**Introduction**

Healthcare serial killers (HSKs), sometimes also known as *medical murdere*rs (Hickey, 2010) have emerged as a common concern within popular culture and true crime, with various books, documentaries and films all eager to understand what might have motivated, for example, Beverly Allitt, Harold Shipman or Charles Cullen to have taken the lives of their patients (Davis, 1993; Graeber, 2013; Peters, 2005). However, whilst the HSK has been emerging into popular consciousness, academic, criminological research about this type of offender remains somewhat underdeveloped. Even so, a relatively small body of work has begun to identify, map and describe cases of healthcare serial murder (see, for example, Ramsland, 2007; Yorker *et al*., 2006). Within this academic literature, HSKs have been defined as, "any type of employee in the healthcare system who use their position to murder at least two patients in two separate incidents, with the psychological capacity for more killing" (Ramsland, 2007, pp. xi-xii). Further, it is suggested that these offenders constitute a special subcategory of serial murderer (Ramsland, 2007), and as such should be studied more extensively given the observed increases in the number of arrests and convictions of healthcare employees murdering or attempting to murder patients in their care since the 1970s (Field, 2007; Field & Pearson, 2010; Yorker *et al*., 2006).

Here we should also note that the description *angel of death* often emerges in popular and more recent academic discussions of HSKs, but that this term and its application have been heavily gendered. This is evident, for example, in Kelleher and Kelleher's description of an angel of death as, "a woman who systematically murders individuals who are in her care and rely on her for some form of medical attention or similar support" (1998, p. 15). This is important to note, particularly given gendered understandings of serial murder, which suggest that female serial killers are distinct in several ways from male serial killers in terms of the way that they

kill and the relationship that they have to their victims (Schechter & Schechter, 2010). However, this description is now also appearing within popular discussions of male HSKs, who are similarly and increasingly being described as 'angels of death' in a way previously only seen with female HSKs. Charles Cullen, for example, was labelled by the media as an angel of death after his arrest in 2003 (Graeber, 2013, p. 255) and numerous press reports described the British HSK Colin Norris in the same manner after his conviction for the murders of four of his patients and the attempted murder of another in 2008.

We seek to contribute to this recent academic interest in HSKs generally and, in particular, we have chosen to concentrate on male and female nurses who murdered within a hospital setting. In doing so we provide some greater rigour about how to apply this label and to whom, and also begin the process of bringing criminological understanding to bear on this phenomenon. We hope that this understanding may be of use to both hospital administrators and law enforcement. Most immediately we suggest that the label of HSK has hitherto been applied in a rather loose way. In short, in this emerging literature, a HSK can be a doctor or a nurse, sometimes working within a hospital, the community, a nursing home, or simply a healthcare professional using their medical skills to murder. As Ramsland has put it "a HSK might be a physician, nurse, or any of the key support staff, and while some of the predators discussed in the following chapters were convicted of only one murder, they were typically suspected in many more" (Ramsland, 2007, p. xii). However, even this very broad description raises yet another issue which we seek to draw attention to. To be labelled as a *serial killer* in the United States, that person would typically have to have killed at least two people in separate incidents – not the one which Ramsland describes, with a *cooling off* period in between each murder and, in the UK, as someone who has killed three or more victims over a similar time frame, (Canter

& Wentink, 2004; Deitz, 1996; Egger, 1984; Ferguson *et al*., 2003; Holmes & De Burger, 1988; Holmes & Holmes, 1998; Wilson, 2009).

This imprecision about what is meant by the description HSK remains present in other scholarly contributions. Yorker *et al.* (2006), for example, suggest that there is a need to better understand the phenomenon of serial murder by healthcare professionals, and in doing so offer an analysis of 90 such cases collected between 1970 and 2006. However, they do not define serial murder in their article and include cases where the nurse or doctor may have been charged with murder but not convicted of that charge or charges; was subsequently convicted of only one murder; or convicted of charges other than murder, such as attempted murder, assault, or illegal distribution of a controlled substance. Field (2007) sums up the perhaps not surprisingly wide range of socio-demographic characteristics displayed by this broadly defined group of serial murderers,

> The diversity of the defendants illustrates the variety of individuals who engage in this practice. Some are clearly extremely intelligent; others are not. Some are young, some are older, some are male, some are female, some are gay, some are straight, some are senior nurses, some are mere assistants, but all are able to murder patients (Field, 2007, p. 316).

