Successful Static Splinting: Forearm Based Splint Fabrication, Part 2

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- [Fawn] Today's course is Successful Static Splinting, Forearm Based Splint Fabrication. This is part 2 of a four-part series on static splinting. Our presenter today is Dr. Kirsten Davin, she is a veteran occupational therapist of nearly 20 years with extensive experience in a variety of practice areas, including inpatient, acute care, and intensive care units, as well as the Central Illinois Regional Burn Center. Since initially obtaining her occupational therapy degree in 2001, followed by her OT doctoral degree in 2007, Dr. Davin has routinely worked in the acute care realm. Through her experience with clients who have experienced burn injury, she has acquired extensive knowledge in splint fabrication and application. She has fabricated hundreds of splints within her acute care career, many of which were custom-fabricated, individually designed on a case-by-case basis. Her splinting experience ranges from a standard safe position and resting hand splints, to highly intricate custom-fabricated splints for the hand, wrist, lower extremities and cervical spine, incorporating all varieties of materials in splinting medium. For the last decade, she has been best known for her live national speaking tours which to date have reached over 20,000 therapists in 46 states. She has conducted thousands of educational events on the topics of seating and positioning, assistive technology, work-life balance, acute care ICU, rehabilitation, splint fabrication, orthotic application, and more. Dr. Davin is an engaging speaker who strives to make learning fun. Welcome back, Dr Davin.

- Thank you, Fawn, I appreciate the nice introduction there, and welcome back to some of you who may have been participating in our part one course. This is a four-part series that we're going to be completing over the next couple of weeks. So I'm excited to see that we have quite a few participants. As we go through today, if you have any questions, please feel free to let me know. You can type a question in the Q and A box and I will, I tend to try to answer the questions as they come in, while we're still on topic, 'cause I think that's a little easier for everyone to follow along, and then if

there are any followup questions, we can address those at that time as well. So feel free to chime in or ask questions, if needed, and as Fawn said, yes, I have quite a bit of experience on the trauma side and on the acute care side, and definitely in the splinting and orthotic side. As we progress through today, keep in mind that, in addition to today's webinar, my team and I also offer live courses, or in light of COVID-19, the current COVID-19 situation, we also have been offering some tutorials and some additional one-on-one education via videoconferencing methods, Zoom, that type of platform. So if you like what you see here, if you feel like you need a little bit more information, or if you want to do kind of a private course or a tutorial, we're happy to help you with that. My contact information is on the back slide.

So without further ado, let's get started. So many of our photos and images within, not only today's seminar, but within this four-part series, are being used complements of Performance Health. They have an abundance of splinting material and orthotics, and many of the products that we'll be talking about today, and many of the techniques we'll be talking about today, are being represented by their photographs. So I wanna thank them because it was very nice of them to be able to offer those photos for our use. A couple of disclosures we need to go through, kind of the legal beagle stuff, is that I am a paid presenter through OT.com, but there is no relationship with any of the products or materials that you'll see here as we go through today. So by the end of this course, I want you to be able to identify and describe a volar approach for a splint fabrication versus a dorsal-based approach.

There are two definite benefits to each. There are some benefits and some liabilities with each that we'll discuss, but I'd like for you to make sure you know the difference between each approach and why you may use one versus the other. It's also important to consider when you may want to use a sheet application, versus a precut, versus a preformed method of splint or orthotic application as well. I'll also ask you to be able to list the steps involved in selecting, fabricating, and modifying a thumb spica, a wrist

cock-up, a functional position, and an intrinsic plus splint, and we'll walk through three videos on fabrication of each of those, so you'll have a really good idea as to how to fabricate. And then also, we're also going to describe the benefits of a forearm-based splint as compared to a hand-based design. Now, as Fawn as mentioned, at the end of this, you have a bit of a quiz or an examination that you'll have to complete in order to acquire the CE hours.

So as we go through today, I have found that it's easiest and most effective for you, as you're probably sitting there, hopefully taking notes, to touch on those questions as we go through the slide show. So if you hear me say, make sure you know this, write this down, you'll wanna make sure that you touch on this, or highlight it, that's probably a good indicator that it's going to be on the upcoming exam or the upcoming quiz. Now before we really get rolling, there's an important delineation that we should discuss. The term splinting versus orthotics. Now many therapists who have been in the field for a number of years refer to all methods of splinting and orthotic application as splints. Many of them refer to splinting only as the custom-fabricated items and orthotics as the off-the-shelf items. And then there's another group of therapists that abide by the most recent research which is pushing to shift the conversation to where orthotics is the preferred terminology. So in an effort to standardized the conversation today, as we go through, and through the next couple of courses in the series, I'll be referring to all types of orthotics as splinting. So just know that there are some delineations between the two, but for sake of continuity, we're going to refer to today's products and today's applications as splints.

