the remote physician to see, diagnose, and deliver care via the hands of an onsite Call9 first responder within minutes of a patient's acute health event.

In this interview Timothy Peck, MD XiaoSong Mu, and Garrett Gleeson describe the need for Call9, its founding, recent developments, outcomes, and plans for expansion.

About Timothy Peck

Timothy Peck, MD, is the co-Founder and CEO of Call9. He previously held a faculty position at Harvard Medical School and was the Chief Resident in the Emergency Department at Beth Israel Deaconess/Harvard

About XaioSong Mu

XiaoSong Mu is the co-Founder and CTO at Call9. XiaoSong received his BS in Computer Science from Stanford University in 2015. While in college Mu interned as a Software Engineer at Collective Health, and he was set to begin a career at Google prior to pursuing Call9.

About Garrett Gleeson

Garrett Gleeson is the Chief of Staff at Call9. Gleeson works closely with Peck, to advance Call9's messaging and investor relations. Gleeson formerly worked in the nonprofit sector where his experience as a mission oriented leader has helped inform Call9's patient first ethos.

Interview

Jean Galiana (JG): What is your background?

Timothy Peck (TP): I am an emergency physician by training. I went to New York University medical school. I did my residency at Harvard and stayed on as faculty. I left in early 2015 to build Call9 with XiaoSong. At that time, he was at Stamford, finishing up a computer science degree. He had not yet graduated. He had been accepted into med school and had been offered a job at Google but I convinced him to come on board and build Call9. Garrett joined the team at the beginning of 2017. He and I work closely to advance our external messaging and investor relations.

JG: Why did you build Call9.

TP: When I was an emergency doctor, we received many patients from nursing homes. We often admitted them to the hospital, which may not have been the best place for the patient, but there were no better options at the time. I learned that nineteen percent of ambulance trips to the emergency department originated from nursing homes and rehabilitation centers. This nineteen percent represents a substantial cost burden to the system. It also puts the patient through the trying experience of rushing to the emergency department and, in most cases, being hospitalized.

I wanted to find a way to fill the need gap between nursing home care and emergency care that was more patient centered, had better outcomes, and was less costly. Because I did not know anything about nursing homes, I decided to live in one. I learned everything about nursing homes. I spent time with the chief financial officer to understand how the finances flowed through the system. I shadowed the nurses, became one of the doctors, and spent a lot of time with the administrator to understand that side of the operation. I learned that the reason

the nursing home residents ended up in the emergency department boiled down to three contributing factors. One was that the nursing to patient ratio was one to twenty at best. Secondly, was the nursing home staff had no diagnostic capabilities. Lastly, physicians and other high level medical clinicians were not available around the clock. There is no system in place to treat a resident who becomes sick in the nursing home. If anyone became sick, there were not enough nurses to take care of the patients, there were limited diagnostic tests available, and doctors are there infrequently, and were not emergency trained. The residents were simply sent to the emergency department. From that understanding, we created a new system of care to address the problem of the nursing home residents being sent to the emergency department.

JG: What is the training of the Call9 clinical care specialists?

TP: Call9 uses on-site first responders we call 'clinical care specialists' who are mostly paramedics by training. Some are emergency department technicians. Others are physician assistant students. They all have a background in handling emergencies. The skill set is different than that of a nurse. The clinical care specialists go to the bedside of the patient whenever there is any type of acute need. They are also with patients to provide follow up care, and ongoing palliative care.

JG: Are your providers educated in aging and geriatrics?

TP: Our Medical Director of Population Health, Kevin Biese, the Vice Chair of Emergency Medicine in geriatrics at UNC School of Medicine, offers a lot of continuing medical education for our physicians. We want our physician group to be emergency trained and to participate in geriatrics training. We have a robust geriatric education system as well as palliative care education. Twice a month we conduct educational programs. We are creating a new work force of emergency physicians who have geriatric and palliative care training. It is somewhat like an additional residency process. We also have a residency program in SUNY Downstate Medical Center. One of their fourth year emergency residents rotates with us every month. We are creating a new system of value based emergency, geriatric and palliative care.

