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RESEARCH ARTICLE

"HOW DOES DIRECT INVOLVEMENT WITH DISASTER RESPONSE IMPACT PSYCHOSOCIALLY ON PARAMEDICS?": A SYSTEMATIC REVIEW.

Alnasser,Anas.

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Abstract

Background: Research revealsthat paramedics that have been directly involved within disaster situations are more at risk of experiencing stress, anxiety and post-traumatic stress disorder. This review aimed to examine how direct involvement in disaster response impacts psychosocially on paramedic and how this can be minimised.

Method: A systematic literature search was undertaken. Electronic databases were searched according to strict eligibility criteria that included key word searches such as 'paramedics', 'disaster' and 'post-traumatic stress'. Only studies published between 2000-2015 were included to prevent the inclusion of out of date research.

Results: A thematic analysis of 11 eligible research studies highlighted a number of key themes around psychosocial impact, factors contributing to psychosocial impact and interventions to minimise PTSD risk.

Conclusion: The findings reveal that PTSD is prevalent amongst paramedics who have been involved within disaster response and that greater organisational and cognitive support is needed.

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Introduction:-

The paramedics role, as the Health Professional Council (HCPC, 2014: standard 4.5) states, is to "*be able to use a range of integrated skills and self-awareness to manage clinical challenges effectively in unfamiliar and unpredictable circumstances or situations*". Such situations can include unforeseeable events and crises, which Saltbones (2006) defines as 'disaster' situations that can result in illness, social and economic misfortune and death at a community, group or individual, group scale. Paramedic's roles therefore place them at risk of experiencing the impact of such events in responding to such emergency situations, which requires them to foster effective coping skills alongside organisational collaboration to enhance resilience (Aehlert and Vroman, 2011). However, it is argued that the psychosocial strength needed in such situations is far beyond the remit of the HCPC (2014) standards of proficiency and the expected knowledge and skills of a paramedic, therefore paramedics are in need of greater organisational support and training to manage such potentially traumatic situations.

Consequently, emotional burnout is well documented amongst paramedics who have experienced exposure to such traumatic disaster situations (Armstrong, Shakespeare-Finch, & Shochet, 2014; Fjeldheim et al., 2014; Mitani, Fujita, Nakata, & Shirakawa, 2006). As Mitani et al. (2006) note, paramedics often experience stress in response to disaster, which subsequently triggers emotional responses that can lead to emotional fatigue and exhaustion which can cause paramedics to question their abilities, feeling despondent, inadequate and doubt their competency as a paramedic.

Corresponding Author:-Alnasser.

Such emotional reactions have been associated with Post Traumatic Disorder (PTSD), which Khashaba, El-Sherif, Ibrahim, &Neatmatallah, (2014) reveal frequently occurs within paramedics who have been witness to disaster situations leading to great stress in dealing with the disaster incident. Fjeldheim et al. (2014) identified that approximately 22% of paramedics who participated in their study revealed symptoms that could be defined as PTSD according to diagnostic criteria. However, more disturbingly, a study in Iran, revealed approximately 94% of individuals working in disaster situations evidenced symptoms corresponding to PTSD, which they argued was due to poor organisational support that increased the risk of stress and disaster exposure.

Given the dramatic differences internationally in how paramedics respond to exposure to disaster situations, the rationale in engaging in this systematic review is to further understand how direct involvement impacts psychosocially upon paramedics so that the best support interventions can be offered to help minimise stress and symptoms associated with PTSD (Fjeldheim et al. 2014; Khashaba, El-Sherif, Ibrahim, &Neatmatallah, 2014). This systematic review examines the literature to address the main research question: How does direct involvement with disaster response impact psychosocially on paramedics?

Methodology:-

The study adopted a systematic literature review methodology, drawing upon highly relevant primary based research that could answer the research question. The rationale in selecting the method of a systematic review is as Aveyard (2014) suggests it offers a rigorous and structured process to collate and examine a large evidence base in the topic area. Adhering to the Centre for Review and Dissemination's (CRD, 2009) protocol for conducting systematic reviews, rigor in the search strategy and methods enabled a structured data collection, synthesis and analysis process that ensured the quality of the literature identified, whilst minimising researcher bias (Parahoo, 2011).

