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Can simulation impact on first year diagnostic radiography students' emotional preparedness to encounter open wounds on their first clinical placement: A pilot study

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ABSTRACT

Introduction: This study reports on the use of moulage within a simulation to introduce first year diagnostic radiography students to open wounds in preparation for clinical practice.
Methodology: A mixed-method quasi-experimental design was used. Visual Analogue Scales were used to capture state feelings at the point of seeing open wounds. Interpretative Phenomenological Analysis was used to draw themes from focus groups and an interview following clinical placement.
Results: The simulation reduced negative feelings whilst emotional preparedness, distraction and excitement increased. Five major themes were identified including emotional engagement, engagement with wound, building relationships, developing professional self and simulation impact.
Conclusion: The use of moulage and a simulation provides an opportunity to explore initial reactions. Students actively reflect on this experience during clinical practice changing practice. The impact of open wounds can be long lasting and support from radiographers should allow these new experiences to be processed reducing the risk of burnout.

Introduction

Student transition from academia to clinical practice can be challenging, whether in the first year or upon qualifying.[1–3] One modality a Radiography student will be expected to practice within their first clinical placement is conventional imaging. Patients attending accident and emergency with suspected non-complex or complex open fractures are likely to require conventional imaging.[4,5] These patients are likely to be in pain, possibly disfigured, anxious and vulnerable.[6] Hyde and Strudwick[3] found working with complex patients causes students' anxiety. It is therefore paramount that students are prepared for these experiences as far as is reasonably practical within the academic environment.

Good communication plays an important role in building rapport and gaining patient trust.[7] Face-to-face non-verbal communication can provide both parties with a rich understanding of each other's emotions.[8,9] Often with first encounters an observer may stare at an injury impacting negatively on the psychological well-being of patients, causing the patient discomfort.[10] This can influence important practitioner-patient outcomes including adherence and satisfaction.[11] Exposure to trauma and wounds also has the potential to increase anxiety of the carer or student.[3,12] It is therefore important students have the opportunity to explore their feelings, learning communication skills to reduce any negative impact to the patient and themselves.

The use of simulation to provide a safe learning environment to improve skills and quality of service stretches back over centuries.[13] Its use in undergraduate and postgraduate health education has provided risk free learning opportunities and is now becoming an established pedagogical approach in radiography curriculums.[14,15] Yet there is no peer-reviewed research preparing students for the sight of patients' open wounds within diagnostic radiography.[15] Moulage (the art of applying mock injuries) has been used within medical education to introduce students to conditions they may not typically encounter on placement.[16] Stokes-Parrish[17] found there is an assumption that moulage adds to the realism in simulation yet there is no evidence to support this; recommending further research to assess the impact on learner engagement. Gaining an understanding of students first encounters with open wounds would build on existing evidence related to student transition to clinical practice.[1–3,18]

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This article reports the outcomes of a small-scale pilot study designed to introduce first year radiography students to open wounds using simulation and moulage.

Methods

Sample

Ethical approval was granted by the College of Health and Social Care ethical committee. Steps were taken to reduce physical and psychological risks following assessment. Gate keeper permission was granted from the Head of the Diagnostic Imaging department.

All first-year pre-registration Diagnostic Radiography students were invited to participate. As a pilot study participation was limited to small numbers. Participation information sheets and consent forms were signed by students in the control and intervention groups (combined total $n = 9$).

Method

The study utilised a mixed methods approach allowing for methodological triangulation of the data improving the validity of the results.[19]

Questionnaires using Visual Analogue Scales (VAS) captured student feelings in the form of quantitative data. VAS enable students to rapidly record their feelings on single item scales. Several statements allowed students to place a mark on the scales from 'strongly disagree' to 'strongly agree'. Statements were specific to seeing open wounds to remove ambiguity during analysis. As the aim was to establish preparedness the statements were mostly centred around negative feelings that would indicate a level of unpreparedness, e.g '*I think I will feel anxious seeing an open wound on a patient on my first clinical placement*'. Excitement was included as Crowley[20] found nurses experience this emotion when presented with trauma cases. VAS are a validated reliable tool,[21,22] used in other simulation-based research,[23,24] are quick reducing questionnaire fatigue and limit disruption on clinical placement. Quantifying feelings using VAS introduces objectivity, reducing researcher bias that may be present when interpreting qualitative data.[25] Questionnaires were reviewed by two academics for face validity and were distributed before and during clinical placement. The simulation group completed an additional questionnaire prior to the intervention.