So I wanna start off today by discussing materials selection, and we had touched on this briefly within our first course, within the first course within this series. Now there are three types of materials selection options that you can pick from when you're picking materials. There are an abundance of thermoplastics, and for information on thermoplastics, I'd suggest looking at the part one of this series because we did go

into some of the thermoplastic qualities, drapability, conformability, those types of things, and we did discuss some of the thermoplastics that are out there for use. What I'm referencing here is how the materials are presented to you for fabrication. So we have three different types, we have preformed splints, we have precut splints, or sheets, and we also have sheet fabrication. So preformed splints are splints which are previously molded and you'll take them off the shelf and they will already look something like this, okay? They'll already be pretty well formed. If you're working in an acute care situation, many times you'll see a typical resting hand splint or a functional position splint that's off the shelf. You can just grab it, apply it to your client, and you may need to make a couple of heat gun adjustments or a quick dunk in the splint pan to make the size, to size it most appropriately. But the majority of the splint is already fabricated. The preformed splints are oftentimes easily adjustable and easily reshaped and it can save you some time.

So if you know you just need a typical resting hand splint, there aren't any real abnormalities, it's a pretty standard size individual, a preformed may be the way that you want to go. Now, in addition to preformed, there are also precut splint blanks. Now these precut splint blanks are designed to already have the splint design itself cut out of the sheet material. So as you can see here, this is a precut splint blank, it will come in a stack, it's ready to go, you grab it off the shelf and you're ready to run with it. With the preformed versus precut, one thing to think about is the preformed oftentimes can save you quite a bit of time, but if you have someone who maybe has a bit of a unique anatomy, or if you have someone who's a thoroughly involved client, the preformed may not be enough to completely accommodate for what that client needs. So I'll give you an example of this. The splint that you see here is a Rolyan forearm-based thumb spica, okay? Over here on the right. Now it's going to immobilize the wrist and the CMC and MCP joints, so it's going to be ideal for treatment of De Quevain's, gamekeeper's thumb, some arthritis applications, and on the left here, you'll see a precut splint blank for what could be a radial gutter. Or I'm sorry, an ulnar gutter, or a

couple of other protective mechanisms. Now let's say, for example, I get an order for a client who has experienced some sort of a trauma. Maybe we have an amputation at the proximal fifth digit, the PIP joint of the fifth digit.

So maybe this is an individual who worked at a meat packing plant, and we have saw versus fifth digit, where there's an amputation right at the proximal, the PIP joint of that fifth digit right here. What you may find is this precut splint blank can be very versatile. You can utilize that very easily to create that ulnar gutter that you need, or if you want to, you can trim it back, you can lead the distal IPs free, if you wanted to do that, which in this case, you wouldn't, but if you needed to do that. So the splint blanks are going to traditionally be much more versatile than the prefabs will. So I tend to lean towards the splint blanks, the precuts, because if you have a traditional splint, it's easy to fabricate. If you have a nontraditional splint, they're easy to modify, and that's just my personal preference. They are easier than incorporating the sheet options, which we'll touch on here in just a few minutes. Now the precut splint blanks can be acquired either in a perforated design, or they can be acquired in a solid design. Now we touched on perforation very briefly during our last seminar. We didn't get to dive too deeply into it because of time.

So I do want to take a few minutes to discuss perforation, especially with your hand-based and with your wrist-based splints as well, because as you know, the palms of the hands tend to be somewhere where they can get very clammy and very sweaty very easily, especially if you have a client who has some flexion contractures or someone who is in a position where they tend to be a bit more of a sweatier person than average. So when you place those thermoplastics on the hand, or on the wrist, you'll find that very frequently, the hands get kind of sticky and sweaty and that can lead to some foul smelling odors, a need for improved hygiene with splint wear, that type of thing. So the perforation option, that you see here, is going to allow for improved airflow within that splint itself. It will actually reduce the weight of the splint.

So sometimes with your pediatric clients, it may be more helpful to include a perforated option because it does make it a lighter airier sweat for them. And again, if you have those clients who have the dampness or the sweatiness at the palms or under the splint, wherever that splint may be, this is going to allow for some improved airflow and it will lead to improved skin protection. And the reason for that is if you're familiar with the concept of skin maceration, there are three components that lead to the presence of skin breakdown. And those components are heat, moisture, and pressure. Heat, moisture, and pressure.

So if we're able to reduce the heat under the splinting surface, if we're able to keep it drier and cooler, and also if we're careful to eliminate any pressure points that may be applied as a result of the splint, typically you'll be in a pretty good place as far as skin protection is concerned. And this is where the perforation can help us with that. So if we think about solid versus perforated material, on the spectrum, the solid material, with no perforations in it whatsoever, is going to give maximum support. If you think about it, it's a solid sheet with no holes in it. If we start to put some holes in that solid sheet, it is going to impact the support capabilities just mildly. So a solid sheet is going to offer maximum support, but at the same time, it's going to allow for less airflow, increased moisture retention, and it's gonna be a little heavier. So with our perforations, there are several options to perforations ranging from a small one, two, or 2.5% perforation.