Additionally, all of our physicians work together while they are treating patients. We have a HIPPA secure text platform. A physician will ask a question and twenty others will respond. So, in essence, we are all working together to treat our patients. This group work is a form of ongoing learning.

JG: Do you have any quality assurance programs in place?

TP: Yes. Call9 has a quality assurance and improvement program. Jonathan Fisher, the head of quality at Maricopa Integrated Health Systems at the University of Arizona, leads our quality assurance and improvement program. We have recruited physicians who have kept one foot in the door of academia but are be free to innovate without the restrictions.

JG: How long does it take you to respond to an emergency call?

TP: We keep our clinical care specialist on site in the skilled nursing residences twenty four hours seven days a week. We staff the nursing home with three, eight hour shifts of clinical care specialists. It is necessary for someone to be on site at all times because we respond to emergency care, provide continuing follow up care, and ongoing palliative care. Our physicians are available remotely around the clock. The clinical care specialists are also busy with documentation, customer service, and regular discussions with the family. So, the answer to your question is that we are at the bedside of the patient within minutes. This is in stark contrast to the time it would take an ambulance to transport a patient to the emergency department and the unpredictable wait for care after arrival.

In essence, we have embedded a light model of an emergency department in the nursing homes we serve. We also have access to the resources at the nursing home. Our overhead is exponentially less than an emergency department. It enables us to generate a great amount of savings, which makes it sustainable for us to keep a clinician on site and a physician remotely available at all times.

JG: What are the most common emergency conditions you are called to treat?

TP: The chief complaints that we treat in approximate order of occurrence include: shortness of breath, altered mental status, febrile or fever, abnormal vital signs, cardiac issues, falls, emesis or vomiting, and pain.

JG: Please walk me through a Call9 emergency visit.

XiaoSong Mu (XSM): When a clinical care specialist responds to a call, he or she taps on our app and the physician is notified. Immediately the physician will have access to the detailed dashboard we created that, among many options, contains the electronic medical records, patient workflow, telemetry, and lab and diagnostic results. The physician picks up the call and, via tablet, speaks to the patient and the clinical care specialist who would be in the process of setting up diagnostic procedures. The physician has access to several camera streams. On the top left is telemetry where the physician sees the patient's vitals. Also visible is a live stream of the EKG, pulse rate, and heart rate. The dashboard displays all of the critical information that an emergency doctor would need and normally

has access to in an emergency room. We specifically place this information in the same location on the screen that a physician would find it in the emergency department. It helps to keep the emergency physician in a familiar environment.

TP: The positioning of the telemetry streaming on the upper left of the patient on the screen may seem like a small detail that we have but that is where I, and every other emergency medicine doctor, expects to see it when treating a patient. The software is designed with the user in mind. We have a unique opportunity because we manage the physician group working for Call9. We also have technology and product experts on staff. When we receive ongoing feedback from physicians about what they need, we have the ability to make the technological adjustments to meet those needs.

JG: Does the Call9 physician have access to the patient medical record?

TP: We have our own electronic medical records system that is integrated with the electronic medical records of the nursing homes we serve. We have access to all of the data. This enables us to know their entire individual health history. We update the patient record in real time.

XSM: The patient medical record houses all the orders that we have placed--not just for the present session but in the previous sessions as well. The record is a summary of all the history of the patient under our care. We recently rolled out our patient board software. It is analogous to the boards in the emergency room and the hospital where you have a list of patients, but it is much more than that for us because we are geographically disparate. Doctors can filter for all the acute patients, all the patients of one specific nursing home, or check all those receiving palliative care. The physician is able to maintain a detailed view of each patient and a broad view of all the patients at once. No one is left out of the treatment pipeline while the care team moves patients through.