A search of the electronic databases included, SPRINGERLINK (2000-2015), PubMed (2000-2015), DeepDyve (2000-2015), and Science Direct (2000-2015), which facilitated the selection of literature that was specific to the research question (Jesson et al., 2011; Samadzadeh, Rigi, &Ganjali, 2013).The keywords were drawn from the PICO (Participant/intervention/comparison/outcome) framework in devising the research question led to terms that included "paramedic", "disaster", "psychosocial", "posttraumatic" and "stress", "PTSD", "depression" and "anxiety", which were also combined with Boolean operators to increase the selectivity of the search (Huang et al.2009 ;Wakefield, 2014).

Parameters

In defining the study's eligibility criteria, it was decided that only quantitative studies would be included, to ensure the most objectively and rigorously employed methods had been utilised in obtaining data findings, as Robson (2011) states quantitative methodologies such as randomised controlled trials are considered the highest standard of research and valued greatly (Bowling & Ebrahim, 2005). Therefore, the systematic review only included studies that were quantitative in methodology to ensure only the most valid and highest quality studies were included to minimise the interjection of bias on the study. As Creswell (2013) argues, however, quantitative research fails to offer insights into individuals' experiences and the social processes that underpin such experiences. It could be argued that this may be a limitation of the study; however, the decision to include only quantitative studies was taken minimise potential bias in the findings that are associated with qualitative research methods (Robson, 2011).

Whilst greater credibility was given to more recent studies published in the last five years, papers published in the last six to ten years were also considered as the initial searched revealed few current papers and to prevent eliciting a too restrictive search that could lead to the missing of important findings these papers were considered valuable (Ridley, 2012). Therefore, studies were included that were published between 2000-2015, whilst literature older than 10 years may be considered outdated, given the large number of seminal disaster management research papers following the large scale disasters of the 11th September 2001 USA terrorist attacks, and the 26th December 2004 Indian Ocean tsunami, it is argued that information from these papers could still inform recent research (Pautasso, 2013; Timmins & McCabe, 2005). Setting these date parameters may indeed omit access to other earlier papers that may be of value to the study, however parameters are deemed necessary to ensure the number of papers accessed are manageable and the research 'doable' (Aveyard, 2014). The full inclusion criteria can be observed below:

INCLUSION	EXCLUSION
• Papers published from 2001-2016. • Papers published in English • Papers involving paramedics involved in direct disaster response • Papers focusing on psychosocial impact or outcomes • Quantitative studies only	• Papers not published in English. • Papers that do not match the identified key words. • Papers involving paramedics involved in direct disaster response • Papers not focusing on psychosocial impact or outcomes • Not quantitative studies

Results:-

Following application of the eligibility criteria, the search strategy led to145 studies being identified: PubMed (n=23), Science Direct (n=50), Springerlink (n=71) and DeepDyve (n=1). All identified papers' titles were reviewed, and duplicates were omitted, titles that did not include the key search terms or indicate relevance to the topic were disregarded. Following this the abstracts of the remaining papers were read and papers that were not specifically relevant to the topic under study were also omitted. Finally, the full texts of the remaining papers were reviewed and those not relevant removed in line with Moher et al. (2009) PRISMA reporting format. After removal of duplicates and irrelevant articles this led to 16 paper being selected for quality assessment (CASP, 2013). Critical appraisal utilised the Critical Appraisal Skills Program CASP tools checklists, which offers a series of questions by which to assess the reliability and validity of each study's findings and methods (CASP, 2013). Each paper was rated against each question that led to a final quality score of excellent, good or poor, studies rated good and excellent were selected for inclusion, leading to the final 11 papers (CASP, 2013).The final 11 papers were then read and re-read according to Braun and Clark's (2006) method of thematic analysis, enabling key themes to be identified within and across the study's findings. Coding of themes continued until a point of data saturation was achieved where no further themes could be identified (Parahoo, 2011).

Discussion:-

The research studies examined in this systematic review have revealed three key themes that frame the discussion chapter. These being; Psychological impact upon paramedics of exposure to disaster situations; Factors making PTSD more likely to develop and interventions to limit the effects of PTSD.