Now when we look at these percentages, I'm gonna draw a quick picture up here in the corner. If we look at these percentages, let's say we have one section of splint, and within that splint, we have multiple perforations. When we look at that thermoplastic and we see the perforations within it, the percentage that you see down here, that percentage correlates with how many holes there are within an area where 100 holes could be. So if I were to create 10 lines of 10 potential slots for perforation here in this one inch by one inch area, let's say, and I were to take one of those holes and actually

perforate it, and the rest of this were solid, that would be a 1% ratio of our, a 1% ratio or a 1% perforation. So if you have, let's say, a 13% perforation, much like you have down here at the OptiPerf, that means 13% of that surface area is perforated. So UltraPerf is 13%, OptiPerf is 19%. And there are some very high-end perforation options with a SuperPerf option, which can actually go up to 42%. We oftentimes will use the very high perforation options in the burn unit. So let's say, for example, you have a client who presents with a cervical burn and you're really wanting to get good conformity. You also want really good airflow in there to allow for drainage of the wounds and to allow for airflow to the surface.

So I oftentimes will use those SuperPerf options for some of those higher-end, more intricate splinting endeavors that we take part in. Now with sheet fabrication, the nice thing about sheet fabrication is that you can acquire a variety of different types of thermoplastics and you can create anything you want because it simply comes in a sheet. There are no precut options, they're not preformed, they're not precut, it's literally a sheet of material that you get, that you can use for whatever it is you'd like to do. Now typically when we think of sheet fabrication, we think of ordering the big two foot by three foot sheets of material that you have to then kind of fight with to get in the splint pan, and then you have to cut a big chunk off, put the original material away, and then you have another smaller sheet to deal with. But keep in mind, if you're finding that to be a hassle, you can actually order various sizes of sheet fabrication options. So if you are in a home health setting, maybe you don't have the beautiful $2,000 splint pan and all of the great utensils and the great supplies. Maybe you're doing splinting in a home health setting and you have an electric skillet and a spatula and some scissors that you found somewhere.

That's okay, you can still create wonderful splint options with limited equipment. If you're in a travel situation where you're carrying a lot of this stuff with you, or if you're in a situation where you're in contact isolation, you really don't wanna take the entire

sheet in there with you, you'd really like to have a small sheet you can work with, you can order these sheet options in sizes as small as five to nine inches. So if you're doing a regular thumb spica or if you're doing a small wrist-based splint, you could very easily order the five inch by nine inch sheet, it's smaller than a piece of paper, a standard piece of paper is eight and a half by 11, and it gives you plenty to work with in terms of wrist splints, finger splints, that type of thing. Again, you can get these in perforated or solid options as well. So now let's take a look at forearm-based versus hand-based considerations, okay? So we want to keep in mind that, first of all, one of your first test questions is going to be here, and I want to make sure that you understand the difference between hand-based versus forearm-based, okay? With a hand-based approach, if you have intrinsic muscular involvement. So you have the intrinsic muscles of the hand, solely of the hand, being involved, you can go with a hand-based option. The reason you want to do this is if you have the intrinsic muscles of the hands that are involved, maybe it's just a thumb CMC joint that you're concerned with, maybe it's just one of the IPs, trigger finger, De Quevain's, something of that nature. You can create a hand-based option that will allow freedom of the wrist and allow that patient the greatest degree of functional capability possible. Because when we splint or when we provide orthotics to clients, we want to be careful that we're only immobilizing what we need to immobilize and hopefully we're keeping the rest of the joints around that problem joint free and available for use.

So as you can see here with the thumb spica, with the hand-based thumb spica, you can see the CMC joint is immobilized, you can see we do have wrist freedom down here, so we can have range of motion at the wrist, and we are also stopping our splint short of that proximal and distal palm or crease, so we should have full flexion of the fingers and full opposition, okay? Now if you have a client who has some extrinsic muscular involvement, so there are some different muscles that we do want to isolate, you may go with a selection of a full forearm-based splint. This is going to immobilize the wrist, as well as the thumb CMC that may be leading to the problem. So before any

type of splint fabrication, really consider what options can I go with that will provide my client with the immobilization that they need but allow them to perform the function that we want them to be able to perform? And the reason for that is what you'll also find in terms of patient compliance, and in terms of patient preference and comfort, is if you are isolating too much. So if a client only needs that CMC isolated and we go ahead and make a full forearm-based thumb spica, what you'll find is the odds of this person utilizing that splint for an extended period of time becomes reduced because of the limitations that we're impacting. So if we're able to get away with a cut right here, to chop that splint off, create a hand-based splint, it's going to be quite a bit easier on your client.