The physician can zoom into any individual patient to determine how long they have been up on the patient board. If it has been too long, the physician receives a flag notification and checks in on that patient. The physicians can also sort the patients for how long they have been on the board. The palliative care patients are often on the board a little longer than the others.

JG: What real time laboratory measurements and other diagnostics are you able to conduct at the bedside?

XSM: Our newest feature is the Philips Lumify ultrasound wand that attaches to a tablet and provides a good view of the patient's organs. The results of the lab and diagnostics conducted at the bedside are displayed in real time on the right

side of the physician's dashboard. The physician can enter orders for diagnostic tests from the tablet and the clinical care specialist will conduct the tests and upload them in real time for the physician to review. The blood tests are processed through an i-STAT machine. It is a small portable device that gives a reading from a cartridge of the patient's blood in approximately two minutes. One time I collected my own blood sample and then I called Uber. I received the results of my blood test before the Uber arrived.

TP: We have a urine dip as well as PT/INR, H/H, and CHEM-8. We also do outpatient CT scan (computed tomography) and blood transfusions.

JG: Are the EKG results also uploaded online in real time?

XSM: Yes. The results are uploaded instantly and the machine also prints out a paper version. The results are housed alongside any former EKGs so the physician has an individualized comparison to determine any abnormalities. The physician is also able to use earphones and listen to the heart and lung sounds of the patient through a stethoscope that is connected via Bluetooth to our mobile devices on site.

JG: What is one common health event that you treat often?

TP: There are many. We have had success with dyspnea, or shortness of breath, experienced by patients with congestive heart failure, chronic obstructive pulmonary disease, asthma, and pneumonia. There are no resources for people who experience dyspnea in the nursing home. I chose to mention dyspnea because approximately ninety percent of people living in skilled nursing who experience it are sent to the emergency department. Only thirty percent of the residents who experience shortness of breath in the skilled nursing homes that we serve are sent to the emergency department. This means that approximately seventy percent of the patients we treated for shortness of breath in their 'home' avoided an emergency department visit. (Appendix A) With these patients, we measured emergency room avoidance and patient health outcomes including, oxygen levels, respiratory rates, recovery level rates, and things of that nature.

JG: How many patients is the remote physician able to attend to at one time?

TP: Our emergency physicians may see ten patients at the same time. The physician will click in and out of each virtual room.

XSM: Not all of the patients need full attention all the time. This allows the physician to provide medical expertise across many patients just like they do in an emergency room.

JG: Do the physicians and clinical care specialists maintain the patient chart online?

XSM: At the bottom left of the screen is the panel where the physicians update the patient chart. Even though it occupies only a quarter of the screen, it is a major part of our functionality. We built our own electronic medical record and charting system to support emergency care, follow up care, workflows, and the way our physicians want to practice.

Our physicians can move through the health documentation quickly because it is clear and accessible. It is necessary for them to be efficient. When labs and diagnostics are posted, the physician will click to acknowledge that they have been reviewed. The physician will also document any findings. We made sure to create a clean user friendly chart. Medical charts are rarely organized and clear. We are bringing a consumer level of user friendliness to medicine.

TP: We have built consumer grade software. We started in Silicon Valley and moved our engineers to Brooklyn along with the rest of the company. We have a talented team including some of the best engineers in the world.

JG: Please describe your follow up care.

TP: Eighty percent of the patients we see would still go to the emergency department if we did not keep treating them after the original event. When we have a patient who has been in our care for twenty four hours, we put them on observation and then followed up care. All of the steps are tracked in real time via technology and in person by our clinical care specialist. We use both emergency and internal medicine doctors to monitor our patients' progress after the initial acute crisis. Commonly we provide follow up care for two or three days. Occasionally it lasts for weeks. We are essentially running a remote hospital, not just an emergency department. Additionally, we have palliative care physicians who oversee palliative care throughout the life of the patient.

JG: Do you conduct medication reviews for your patients?

TP: We conduct regular medication reviews for our patients. One example is that patients who have a urinary tract infection or any dehydration will have their kidneys affected. Medications need to be adjusted to account for the change in how their medications are evacuated.