Summary of Key Themes

The key themes explored in the 11 most relevant papers that met all inclusion criteria and none of the exclusion criteria are now explored.

Psychological impact upon paramedics of exposure to disaster situations

Across the eleven studies identified, methods of measuring PTSD have been used as a means of assessing paramedics psychosocial responses to the effects of 'disaster' and highly traumatic and challenging situations (Misra, Greenberg, Hutchinson, Brain, &Glozier, 2009; Armstrong, Shakespeare-Finch, & Shochet, 2014). In including only quantitative studies measuring PTSD symptoms across paramedics has minimised possible confounding variables and extraneous factors through utilising a variety of diagnostic criteria and validated PTSD measurement tools such as the Trauma Screening Questionnaire (Misra et al. 2009; Robson, 2012). Whilst such validated tools demonstrate internal construct validity, as Creswell (2013) suggests they fail to understand individuals' actual unique experiences. Consequently, many of the included studies adopted case-cohort studies, which could effectively identify that PTSD was prevalent amongst paramedics engaged in disaster situations, however the actual causality could not be precisely determined (Perrin et al. 2007; Smith et al. 2011; Robson, 2012). A cross-sectional study by Misra et al. (2009) conducted two months following the London bombings recruited 525 London Ambulance Service personnel who were involved in the bombings. To provide an appropriate comparison group, 525 randomly selected employees were also recruited, and each group stratified by age, role and gender to ensure a representative population sample was achieved (Parahoo, 2012). Adopting the validated screening tool, the Trauma Screening Questionnaire, (Misra et al. 2009) participants were screened with diagnosis of probable PTSD being made where participants revealed at least six symptoms from the 10-symptom rating scale. A measure was also made to account for other experiences of substantial stress where participants identified one or more of five symptoms that were associated with adjustment disorders, with Misra et al (2009) implementing the same measure used following the September 11th USA attacks (Perrin et al. 2007). Likert scales were also used to assess the impact

on well-being by examining the effects of the bombing on day-to-day activities and to ascertain whether the participants had discussed the feelings about the bombings someone. Whilst Likert scales are an effective method of measuring aspects of personality and behaviour, as Parahoo (2012) states manipulating subjective data quantitatively can be prone to researcher bias, due to the potential effects on participant's answers of the actual research context. However, despite potential methodological limitations in data collection, Misra et al. (2009) demonstrated that those involved directly in the bombings were twice as likely to be affected on a day-to-day basis (13% versus 5%, P, 0.05) and also twice as likely to discuss their feelings with others about the events than individuals that were not involved (31% versus 16%, P, 0.01). Results indicated that approximately 4% of the directly involved group reported probable PTSD with 13% reporting also substantial stress, however this is much lower than the reported 22% PTSD figure of paramedics that took part in Fjeldheim et al. (2014) study.

Misir et al's (2009) findings also demonstrated that proximity to the disaster and the nature of the incident was highly influential in cases of psychosocial stress and PTSD with personnel working at the actual disaster scene being more at risk, however the 13% of the sample that reported substantial stress was shown to not be associated with responding to the bombing. Whilst Misir et al. (2009) has established a link between the experience of PTSD amongst paramedics involved in Disaster situations the methods are limited to identifying only associations and cannot identify the actual causality, however further studies have attempted to identify the actual factors that contribute and cause symptoms of PTSD.