So a test question that you may see in the post-test reads, which of the following factors would be least likely to contribute to the decision to fabricate a hand-based splint? So which would be least likely? Client preference or comfort, an intrinsic design versus an extrinsic design, or a need for increased protection or support? Now the answer to that is that all of those things are going to actually contribute to the decision. So any of the things I just mentioned, client preference, client comfort, an intrinsic design, and/or a need for protection and support could be a reason that you choose a hand-based over a forearm-based. Now the other concept or one to think about is the forearm splint design. So if you are creating forearm splint, there are two options. There is a volar design, where the splint itself is on the palmar side of the hand, and there's a dorsal-based design where the splint itself is on the back of the hand or on the dorsal side of the hand. Now either one can be perfectly functional, either one can be very usable, but let's take a deeper dive into this and see why we may want to go with a volar application as opposed to a dorsal application.

So on the left, you can see this is a Rolyan radial bar wrist cock-up splint. Now this can actually be fabricated on the volar or the dorsal side. What you see here is a volar application. So your supporting the palmar arch, okay, we talked about our arches in

the first series of this course. You're supporting the palmar arch that you see there, and you also are allowing good wrist support and you're clearing that thenar eminence to allow for thumb function. You can see that this one actually has a 2% perforation to address moisture and the skin integrity content, okay? On the right, we have a dorsal wrist cock-up splint.

Now, this dorsal wrist cock-up, you can see the key difference between the two, the volar over here and the dorsal over there, you can see that the dorsal allows for a lot of freedom with that palm. So with this dorsal application, you are leaving that palm free for some functional tasks. So if you have someone who does need the wrist support, but they do want to have fingers as free as possible, that may be ideal, to take a dorsal approach to that. On a side note, over here on the left, I mentioned that the radial bar wrist cock-up that you see here, this splint, it can actually be applied on a volar or a dorsal surface. Again, what you see here is volar but it can be applied on a dorsal surface. So if you were to take this and apply it on the dorsal surface of the hand, this splint can be very well-utilized as the base for a dynamic splint or for an outrigger attachment. We've talked about maybe doing a second series, that would be dynamic splinting, and if that's the case, you may want to keep this splint in mind because right here and right there are some good areas for some dorsal attachments. Now both of these volar and dorsal-based design, both of them are used to position the wrist and both are designed to protect and support and immobilize.

But again, why would you possibly choose one or the other? If we think about a dorsal-based, one that is on the back, one thing you'll need to consider is that you will have to address bony prominences because we do have traditionally more bony prominences on the back of our hand as compared to the palm of our hand. Our palm and our volar side tends to be a little meatier, it tends to be a little thicker, and we tend to have some fattier tissues on the volar side as compared to the dorsal. So if you go with the dorsal route, be careful that you're paying attention to those bony

prominences. What a dorsal approach will also give you is increased tactile input. So you can see fingers are free, palm is free, so you have easier access to functional tasks that you would have to perform. The other concept that you may wanna think about with a dorsal application is that you can widen this metacarpal bar that you see here, you can widen this metacarpal bar fairly easily if you have to do some ulnar deviation, where you wanna bring the wrist to the pinky side, or some radial deviation, if you want to adjust that wrist to the radial side. The other thing to think about is if you're taking a volar approach. So if we're going to go with the approach on the left, you don't need to pay as much attention to the bony prominences because, again, on the pads and on the volar side of your hand and wrist, you have some meatier tissues, some fattier tissues. So typically with the volar approach, you don't have to pay as much attention to those bony prominences. Also, you can typically get more immobilization out of that volar approach. So if the goal is absolute immobilization, you probably want to go volar.

Also, if the goal is to have a well-fitting splint, and maybe you're not super comfortable with splinting just yet, you may want to go volar because that traditionally tends to be a little bit of a safer option as well, okay? So a couple of the questions that you'll see on the post-test are addressed on what we had just discussed here. You'll have a question about dorsal-based splints and what they can offer. So again, dorsal-based splints can offer increased tactile input through the pad of the hand or through the volar surface of the hand. You can also widen this metacarpal bar, if you need to, to allow for some ulnar or radial deviation, if you'd like. And it also allows you to... It also encourages you, actually, to be a little more careful with those bony prominences. So be a little bit more mindful of the bony prominences if you're incorporating a dorsal-based design.

Now, let's consider, I'll let you type the answers in the bar here, if you would. And Lauren, I see your question there, I will get to that in just a minute here. Let's say you

have a client who presents with fluctuating edema. So the hand becomes swollen, it reduces down, and it kinda fluctuates. This client is going to be required to wear a wrist cock-up splint due to a recent diagnosis. Doesn't really matter what the diagnosis is for this question purposes, for the purposes of the question. What do we need to consider when we think about edema? Any thoughts on that? What do we want to think about when we consider a forearm-based, either volar or dorsal-based splint, for edema? And I think I'm seeing a couple of options pull up. So right, so Ricky mentions we need to be careful about all of these side areas, and especially because in this situation right here, we have a hand that's going through a hole in the splint material.