As VAS provided a snap shot in time; following the students' first clinical placement semi-structured focus groups were conducted to understand their experiences in more depth. This would also provide information as to whether the simulation had an impact on their preparation for practice. A semi-structured approach allows the researcher flexibility and allows participants to develop ideas and speak widely around their experiences.[19]

Utilising a quasi-experimental design, students were randomised into a simulation group or control group, this reduced researcher bias. Both groups were initially prepared with a standard didactic lecture with imagery of open wounds seen typically in practice. The control group would continue onto placement without any intervention.

Intervention

The simulation included a briefing, intervention and debriefing.[26] Students were briefed with the learning outcomes, which included supporting the radiographer, engaging with the patient and observing an open wound. The intervention required students ($n = 2$) to support the radiographer (role played by an academic) to X-ray a patient's ankle. The patient was played by a member of a simulated patient group and had suffered a compound lateral malleolar fracture, simulated using moulage (see Fig. 1). This allowed students to see an open wound but reduced the potential stress related to obtaining a diagnostic image themselves. It was felt this would reflect a similar experience to clinical placement. Allowing students to attend in pairs encouraged discussion and potentially reduced individual anxiety.

A post simulation debrief followed the Promoting Excellence and Reflective Learning in Simulation (PEARLS) approach encouraging participants to reflect on their learning.[27] This ensured consistency across each simulation.

All participants attended 12 weeks mandatory clinical placement, with exposure to theatre and Accident and Emergency; increasing the likelihood participants would see an open wound. It was not expected the participants undertook the imaging however active involvement in the patients' care was encouraged. All participants were encouraged to complete the last questionnaire promptly following seeing their first open wound.

Data analysis

Questionnaires were analysed using Statistical Package for the Social Sciences (SPSS) Version 24 (IBM Inc, Armonk, NY), descriptive analysis was appropriate as the sample size was small and would not provide any statistical significance.

Thematic analysis of the debrief informed the semi-structured questions used in both the focus group and the interview. These would help to understand feelings that were experienced during the simulation. This data was reviewed blindly by two academics, themes were then agreed to improve validity and rigour.

Interview data was transcribed verbatim. Analysis using Interpretative Phenomenological Analysis (IPA) utilised a six-step approach outlined by Smith, Flowers and Larkin[28] and identified major themes. This is an iterative approach allowing the text to be interpreted and the researcher to understand the meaning of each student experience. This double hermeneutic approach required the researcher to become immersed in the data whilst remaining reflexive.[28]

Following individual analysis each method of data collection contributed to the triangulation and informed the discussion.

Results

Four students reported having jobs prior to the radiography course that exposed them to seeing open wounds. These roles

Figure 1. Moulage used to create a compound lateral malleolar fracture.

included veterinary nurse ($n = 1$), radiography assistant ($n = 2$) and combat medical technician ($n = 1$). Three of these students were incidentally randomly selected from the sample population ($n = 9$) for the simulation group. Time in these roles ranged from 30 to 180 months, respectively. No student had previously undertaken formal education with hospital placements.

Quantitative results

Fig. 2 demonstrates the mean values for the simulation group ($n = 6$), both pre- and post-simulation. Indicating an improvement in all feelings except for being more distracted following seeing an open wound.

Following the simulation the debrief was thematically analysed and four themes emerged across all six students:

1) Focused on the wound: '*I thought that was amazing! … I couldn't take my eyes off*'
2) Unsure what to do: '*Not knowing what to do, I just stand there and face them*'.
3) Improving patient experience: '*Personally for me it would be trying to distract myself to communicate with the patient more to start with. Rather than trying to get stuck in*'.
4) Gaining experience: '*I've never really seen like bare wounds anyway, so that's why I wanted to do this to ease myself into it*'.

Three students completed the full study. Fig. 3 compares the control ($n = 1$) and the simulation group ($n = 2$) feelings following seeing an open wound on clinical placement. The trend is comparable; however the simulation group appear more distracted and excited than the control individual.