JG: Is your electronic medical system interoperable with others?

TP: Everything will eventually go into Epic. The last component that we need is an integration for is the telemetry. We just did a round of funding that I cannot disclose because I do not have final papers. But I will tell you in about a week and a half. And part of the funding is to do integrations with telemetry. So once that is done, our system will be interoperable with Epic.

TP: The typical hospital electronic record is not designed for unique workflows. It is generally a one size fits all platform. It has a lot of functionality but is not user friendly. It is also a cause of burnout for many physicians. Our user friendly technology is only part of our physician friendly culture. Our head of operations, who is number two in the company, is a nurse practitioner. Without counting XiaoSong, the Call9 original team is ninety percent clinicians. Supporting them in their challenging work is important to us.

If a patient dies in most medical settings, the physicians and other care team members move on to the next patient—especially in the emergency department. No one receives a call or flag alert that one of their patients died. There is no system of support for the clinical team. We have a flag when anyone passes away, the clinical care specialist and the physician receive a call from our administrator every time someone passes away. They might say, "I am just checking in. How are you doing? Do you need anything right now? Do you need the day off or need to be relieved? Was it a hard case? Let us debrief." That support is incredibly important to the health of our staff.

JG: How does value based care fit your business model?

TP: Our business model is based on value based care. Rather than racking up the fees for service and providing more and more unnecessary care, we spend quality time with patients and only provide necessary care that is aligned with their advanced care plan. It is humane care that mitigates staff burnout. Patients are not over medicated or given unnecessary tests. They are treated immediately in their home. We are reimbursed by the savings to the insurer created by Call9 providing the right care at the right time in the right place.

JG: Do most of your patients avoid an emergency department visit?

TP: Eighty percent of our patients do not go to the hospital. Twenty percent do. We hired a third party economics firm to review our outcome data also. They found that we were saving the payers, including the Centers for Medicare and Medicaid Services, eight million dollars per year per nursing home with our hospital avoidance. West Health in San Diego, California, is sponsoring a study in

which Harvard Medical School is examining our data to provide further validation.

JG: Do you participate in shared savings with Centers for Medicare & Medicaid Services?

TP: We are working with legislators and policymakers in Washington to have companies like Call9 included in value based arrangements. Medicare Advantage and the private payers reimburse us via value-based arrangements because they see how much we save them. We currently take a loss on Medicare patients, but it is important for to use to keep treating them and to collect data on how well we are doing. It is also the right thing for the patient. We can't keep treating Medicare patients forever without proper reimbursement, but we're confident our value is being recognized by decision-makers and the better we're compensated the faster we can grow, the more money we can save the healthcare system while delivering superior care.

JG: What other insurers reimburse for your services?

TP: We have reimbursement arrangements in place with Anthem, United Healthcare, Healthfirst, and Emblem, which are the first, second, third and fourth largest insurers here in New York. Most of the major payers work with us at this point.

One of our insurers, Anthem, has a complex case management program. We conduct a risk assessment to help them identify people at a high risk of hospital readmission. The patients in complex case management are given more supportive and health services to prevent readmissions and provide them with a better quality of life.

JG: What outcomes do you measure?

XSM: We are beginning to measure many indicators. The most basic one that we have been tracking to date is the emergency department avoidance for our patients. We have the ability to break that down data based on chief complaint and diagnoses. We are beginning to conduct an intake process with people who are new to the skilled nursing homes we serve. We also conduct a risk assessment that includes a series of questions from the LACE index scoring tool that assesses risk of hospital readmission.

Garrett Gleeson (GG): We are also collecting data at the moment of a patient's emergency. No one has ever been able to collect this data. It allows us to understand things about patients that previously have not been understood. It

also allows us to provide better and more individualized resource allocation for our patients in a way that has not been previously conceived.