So if we do have some circumferential areas, as we do in the one that's demonstrated here, we want to be very careful about that. Bruce mentions that as well, very good, as does Michelle, because if we have a client where we're sticking their anatomy through a hole in the splinting material, if they were to become swollen or to experience edema, we want to be careful with that because that could be a very risky place to have a cut in of the splint material or to have some issues. So with edema, you may actually want to go with the radial bar that you see here on the left because as that edema fluctuates, you can adjust via the soft strapping, you can adjust that radial bar and adjust the snugness of that splint material. Good job. All right, now let's take a quick look at the overview of splint fabrication. So what we want to make sure that we convey here is I want to give you an idea of what this is going to look like from beginning to end, the actual overview of the process, before we get into the actual fabrication, okay?

Now, the first thing you're going to do is determine what type of splint do you need. So again, in our first course within this series, we talk about a lot of thermoplastics, we talk about a lot of characteristics of thermoplastics, so you'll want to select your splint pattern and your splint design. Do I wanna use a prefab, a splint blank, a precut? What route do I want to go? Decide your material. And it's going to be easiest for you if you have all of the materials there, and everything ready to go, next to the patient as much

as possible. We'll get our materials together. Ideally, our splint pan temperatures or our water temperatures, even if you're using an electric skillet or whatever method of heating your water, ideally, you want that temperature to be around 160 degrees, that's typically ideal for most thermoplastics. You'll then apply, or warm the material, apply the material to the patient and then we're gonna get into our finishing. So that's where we wanna make sure all of our edges are flared or not cutting into the patient. We'll talk about that when we see the videos here in just a few minutes. And we want to address our strapping. One of the most important things that we have with splinting and with the provision of orthotics, and sometimes something that kinda gets overlooked is we also want to make sure that the client, or the patient, or the nursing staff, if it's an inpatient situation or family or caregivers, are able to identify potential issues.

So make sure they know to take the splint off and to look and see if there are any redness, if there are any problem areas. Make sure that they know that they can adjust the strapping material, if they need to. Make sure they know the function of the splint, why are we doing it? Make sure we know that, make sure the client knows that what their wear schedule is. What are they supposed to be doing with this splint? How often is it supposed to be on and how do they care for it? Make sure that they know that they can't put it in the windshield of a car when they're running to the store and it's 120 degrees out in Phoenix, Arizona, because you'll come back to a pile of splint. So just make sure that they have that knowledge and that you've educated them on the wear, the care, and the schedule. That's one of the most important things. All right, our goals of splint fabrication. As we talked about in our first course within the series is we want to maintain the arches of the hand. We don't want to flatten out the hand, we don't wanna take away those arches, we want to keep function. We want to contour with the anatomy. Our splint, in most cases, should not change the anatomy, it should enhance the anatomy and follow the anatomy. If motion is allowed, we want to make sure motion is available. So much like we saw on the previous two splints that allowed that finger flexion and allowed that thumb opposition. If we're able to allow that motion, and

if the orders ask us to allow that motion, we want to make sure that we can do that. Allow for freedom of digits, if necessary. Excuse me.

Now, one other concept that we wanna make sure we're familiar with is if you are looking at stretching or providing a low load stretch to part of the anatomy over a long time, we want to make sure that you select a splint material that you can very easily go back into and adjust and the reason for that is if the goal is to increase range of motion over time, we want that to be done over a longer period and not an immediate correction, because typically an immediate correction will result in not an effective and not as successful correction. So for your low load stretches, we wanna make sure we do that over some time. So now let's take a look at a couple of case studies. So here we have Mrs. K. Mrs. K recently took up kayaking, she's 62 years old. She's been kayaking several times a week, three to four hours a day. So Mrs. K clearly has more ambition than I. And recently she was diagnosed with a thumb MP joint ligament strain, okay? So what our orders are? Our orders are to address this via some splinting and some orthotics. So what she's experiencing is some MP joint pain, some CMC joint pain, and we've been asked to create a thumb spica splint. Now, you may go with either a hand-based or a forearm-based. In her situation, because of her diagnosis, we're going to go with a forearm-based. And again, you may see a question, on your post-test, about using the hand-based versus the forearm-based thumb spica.

So the question may read that often a traditional thumb spica splint, a forearm-based thumb spica, otherwise known as a 2/3 thumb spica that will go up the forearm 2/3 of the way, have been replaced by a short thumb spica. What would be a benefit of incorporating a short or a hand-based thumb spica over a forearm-based? So you may see greater compliance of the patient. Again, less restriction. If a hand-based addresses the issue, we don't need all of this. If we don't need all of the forearm, that's great, let's get rid of it. So if you're able to go a hand-based versus a forearm-based, that would be more beneficial for the client, as long as it still achieves the objective of

isolating that thumb. Now in the case of Mrs. K, our orders were to create a forearm-based thumb spica. So we'll take a look here at some of the materials and we'll do a walkthrough of how to fabricate this splint. So for Mrs. K, we selected a radial gutter, otherwise known as a short thumb spica. Now, here's a tip, and you'll see this in the video coming up here in just a minute. If you have children, there's a good likelihood you've been to one of your local craft stores and you've seen the pieces of flat foam that you can cut out and that you can make little craft projects with. Traditionally, when we think of making patterns for the sheet cutting that has to do with the creation of splints, often times we'll grab a paper towel or we'll grab a piece of paper to try to cut that splint pattern out with.