Qualitative results

Three participants were questioned following seeing an open wound. Two student radiographers (SR1 and SR2) from the simulation group attended a focus group. As there was only one remaining student (SR3) in the control group a focus group was unachievable, therefore a semi-structured interview was used to explore their experience. Five master themes were shared across all three participants.

Engagement with wound

Two participants saw their first open wound in a theatre environment on an anesthetised patient (SR1 and SR3). SR2 was in accident and emergency with a conscious interactive patient. All participants were distracted by their level of curiosity of the wound.

SR2: '[radiographer] was trying to show me something and talk to me and I was just like [makes distracted face], and then he said, "you're not even listening are you?"'

Students initial reactions were pragmatic and the simulation participants (SR1 and SR2) appeared unphased. However this is contradicted in the theme 'Emotional Engagement'. The student from the control group (SR3) had a more profound experience with a lasting impression.

SR1: 'Because it hasn't phased me I'm not nervous or anxious about it'

SR3: 'you can't go back from that, you can't unsee it.'

Students considered the presence of blood to indicate the wound was more serious, however this provided comfort and focus as they felt able to interact with the patient. In contrast pain proved to be a psychologically challenging factor for all students. Patients in pain with no obvious wound left the students with an 'unknown' factor and a lack of experience left students feeling concerned.

SR1: 'If it were something you could physically see, I wonder if that makes it a bit different'

SR2: 'at least I can interact with you [patient with a wound], because I know your pain is ok I know you are being sorted you know. Whereas with pain it's a whole other level. [SR1 agrees].'

SR3: 'hoping they were ok.'

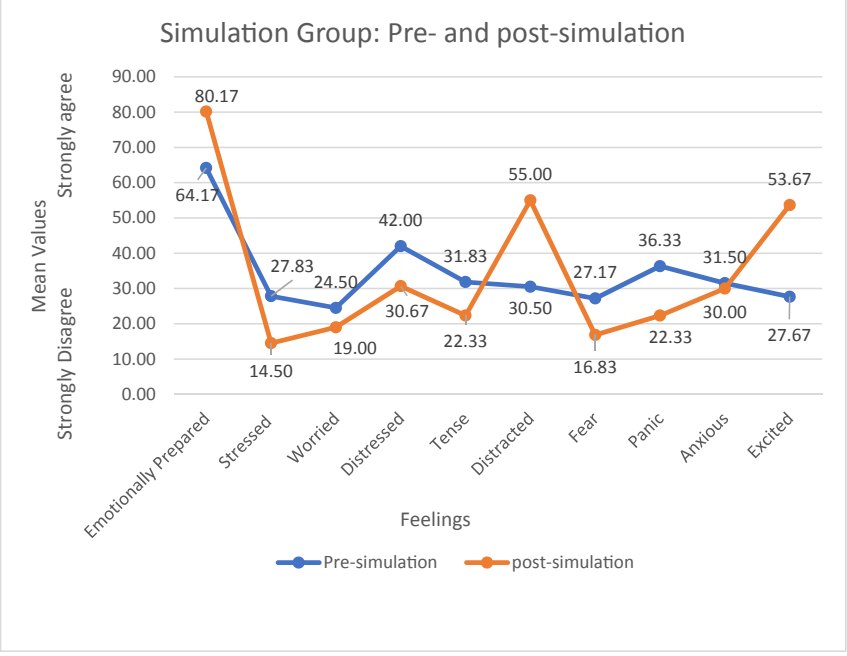

Figure 2. Feelings pre- and post-simulation.