Even so, no matter how loosely defined and this immediate criticism of ours notwithstanding, there is a small but growing body of evidence to suggest that HSKs tend to use their authority to target more vulnerable groups, such as the elderly (Lubaszka & Shon, 2013; Smith, 2002; Soothill & Wilson, 2005); are more likely to be female than male (Hickey, 2013); and, ironically given this finding, can be seen as *confidence men* in how they go about their murders,

(Lubaszka *et al*, 2014). Again it should be noted that Lubaszka *et al* (2014) also consider examples in their discussion of a nurse or doctor who was charged, but not convicted of killing two or more victims in their sample of 58 healthcare serial killers located within North America, South America and Europe, between the years of 1970 and 2010.

It has been noted that the motives of HSKs are particularly challenging to establish (Field, 2007). Yorker *et al* (2006) discuss claims of mercy or compassion expressed by HSKs but are careful to emphasise inconsistencies with victim's health statuses – whilst they may have been elderly or experiencing serious conditions, many were not terminally deteriorating at the time of their deaths. Yorker *et al* (2006) went on to identify other motives of HSKs, which included ridding themselves of demanding patients, freeing up beds in facilities with high demand and benefiting financially from a patient's death. In addition, Yorker *et al* (2006) also suggest that a variation of Munchausen Syndrome by Proxy – where parents or caregivers induce illness in their children in order to gain medical attention - may be relevant in understanding such cases, a factor other scholars have termed a "hero complex" (Lubaszka *et al*, 2014, p. 25). Lubaszka *et al* (2014) suggest that motives are complex and diverse – around a third of HSKs in their sample killed for a combination of reasons. However, we would suggest that the current theorizing in relation to motives of HSKs is somewhat premature given the aforementioned imprecision in defining them and the need to establish tighter parameters when constructing samples.

As all of this indicates, academic interest in the phenomenon of HSKs is now becoming well established and, more importantly, a number of these studies have attempted to see how this interest might aid law enforcement. For example, what method(s) does the HSK typically use?

How do they gain the trust of their fellow workers, patients and the families of their patients? In what ways do they evade detection? Lubaszka *et al* continue:

> By recognising certain aspects of the healthcare profession or structural or organisational factors that make it possible for these types of killers to flourish, scholars, hospital administrators, and healthcare workers themselves can continue to outline ways to prevent the occurrence of these predatory behaviours (2014, p. 3).

In this respect Ramsland has outlined a 22-point checklist of personality traits and behaviours that have been associated with HSKs and suggests that a "number of them together in constellation should be alarming to the person's colleagues and supervisors, as well as to facility administrators" (Ramsland, 2007, p. 127). She further describes these personality traits and behaviours as *red flags*. However, she does not identify how many of these red flags should be alarming when seen together, or if particular behaviours or traits are of greater concern than others. Of more immediate interest, no evidence is presented as to whether greater numbers of red flags, for example, relate to greater numbers of murders – an issue which we consider further below. For ease of reference, Ramsland's red flags are set out below in Table 1.

*Insert Table 1 about here*

Our aim in this article is to further refine what is meant when the label HSK is applied to either a male or female nurse working within a hospital setting and, thereafter, by constructing an appropriate sample of those nurses who can legitimately be defined as such we seek to test the claim of Lubaszka *et al.* (2014) that this growing academic interest might allow hospital administrators and law enforcement agencies to better understand and then to reduce the opportunities that this type of offender has to kill. In testing this claim we seek to harness Ramsland's checklist to determine which combination of red flags should give cause for concern by relating how these red flags compare with what we know about nurses convicted

of healthcare serial murder. Whilst HSKs would appear to be an incredibly rare phenomenon when considered in relation to the number of individuals employed in caring capacities throughout the world, their negative impact upon public attitudes towards and confidence in healthcare institutions is particularly damaging and as such, worthy of more rigorous academic study than has been the case to date.