Although here's the reality of it. If you use those foam sheets, and you'll see an image here in the video in just a second, if you use those foam sheets, they're gonna be quite a bit more durable, they are cleanable, you can use them for other clients, and they can become a long-term pattern that you can then trace onto existing sheets of thermoplastic. Also, if you were to take that pattern and place it on the client's hand, you'd be able to get a better idea of where everything would fall because it will wrap better, as opposed to a paper pattern. So if you've been using paper patterns for a number of years, go to the local craft store, you can get five by nine sheets of craft foam, a very thin craft foam. They are washable, they are reusable, and you can use that for your patterns as well.

All right, so Caitlin, let's go ahead and incorporate the video here. If you would do the first video, and I'm gonna kind of narrate and walk you through it as we go. So here we have two materials. Those are the foam sheets that I was referencing. So they're the thin foam craft sheets, we use them all the time for splint fabrication. We hardly ever create splint patterns out of paper anymore. So you can go to your local craft store, pick up some foam sheets, cut your patterns out of that, and then transfer that pattern to your thermoplastics. Typically, you'll find that with the foam sheets, you'll have

greater durability and it will save you time in the long run because you don't have to go back and create a paper pattern every single time. You can keep these in a file, you clean them, you can use them from person to person. Now as we go through these videos, you will see where they have been paused, and a couple of the hurry up and wait components have been eliminated for sake of time. So we've placed it in a pan of water. Again, I want to encourage that one of the biggest, some of the biggest feedback I get from courses that we do is that, well I don't have a splint pan and I don't have this material and I don't have that material. As you can see, because of COVID-19, we're not able to bring video cameras and things into clinic. In fact, our clinic just reopened not too terribly long ago, so they don't want any extraneous people in there who aren't working with clients.

So as a result, what you're seeing here is done with a pan of water on a stove, very simple, very easy, very low key. So we've taken the material, we've warmed it up to 160 degrees. We're now going to take scissors and we are going to cut the material. Okay, so we'll trim that out, and I'm gonna fast-forward here just a touch so we can see that that is completed. And after I cut the material, I'm gonna put it back into the water just to warm it up one more touch because it will, you will find that it does cool as you are... You will find it cool as it does the cutting, okay? All right, so we're taking our splint material, we're cooling it off, we're checking for temperature. And I have a comment over here, from Bruce, I wanna share with everyone while you're watching the fabrication of the splint. Bruce notes that his first step is to assure the differential diagnosis or the assessment of the problem is correct because he has also treated many kayakers, and many times, the problem wasn't acute De Quervain's, and if that's the case, the forearm-based orthotic is the ticket, and if the thumb spica, if it's just a MP or CMC issue, the thumb spica would address it on a hand-based. Thank you, Bruce, for that input. That's a good note. Now as you can see, we're placing the splint on to the hand. We're careful to do a rollback or a flare back at the distal thumb, and along the dorsal surface of the thumb itself. Two areas you can see, right here, and

right there, that could be potential problems. We also want to look at the thenar eminence just inside the thumb and make sure we have no issues there with fabrication as well, make sure that's flared out. A cold spray, if you're in a hurry to complete this process, a little bit of cold spray, you can see, is being sprayed there, and you can make your adjustments accordingly.

Now in the top corner of this video, you will see that there is some padding material. Up in the upper right hand corner, you'll see that there is some padding material. With the padding material, many times at the thumb CMC, you may want to incorporate padding. Depends on the client, depends on how their hand presents. We'll then take the finished product and add the strapping accordingly, making sure is along the thenar eminence, on the front, along the dorsal aspect, are flared out. I would trim back where you see my thumb, right there, I would trim that back just to shade as well. Now if you want to be careful to flare out the edges, a very easy way to do that is to take the end of the splint, after it's hardened, take the end or the proximal end of the splint and simply take a hard surface, give it a little push, and you'll have a very nice flare right there, a nice even flare. You may want to not attempt to do it with your fingers because you won't have as nice of an even flare. That's a little more than we probably need, but when we place it back on the client, we can reduce some of that flare as necessary. Add your straps like so. Again, if padding is needed, you can see that you can cut to size, and we'll show you a finished version here of where that padding would go just to protect that joint, the dorsal aspect off that thumb. Thank you, Caitlin, for that video.