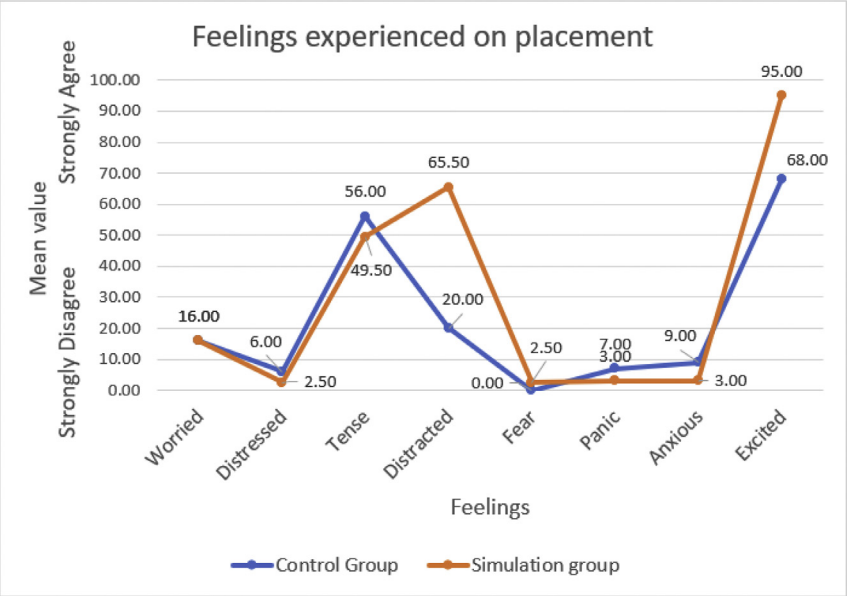

Figure 3. Comparison of feelings on clinical placement.

Emotional engagement

The 'unknown' was a psychologically challenging factor promoting fear. This was linked to a lack of information both of what to expect and not knowing the patient outcome. Students chose to process their experiences outside the hospital environment which may be linked to the lack of support found in the 'Building Relationships' theme.

SR2: 'I was frightened as I didn't know what's coming'.

SR1: 'I went home a number of times in the first placement going to my husband'.

The reality of their experiences was shocking raising anxiety. These early experiences were also significant life events, confirming career choices and leaving a lasting impact.

SR1: 'quite nervous and anxious'

SR2: 'I was thinking 'ok I think I can do this for a job'. Yeah'

SR3: 'TV … but it doesn't actually compare to seeing someone in front of you'

Building relationships

Students found becoming part of the team challenging, there was a perceived lack of radiographer's trust which kept the students at a distance.

SR1: 'you're not really going to be part of that team totally'

SR2: 'they don't know if you are going to say it or are you going to repeat it to somebody'

The students were task focused and preferred to problem solve, favouring distant supervision. Students had to initiate any support following a task rather than this being forthcoming from the radiographers.

SR1: 'a few radiographers that are quite good at standing back and watching you do it'

SR3: 'I don't think anyone would have asked me if I were ok with it'

There was a lack of time given to improving knowledge and understanding of the roles of the wider interprofessional teams. All students considered this to be important to improving their working relationship.

SR1: 'get those health care professionals together when they're not actually physically doing a surgery to discuss something you know'

SR2: 'find out a way of sweetening them'

Developing professional self

Whilst processing past experiences, students continued to look forward to the next, challenging themselves to work with complex patients and implement their training.

SR1: 'Yeah another reaction and my reaction to someone who is totally in pain or of someone or who is very anxious'.

Students developed coping mechanisms which were closely linked to dehumanising a patient.

SR1: 'bloods red, reds a colour that's it'

Labelling patients was witnessed as staff culture within the department. SR1 continues to refer to the patient as 'it' whilst making the point about treating them as a patient, indicating difficulties in moving away from this practice.

SR1: 'treating it as a patient and not a body part'

SR2: 'sometimes it's easier to just block it'

SR3: 'so I wasn't shocked by the sort of depersonalisation. I was just very aware that it was depersonalised.'

Simulation impact

Students in the simulation group referred to this as positive preparation for seeing open wounds. In contrast SR3 from the control group was unclear how they would prepare but indicated a wish for some form of preparation.

SR2: 'Oh no it prepared, fully. For me it did [SR1 agrees], because it made me think outside the box.'

SR3: 'As for wounds itself I don't know how you could directly prepare for that but something like these are common things you might see would be nice'

Students reflected on their simulation experience during practice and all three students considered simulation to be valuable for preparation in the future.

SR2: 'you know the explosion that happened. I was on a night shift and they came in and actually it really touched me actually and I was thinking about the simulation'

SR3: 'In that context some sort of theatre simulation would be really good. Really good'

Discussion

The use of mixed methods allowed for triangulation of the results using the VAS, debrief and interviews. Students indicated a high level of distraction across all methods of data collection: VAS, the debrief theme 'Focused on wounds' and interview theme 'Engagement with wound'. This reduced their focus on learning and ability to interact with the patient. Highlighting the importance of preparing students for initial encounters.