TP: That health data will be invaluable to us as we grow. We hope to receive funding from the Small Business Innovation Research (SBIR) through the National Institutes of Health to study the data in more depth with an eye toward population health management.

JG: What were your main barriers when getting started?

TP: We built our business model and the technology that enables it from scratch. We are innovating in different areas: technology, medicine, and insurance. The contracts we have with payers have never been done. It is difficult to have payers quickly adapt their reimbursement structure. They have moved quickly because we save them money and they have the proof clearly in their data.

JG: How many patients do you cover at this point?

TP: We are responsible for approximately ten thousand people. To date, we have treated approximately three thousand for acute episodes. We expect that number to grow exponentially by the end of the year.

JG: Can you discuss your costs as compared to an emergency room visit?

TP: The insurance companies do not want us to share the details of our individual arrangements but our cost is a small fraction of the costs incurred with an emergency room visit. The Medicare Advantage numbers of our patient population are that every time 911 is called, the payer receives on average a thirty thousand dollar bill. Keep in mind, we are treating the oldest and most frail. The cost savings are so great that the insurers are eager to participate in cost sharing arrangements with us.

JG: Do the nursing homes you serve reimburse Call9 from their cost savings?

TP: Yes. They receive some of the savings we deliver to insurers, we receive some of the savings, and the insurers receive some of the savings. The patients benefit from more compassionate, person centered care with better health outcomes. Additionally, hospitals lower their readmission rates and emergency department overcrowding is down. Call9 is a win win for everyone.

GG: On the eight million dollar annual saving metric alone we are generating revenue for the nursing homes. But there are a host of other ways in which we are escalating the acuity of patients that they can care for and keep in their nursing homes.

JG: Will the nursing homes also receive a better CMS Star rating by reducing readmissions?

GG: We surely keep patients in their beds at the nursing home who would otherwise be sent to the hospital This is as patient centered as care can be. It is also a quality of care that nursing homes are able to describe to potential new residents.

TP: If given the option, it would be simple to choose whether to admit mom to a Call9 nursing home versus a non Call9 nursing home.

JG: Do you envision expansion into other markets?

TP: In the immediate future we will maintain a focus on serving nursing homes. Eventually we may expand into continuing care retirement communities. We are also devising a way to provide follow up care in the home for our short term rehabilitation patients after discharge.

JG: Do you have a founding mission or belief?

GG: Our belief is: Do right by the patient and everything else will fall into place.

TP: That is correct. We have found that to be true. We are patient first. That commitment has dictated everything we have done. If we lose money on a single patient, that is fine as long as we are doing right by the patient. If we find ourselves a quagmire with a piece of the healthcare system, we find a way to do what is right for the patient. We have found by putting the patient first, all else is falls into place on the business side.

The Call9 corporate culture is indoctrinated in keeping the patient first. Every meeting starts with stories about patients. We have memorials for the patients who have passed away. We have commemorations and group settings where people gather to talk about their emotions around different cases. We reach out to all of our physicians and clinical care specialist after every patient death. We are trying to create a much more compassionate culture not only for the patient, but for the work force too. That is directly because of the experiences I have had in medicine that were not satisfying to me.

JG: Does Call9 participate in advanced care planning with your patients and their families?

TP: Everything starts with the advanced directives of the patient. We make an advanced care plan with our patients. The plan tells our emergency physicians what the care goals and priorities of the patient are. Sadly, I never had access to

an advanced care plan when I worked in the emergency department. In most platforms, the advanced care plan is usually buried somewhere in the chart.

The advance care plan is the most important part of our solution. It is the heart of the patient centered care we provide. Unlike most healthcare providers, we have a system in place that enables us to honor the advanced directives of our patients. We contact the family of every patient we see and participate in shared decision making with them throughout the time we care for their family member.

We provide advanced care planning remotely. Our director of palliative care is Claritza Rios. She was previously at the University of California San Francisco and Highland Hospital. She joined us because she is able to treat many more patients through call9. We have a link on the patient dashboard for a palliative care physician to add a palliative consult when appropriate. There, the physician is able to document the advanced care plan of the patient and family.