1) Factors making PTSD more likely to develop

Several studies examined and identified particular factors, which may contribute to a vulnerability amongst paramedics that result in symptoms of PTSD (Difede, Cukor, Patt, Giosan, & Hoffman, 2006; Whealin, Ruzek, & Southwick, 2008; Oginska-Bulik, 2015).). Misra et al. (2009) reported paramedics responding to the 2005 London bombings identified that paramedics who were directly engaged in treating casualties in the disaster environment were more likely to experience psychological distress than paramedics who treated causalities casualties away from the scene. Similarly, Halpern, Maunder, Schwartz, &Gurevich, (2012) identified PTSD to be more prevalent in paramedics who had experienced a particularly distressing experience, although no correlation could be made between PTSD incidence and the organisational and situational factors of the event. In contrast a similar study including a range of emergency service workers (firefighters, police, and paramedics) who had been involved in extremely potentially traumatising events examined the potential impact of occupational and personal variables that could account for PTSD symptoms within emergency workers (Armstrong, Shakespeare-Finch, & Shochet, 2014). Post-trauma outcomes yet at this stage no research has investigated these factors and their relative influence on both PTSD and PTG in a single study. The study was adapted form Calhoun and Tedeschi's model of post traumatic growth (PTG) using study regression models of the symptoms ofPTG and PTSD symptoms amongst 218 firefighters (Armstrong et al. 2014). Findings revealed that firefighters experienced an organisational vulnerability to experiencing PTSD, where operational stress could contribute to the PTSD symptoms; a finding that is consistent with further research (Perrin et al. 2007; Orginska-Bulk, 2015). However, Armstrong et al. (2014) also identified particular individual psychological and social strengths amongst paramedics that could safeguard against PTSD and promote PTG that included social support, effective coping skills and cognitive reappraisal. Indeed, as Perrin et al. (2007) identified in their study that interviewed (2-3 yrs. after the event) rescue and recovery workers who had been involved in the World Trade Centre terrorist attacks on the 11th September 2001. Perrin et al. (2007) identified the prevalence of PTSD amongst emergency workers to be 12.4%, however this figure dramatically shifted according to affiliation, with police reporting 6.2% and 21.2% for unaffiliated volunteers, revealing as Armstrong et al. (2014) suggests that emergency workers may have access to enhanced sources of resilience and coping. Perrin et al. (2007) further supported this claim as PTSD was also found to be prevalent within participants who had no prior experience of working in disaster situations or who had received little training on disaster scenes. Hence, Perrine et al. (2007) concluded that emergency staff required effective and appropriate disaster preparedness training to reduce vulnerability to PTSD among workers and volunteers and to promote coping and resilience.

Further research has linked particular psychological vulnerability with a greater risk of experiencing PTSD following direct contact within disaster events, Halpern, Maunder, Schwartz, &Gurevich, 2012 building from attachment theory (Bowlby, 1969) hypothesised that attachment insecurity could contribute to emotional distress in ambulance workers, leading to a prolonged recovery from acute post-critical incident distress. Adopting a range of validated scales similar to Misir et al. (2014) methods, Halpern et al. (2012) measured attachment insecurity, acute distress, coping and social contact and current experienced symptoms of post-traumatic stress, depression, somatisation and burnout, which prior research has identified to be associated with mentaldistress (Bowlby, 1969;

2012). Halpern et al. (2012) identified that as Bowlby (1969) had prior claimed poor attachments could contribute to impaired cognitive development, which in this case revealed that fearful-avoidant attachment insecurity was associated with impaired coping, reduced social support leading to a slower recovery after the critical incident. The findings of Smith, Burkle and Archer (2011) that examined fear, familiarity and risk in relation to responses to disaster situation also demonstrated that individuals that experienced greater fear were also at a greater risk of death, physical injury and psychological effect. Querishi et al (2005) and Le Blanc et al. (2012) also identified that fear amongst health care workers can also generate anxiety that can cause stress and impede their willingness to actively engage in such disaster settings that highlights the need to address both cognitive and organisational vulnerability is a key aspect of developing appropriate training and intervening to promote resilience and coping within paramedics to prevent the risk posed to them when directly involved in disaster situations.

2) Interventions to limit the effects of PTSD

Examining potential interventions in addressing PTSD, Difede, Cukor, Patt, Giosan, & Hoffman, (2006) explored the use of virtual reality therapy in the treatment of PTSD following the September 11, 2001 attack. The therapy intervention is aimed at enabling the patient to re-experience and confront traumatic events in a controlled and safe environment (Sippel, 2013). Participants took part in 14 sessions of VR-enhanced treatment (n=9) which were then compared to a waitlist (WL) control group (n=8). Difede et al's (2006) study demonstrated high credibility as the methods used such as statistical analysis are aligned with the selected case-control study design (CASP, 2013). ANOVA also demonstrated a significant interaction of time by group ($p<.01$) engaged in the intervention with a large effect size of 1.53 (Difede et al. 2006; Robson, 2011). Consequently, the VR group revealed significantly greater post-treatment decline in PTSD symptoms when compared to the WL group. Difede et al. (2006) claimed this to reveal that VR could be an effective tool for promoting exposure therapy in disaster workers who suffer from PTSD.