The simulation provided an opportunity to meet a patient with an open wound. The debrief themes indicate the students considered their reaction to the wound and how this impaired their ability to communicate and care for the patient. Hayre, Blackman and Eyden[29] challenged whether Patient Centred Care (PCC) can be delivered within a direct digital radiography environment. As this modality is fast paced it limits time with patients discouraging listening skills; for speed and planning radiographers refer to patients as body parts.[29,30] The labelling of patients as body parts is considered endemic within the profession.[31] It results from curricular organisation and confounded by the referral process where clinicians request body parts to be imaged.[31] The simulation demonstrated more than a short-term impact on the students; recognising they had lost the ability to see 'the person' acknowledging the patient had become a 'body part'. In clinical practice students reflected on the simulation and challenged themselves to move away from the practice of 'labelling patients'. Although Hayre, Blackman and Eyden[29] focussed directly on radiographic practice the use of individual components was used to identify PCC, this practice was also used by Little et al..[32] However, in contrast Little et al.[32] gained the patients perspective of what PCC looks like for them as individuals. It is the individual's perspective that matters, however as Stewart[33] highlights, often within education academics attempt to identify components for ease of teaching. Identifying individual components does not consider the unique holistic approach which unfolds with each new patient–practitioner interaction. The experiential learning offered by simulation allowed the students to receive feedback direct from 'the patient' rather than academics identifying components of good PCC. The reality for students meeting patients in practice with open wounds was shocking, raising anxiety which may add to their distraction and impair their ability to provide PCC.[11] The reflection gained from undertaking the simulation encouraged them to change practice.

To ascertain the impact of using moulage in preparation for seeing open wounds in clinical practice, it is interesting to look at the experiences between the simulation group and the control during placement. Both SR1 and SR2 felt the moulage fully prepared them for seeing an open wound and neither were negatively phased by the appearance in practice; reporting a higher level of excitement than SR3. In comparison despite seeing a similar wound in a theatre environment as SR1, SR3 reported an intense and 'profound' experience. The language used to describe the wound was more detailed and the image remained prominent repeatedly stating 'you can't unsee it'. This individual had unexpected repeated visions of the wound and continued to wonder what had happened to this individual at a much later date, finding a lack of closure difficult.

The 'unknown' factor has been recognised as challenging and raises student concerns with a focus in theatre environments.[2] Two students (SR1 and SR3) both saw their first open wound in theatre. Theatre environments operate differently with varied staff, equipment and can be more challenging to build relationships.[34] All three students wanted to know more about this environment and the different staff roles, offering simulation as good future preparation. Naylor and Foulkes[34] designed two theatre simulations offering 2nd and 3rd year diagnostic radiography students an opportunity to interact in an interprofessional environment. Although it is stated that realism was improved by wearing theatre personal protective equipment, no attempt was made to simulate an open wound. As this study found students were highly distracted by wounds, it may have altered the performance and focus within Naylor and Foulkes[34] simulation.

Simulations aiming to add realism should be physically, conceptually and emotionally believable.[35] Moulage within this simulation was key to prompting an emotional response from the students. Lancy et al.[36] discuss the role emotions play in memory recall indicating improved memory of the gist and immediate detail of an event. However, a strong visual stimulus also appears to narrow the memories ability to recall peripheral aspects of an event. The debrief is therefore essential allowing the facilitator to draw students attention to aspects that were not considered. The use of a 'real' patient encouraged students to interact. This moved the student beyond just a visual stimulus and introduced empathy into an event that was pertinent to their life goal. This is known a thematically induced emotion and although builds gradually is more likely to support a sustained memory.[36]