We are providing emergency medicine remotely with emergency physicians who are the right people at the time and providing palliative with care physicians who are also the right people at the right time. I should add that both emergency and palliative care are also provided in the right place.

JG: Do you have special equipment or medications in the skilled nursing homes to provide palliative care and honor the advanced care wishes of the residents?

TP: Yes. Each of the skilled nursing facilities has emergency boxes and a formulary that we have amended for advanced life care. Our clinical care specialist conducts regular comfort checks. We also bring the family around the bedside and into the care circle.

Recently I spoke with our user experience designer, George. I asked, “How was your day today?” and he said, “I just had one of the best days of my life.” I asked him, “What possibly could have made this the best day of your life?” Earlier in the day George had witnessed an interaction between one of our physicians and our patient and her husband. The husband was talking via teleconference with the physician. The physician identified that the patient was likely going to die soon. The physician and the husband had to make the decision of whether to bring the patient to the emergency department or stay in the nursing home. That day was the couple’s sixty fifth wedding anniversary. Understandably, the husband was distraught at first and was worried about his wife going through another ambulance trip and emergency department visit. He eventually moved through various emotional stages. Initially he was very concerned and somewhat angry, but eventually he realized that he had the choice of having one more day of

dignity with his wife on their sixty fifth wedding anniversary. So, he sat down, became comfortable, and was able to be with her as she died in a much more peaceful and dignified way. We have engineers and people from the business world partaking in pivotal life experiences. This creates a work culture that is meaningful and mission driven. It is easy to come to work in the morning when you are part of something bigger than just business.

JG: Thank you for this discussion.

XSM, GG, TP: Thank you for your interest in Call9.

END

Appendix A

Use of Noninvasive Positive Pressure Ventilation By An Advanced Emergency Telemedicine To Reduce Unnecessary Ambulance Transports And Emergency Department Visits from Skilled Nursing Facilities

Background:
Dyspnea is a common complaint leading to activation of EMS and transport to the Emergency Department (ED) in the elderly residing at skilled nursing facilities (SNFs). Prehospital use of non-invasive positive pressure ventilation (NIPPV) has be shown to reduce mortality and hospital admission. We examined the impact of the use of NIPPV by an Emergency Telemedicine Service (ETS) at SNFs to reduce need for EMS and ED visits.

Methods:
Staffs at two SNFs were trained to activate an ETS to evaluate and treat patients who otherwise would be considered for transport to the ED. Encounters were performed with aid of SNF staff and emergency care technicians in the facility. Staff was trained to initiate NIPPV. Data was retrospectively collected from the electronic health record over a 10-month period. Chief complaints (CC) were categorized using the Coded Chief Complaints for Emergency Department Systems schema. The primary outcome was avoidance of EMS transport with secondary outcomes of reduction in respiratory rate (RR) and increase in oxygen saturation (SpO2). All encounters were monitored for delay in care and adverse events. Descriptive statistics, confidence intervals and paired t-tests were calculated.

Results:
There were a total of 859 encounters, of these, 70% (CI 67-73) avoided transport to the ED. 16% (n=137) had a CC of “difficulty breathing”, of which 19% (n=26) received NIPPV. 73% (n=19) of those treated with NIPPV avoided EMS transport. There was a mean reduction in RR of 6 breaths/min ($p < 0.001$) and increase in SpO2 of 9% ($p < 0.001$) in those treated with NIPPV. No significant delays in care or serious adverse events resulting from medical error occurred.

Conclusion:
The use of an ETS led to a reduction in EMS transports from SNFs. NIPPV was safely implemented and managed via telemedicine physicians for patients with respiratory distress. Use of NIPPV significantly improved quantitative metrics (RR, SpO2) and may help prevent need for EMS transport. Additional research is needed to fully understand the efficacy, scope and cost saving benefits of an ETS and the use of NIPPV at SNFs.