And we'll move on to our second case study. So our second case study is Mrs. Q. Now with Mrs. Q, we have orders for her to create a volar or a dorsal wrist cock-up. She's a 42-year-old female legal assistant who's on the computer a lot. She's presenting with numbness and tingling and her productivity is suffering because she has that numbness and tingling and discomfort and she's not able to type and function as well as she did before. Discomfort during the day, discomfort in the evening as well. She's

opting for a more conservative approach before possibly considering surgery. So the physician has ordered a wrist cock-up splint. Now a couple of wrist cock-up splint options that we've seen before. We have our volar and our dorsal wrist cock-up, as you see here. But another option is the thumb hole wrist cock-up. Now sometimes with the thumb hole wrist cock-up, again, if you have someone who presents with edema, be careful with this because we don't want to create any restrictive mechanisms in consideration of that edema, but if you have someone where you don't feel like edema is an issue, sometimes the thumb hole wrist cock-up can be a functional approach and a good approach to take.

Now the reason we do the demonstration with the thumb hole wrist cock-up is because if we were to take a survey, most have seen a traditional volar wrist cock-up, most have seen the fabricated, but many have not seen the thumb hole wrist cock-up. And again, we are available for tutorials. If you really want to take a couple of hours and hop on a Zoom and go through all of this, we can offer you some splint material and some direct one-on-one tutorials, because I know it's one thing to watch this, it's another thing to actually do it. So if you need to, feel free to reach out and we can set something up as well. Caitlin, would you play Mrs. Q's video? Now in this video, you're going to see a demonstration of a volar wrist cock-up, and the method is going to be via thumb hole technique. So this is the precut for the thumb hole splint, right here. You can see the thumb hole right there, and this is what it will look like when it's completed. Okay, so we're gonna take the splint material, we're going to warm it up. We are going to then take scissors and we're going to carve out a bit of an area where that thumb will go, and the rest will contour nicely to the forearm. So we'll take our precut splint blank, as you see here, we'll place it in the water. Again, 160 degrees is going to be your ideal temperature for that. We'll do a bit of a cut screen to save some time, there we go. You'll see that it's been adequately warmed, okay? We'll then take the splint, and the first thing you want to make sure you do is you wanna make sure you give adequate space to that thumb region, okay? So when you're placing the

splint, what I tend to do is I first start to just poke my fingers into that thumb hole and start to make the necessary adjustments. That will give me an idea of how much I'm going to need to cut away in order to do that. So I'm not applying the splint right now. If you're looking at this and saying, hey, wait a minute, she's doing it wrong. All I'm doing is getting an idea on thumb size, okay? I'll get an idea on thumb size. I'll cut, carefully cut a section out of that thumb hole. That way you don't have a lot of excess material. So some therapists will ask you to just push the material out of the thumb hole to get it out of the way. I prefer to cut it and trim it because if you don't, where you see that rollback happening right there? You'll have a lot of material that you're having to mess with. So we will size that thumb, we'll see how it's going to fit on the thenar eminence.

Okay, I think we're in a good place there. And then, we'll actually do our fitting. So we'll roll the sides around the thumb out, we'll flare that out, so there's no cutting in that thenar eminence. We'll place the splint, carefully looking at our distal palmer crease. You can see the distal palmer crease right there, we're allowing for function of the fingers. We're checking to ensure that our wrist is in a good position, and with this material, this is a CuraDrape, we can do a little bit of a stretch to bring that ulnar side around just a touch more. I'm gonna check one more time and make sure I flared out along the thenar eminence, so I don't have any issues there, and I'm gonna double-check and make sure I have function of the fingers and of the digits. A little bit of cold spray we'll apply in order to just solidify that wrist and make sure that it's in a good place. And with a little more cooling, we will have a functional splint that's ready to go. Typically, you'll do a strap at the ulnar site, right here, you'll do a strap at the wrist, and you'll do a strap down here at the proximal region. We have good opposition, we have good finger function, we have no cut-ins along the thenar eminence or along that distal palm or crease. So it looks like we are in a pretty good place, and now we can just add our strapping. Thank you, Caitlin, for that video. And we'll move on to our third case study, which is Mrs. O.

Now Mrs. O presents with the need for a functional position splint. If you are in a situation, I'm sorry, Mr. O. I gave you the wrong individual. He's 72 years old, he's recently experienced a stroke where he's had some right upper extremity weakness. He was admitted to the ICU and we are getting orders for a functional position splint for that right hand and for that right wrist. Now typically, this is a splint that many of you have probably fabricated, so our focus will be, not as much on the actual fabrication of this, but how you can utilize one splint blank to create either a functional position splint or an intrinsic plus as well. So the single splint blank, that you see down here, can be utilized for either a functional position splint, status post-stroke, for flacid extremities, that type of thing, or an intrinsic plus splint. So with the intrinsic plus splint, you can see that the proximal MPs are typically flexed to between 70 to 90 degrees. The DIPs and the IPs are typically extended and that thumb is abducted to pull that web space out so you're able to stretch that web space and to prevent contracture. So again, the functional position that you see on the left and the intrinsic plus that you see on the right can both be fabricated from that splint blank. So Caitlin, if you would put our last video up for us. We'll walk through that fabrication.