Hyde[1] used mixed method to look at this same transitional period for first year radiography students. However it is noted that the sample population were 2nd and 3rd year students. This provided a significant reflective period since attending their first clinical placement and may have altered their perception of their experience. However there are similarities with this study. A struggle to feel part of the team was apparent with variable experiences working with clinical staff.[1] This study highlighted a strong preference for distant supervision enabling them time to problem solve; whilst some staff used an 'over the shoulder' technique which diminished any confidence level within the student. Naylor, Ferris and Burton[2] found a preference for taking ownership of a task persists into qualification and support from more experienced staff was still valued. Hyde[1] recommended increasing mentorship time to improve the student experience. This may also address an issue the students experienced in terms of pastoral support. All three students stated their supervising radiographers failed to acknowledge seeing open wounds as something that could be challenging. No radiographer was forthcoming with an opportunity to discuss the experience or leave the environment. However, the students did suggest they felt able to initiate a conversation, a similar finding by Naylor, Ferris and Burton.[2] However, Naylor,

Ferris and Burton[2] were interviewing students entering their first job and therefore may have developed their confidence and stronger relationships within the departments. In a small sample size this assumption should not be generalised to first year radiography students. Although all three participants did not discuss their feelings at the time of experience, they all indicated they wanted to or had shared their experience with someone outside the hospital. Debriefing with family and colleagues has been favoured by medics following traumatic events, with the latter providing a learning opportunity.[37] Radiographers who fail to offer a debrief opportunity in practice are actively reducing student support and potentially increasing the cognitive load of the student.

Diamond, Middleton and Mather[38] suggests simulation can help to bridge the gap from theory to practice. The five themes indicate students are processing many different new and complex tasks imposing a high load on the student's cognitive load. Cognitive load theory aims to provide guidelines for educational approaches that mimic authentic tasks such as a simulation. It assumes the working memory can only process 2–4 elements simultaneously.[39] Knowledge is stored and organised as schema. Learners must combine simple ideas into more complex ones, building schema in their long-term memory.[39] These schemas are drawn upon by the working memory allowing the learner to develop expertise.[39] As the wound was a distraction, the simulation permitted students to break down and discuss the component parts of imaging a patient, building schema to use later. In contrast SR3 was forced to process this additional element increasing the cognitive load and difficulties in understanding.[39]

Emotions expressed throughout this study were predominantly excitement, shock, anxiety and fear. Emotional labour is the 'process of regulating both feelings and expressions for the organisational goals'.[40] It is a requirement for effective delivery of healthcare. A wound is a sufficient distraction for students to struggle with their emotional labour. Difficulties managing emotional boundaries with patients' may be associated with burnout.[41] Burnout is a 'reaction to chronic, job related stress characterised by physical, emotional and defensive coping'.[42] Akroyd[43] found radiographers exhibit high levels of emotional exhaustion, the first stage of burnout. This can lead to depersonalisation which was apparent in this study. It was not clear at what stage these radiographers were in their careers,[43] so it is difficult to appreciate at what stage this develops and is reasonable to consider it may start pre-qualification.

Limitations

Within our work, the sample size was small, this was reduced further by a high attrition rate of 66% once students were on clinical placement. It was unclear if this was due to students not seeing open wounds or if they no longer wished to participate. This removed the possibility of looking for statistically significant results.

The researcher facilitated the debrief discussion, focus groups and interview, this may have introduced social desirability bias,[44,45] with students reporting what they felt the researcher wanted to hear. A mixed methods approach using VAS to capture their feelings without a facilitator present and the use of the PEARLS[27] debriefing approach aimed to reduce this bias.

Conclusion

This pilot study identified the complexity of student experiences when first transitioning into clinical practice. It can be ascertained from the results that emotions play an important role in learning and providing PCC. The use of moulage within the simulation promoted an emotional response sufficient to create schema that are drawn upon at a later stage. This is important for decreasing the cognitive load whilst meeting real patients. The students were all distracted by an open wound, having a lasting impact for the control individual. Debriefing opportunities were not forthcoming from supervising radiographers. This appears to be cultural and may be linked to fast-paced departments, however this reduces the learning and processing opportunities for students, increasing emotional labour. There is some risk students suffer cognitive overload and develop the early stages of burnout on placement, when no prior preparation is provided and if poorly managed. A simulation using moulage offers a stepping stone into clinical practice to reduce this risk.

Conflict of interest

This work forms part of a Doctorate in Health and Social Care Practice undertaken by the author at the University of Derby. The author holds a full time senior lecturer position at the University of Derby; as such sixty percent of the course fees have been supplemented by the University of Derby. The author holds the position of 'Simulation Lead' for this discipline at the University and the focus of the author's doctorate is the use of simulation within education.

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