More recently, Nelson (2013) in a systematic review of VR studies reported that VT was an effective therapy in minimising risk of psychosocial trauma to emergency workers, thus corroborating Difede et al's (2013) findings. Focusing also upon promoting effective cognitive changes in addressing PTSD, Whealin, Ruzek, & Southwick, (2008) **draw upon CBT and empirical studies of PTSD to theorise that cognitive–behavioural mechanisms impact and can impede trauma adaptation**.Utilising cognitive behavioural therapy (Corey, 2010), Whealin et al. (2008) state can be effective in reducing the incidence of intrusive memories that contribute to PTSD. However, whilst cognitive vulnerability is an important factor to consider in both addressing PTSD and preparing paramedic in coping within disaster context, as Oginska-Bulik 2015) reveal, social support can also act as a protective strategy against trauma risk, revealing that emergency workers who engaged in support from family and peers reported a lower incidence of PTSD and greater report of post traumatic growth following a traumatic experience.

Further studies have also identified that organisational factors can also promote greater coping amongst paramedics, such as engaging in debriefing protocols that facilitate communication and the sharing of thoughts and feelings about the incident, alongside offering a safe context in which the paramedic can discuss their psychological symptoms (Le Blanc et al. 2012). As Le Blanc et al. (2012) states,this should require developing systems and training interventions that can support and prepare emergency workers who are at risk of experiencing disaster contexts in the course of their everyday work responsibilities.

In summary, the discussion has evidenced that paramedics frequently experience a rage of psychosocial symptoms, such as fear, stress, anxiety that contribute to PTSD following experiencing a traumatic disaster even (Misir et al. 2012). However, the findings reveal that particular paramedics may be more at risk, due to cognitive, social and organisational factors that can elicit a particular vulnerability to stress, fear and poor coping skills and innate resilience (Difede et al. 2012). As Le Blanc et al. (2012) reports, therefore it is essential that both organisational and therapeutic interventions facilitate the enabling of appropriate skills, knowledge and training that can enhance paramedics coping skills, self-awareness and resilience.

It is therefore recommended that:

- Paramedics should have access to appropriate social support and debriefing protocols following involvement in disaster events to facilitate communication, a sense of safety and to be able to offer appropriate cognitive based interventions where necessary

- That all paramedics must be offered disaster preparedness training early in their career and this should be regularly updated throughout their career to foster the continuation of coping skill, self-awareness and resilience.

Limitations

Whilst the systematic review adhered to a structured and rigorous research process, it is acknowledged that there may be studies that were missed and that could have further informed the findings of this study. However, given the wide range of studies that were identified it is argued that this has facilitated a wide breadth of literature that collectively have evidenced key issues pertaining to the psychosocial impact of involvement in disaster upon paramedics.

Conclusion:-

The findings of the systematic literature review have significant implications for reducing the risk placed upon paramedics in the course of their everyday work through being able to determine organisational and therapeutic strategies, such as social support, VR, cognitive behavioural therapy, communication and effective protocols in addressing PTSD and promoting better coping styles (Whealin et al. 2008; Le Blanc et al. 2012). Effective training and social support strategies within organisational settings can also foster post traumatic growth through supporting paramedics in learning how to use coping strategies that can facilitate better coping when in the actual incident through familiarising individuals early in training with the potential impacts of disaster context on psychological health. Through developing protocols for both pre-incident training to increase understanding and preparedness and by ensuring post incident protocols such as debriefing are in place,stress, fear and anxiety may be reduced that can promote greater resilience, which can reduce the risk of death and psychological impact upon the paramedic (Le Blanc et al. 2012). As Armstrong et al. (2014) highlights, also paramedics are not only subject to the stress resulting from involvement in disaster but also operational stress if social support is lacking or work pressures too demanding. Therefore, it is essential that organisations ensure cohesions across staff and ensure appropriate social support systems are in place and the demands upon paramedics are not beyond their professional scope of practice, skills and knowledge (HCPC, 2014).

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