All right, so here we have, on the left, we have the splint blank, and you can see the finished product on the right, how it's gonna become a functional, a resting hand splint, where the wrist is in 20 to 30 degrees of extension and the fingers and the thumb are in a functional resting state. So we're going to take this splint blank and place it in the water. And one tip for you, if you look right here, you'll see that there's a slit that's going up the side of that splint that creates our thumb area. What I typically do is I take scissors and I will trim up that area that I'm pointing to right now, I will trim that up and away and make a gap right there, a small gap. Otherwise, typically with this easy form material, it will start to stick to each other and you might have a bit of a mess. So just take a quick trim right there, just like you saw. Typically the thumb is a little bit larger than is necessary, especially with the client that you see here. So we'll

do a quick thumb trim, and again, as you practice these and as you get more comfortable, you'll know how much you need to take off, or you can apply it to the client, take your fingernail and take a quick swipe. A fingernail will make a nice dent in here so you know where to cut and what to do. Typically with these types of splints, I will put them on myself first, while it's really warm and really conforming, and get the basics done. So as you can see here, I am creating a flare out at the thenar eminence, I'm starting to shape the thumb hole. I'm gonna hit it with just a touch of cold spray, just to stiffen it up, just a touch, not so much that I can't conform it to the patient, but just enough that it's a little bit easier to work with. And we'll place it on the client.

So as you can see, we're gonna double-check those thenar eminence areas again, make sure they're flared back. We're also going to get a better cameraman, because I'm off the camera, there we go, we're back, and we'll take the thumb and create the thumb area, the thumb resting pan, and we're gonna fit it with our wrist as well. We take our cold spray, we take a hit of it, and we now have a hardened splint. You'll also want to turn that splint over and identify how those fingers look. So you can see I've made a divot with my fingernail there, I'll do the same on the other side, and that little fingernail mark that I'm making, right there, will tell me what I need to do to cut away the excess material. I'll let that splint cool and we have a resting hand splint. You will put straps under the fingers, at the thumb, at the wrist, and at the distal end of the splint, or near the proximal end of the proximal forearm. Now if I wanted to fabricate an intrinsic plus as opposed to a resting hand, I'm going to do the same exact thing I just did only you can see the adjustments I'm making. So I've now pulled that thumb into abduction and I'm giving 70 to 90 degrees of flexion at the MPs, and the DIPs and the PIPs are both extended out here. So I haven't really extended much of the wrist, the wrist is still gonna be in 20 to 30 degrees of extension, but you can see that with that single splint blank, you're very easily able to fabricate either a resting hand or an intrinsic plus.

Now at the end, what I will do is I'll take the end of that splint and flare it out, just like you saw before. Okay, so I'm going to apply it there, to the water, heated up, bring it over, put it on a hard surface, do a small rollout. Okay, we'll put it on the surface here, do a small rollout, and there you have a very nice even flare that will allow for protection of that proximal end. Thank you, Caitlin, you can stop that video now, if you would. All right, we've got a question here.

We got a question that reads from earlier. I've actually been looking into different materials to practice at home. I'm a new grad wanting to get into hand therapy. Excellent. Bu I wasn't sure what size sheet to get. If you are looking into doing just some hand fabrications, some hand-based thumb spicas, some finger splints, the next course in this series is finger splints. If you're looking just to practice with those, you can probably pretty easily do a five by nine and be able to play with that and get comfortable with that material, five inch by nine inch. What you also may want to do are purchase some of these splint blanks, and I think Performance Health may offer, I think they have student kits actually. Don't quote me on that but I'm pretty sure they still offer student kits that will give you several types of splint blanks that you can trial with, at a reduced cost. So if you want a sample pack, for purchase, that you can try some of these with, reach out to me afterwards. In fact, I'll give you my contact information here. Reach out to me and I'll be able to put you in touch with them, if you'd like, for purchase a sample kit or a pack that you can trial some of these different materials with. All right, we are close on time. I thank everyone for coming, I hope you gained a lot out of this. Again, it's only an hour, so we don't have a lot of time to go through everything. So if you do need more information, or if you would benefit from some additional training or some one-on-one tutorials, feel free to reach out to me. My phone is here, my email is there, and I'm happy to help as needed. Thank you, Ricky . All right, Fawn, I'll give it back to you.

- [Fawn] Thank you so much, doctor. Yes, hello, I'm back. I don't see any questions, let me just give a moment here to see if anyone types anything in, but it just looks like a lot of thank you's. So at this time, I'll go ahead and close the class. Make sure you take note of her email, feel free to reach out to her, and thank you so much, Dr. Davin.

- Thank you, have a good day.

- [Fawn] Have a great day, everyone. Hope you join us again on Continued and occupationaltherapy.com. Thanks.