**Methodology and Sample Characteristics**

A number of stages were involved so as to be able to identify our sample. Firstly, we turned to the lists of HSKs identified by Yorker *et al* (2006) and Lubaskza *et al* (2014), albeit remaining mindful of the issue of imprecision which we have drawn attention to. This initially produced a list of some 41 cases, all of whom had worked as nurses, primarily within a hospital (some might also have had work in a nursing home in addition to their hospital work) and had been convicted at court of at least two murders. However, we then excluded from this list those who might have been identified as HSKs, but who had then had their convictions overturned on appeal, or who were then later convicted of manslaughter rather than murder; those HSKs who were primarily employed within nursing homes, given how nursing homes differ in scale and complexity from hospitals; and HSKs who worked as doctors, or in some other capacity. It is acknowledged that this rigorous selection criterion excludes such cases as Dr Harold Shipman – Britain's most prolific serial murderer, although some have argued that in any event that this case is so unusual as to be of little predictive value, (Soothill, 2001; Soothill & Wilson, 2005).

After developing our sample, socio-demographic data was collected drawing on a range of resources. We used legal records via Lexis and Westlaw for example, supplementing these if required with newspaper reports about cases, accessed through Nexis. Nexis is an electronic

database which houses all major British newspapers, including both national and regional titles, some 2,000 global newspapers, plus copy from newswires and newsletters. We used both English language and non-English language newspapers to refine the details for each case, employing a translation service to translate articles as and when needed. This was necessary in several cases where the murders had not been extensively reported upon outside of the country in which they occurred. For example, Petr Zalenka, a male nurse who killed seven of his patients in the Czech Republic in 2006, was not widely reported upon outside of Eastern Europe and required us to have a number of articles translated into English. These methods also allowed us to identify a number of errors within the Yorker *et al* (2006) and Lubaskza *et al* (2014) tables. All of this ultimately reduced the number within our final sample to 16 HSKs, based on the American definition of a serial killer, and we reproduce their details in Table 2. We suggest an initial source for each individual HSK in the Appendix to enable future researchers to locate information about each case.

*Insert Table 2 about here*

Thereafter, we collated socio-demographic and criminological data relating to the cases of the 16 HSKs in our sample. We included, for example, the age at which the perpetrator had been charged and convicted; how many victims he/she had been convicted of killing; the period of time over which they had been active as a HSK; the methods that they had used to achieve their kills; whether they had confessed to these murders and how they had pleaded at court; and what sentence they received. We did not attempt to identify what might have motivated the HSK to begin killing, although we did try to construct a picture of the HSK both as a killer and more broadly – a process that was necessary so as to be able to complete our final analysis. In the following section we present our findings relating to the socio-demographic and criminological characteristics of the cases we identified.

**Findings**

The 16 HSKs in our sample come predominantly from North America and Europe and the murders for which they were convicted took place during the period 1977 to 2009. The earliest case in our sample related to the Belgian nurse Cecile Bombeek, who was arrested in 1977 and the most recent the Finnish nurse Aino Nykopp-Koski, whose last known murder was in 2009. The United States produced the most HSKs (38%, n=6), then the UK (19%, n=3), followed by Germany (13%, n=2), with Belgium, Czech Republic, Finland, France and Italy all producing one each (6%, n=1 for each country). This result is indicative of how widespread this phenomenon might be and, at the very least, that it is not confined to the US or UK – findings are reported in Table 3.

*Insert Table 3 about here*

Regarding gender, there was a relatively even split between HSKs who were male (44%, n=7) and those who were female (56%, n=9), see Table 4.

*Insert Table 4 about here*

In terms of age, the average (mean) age at which a HSK was charged with their murders was 35.8 years and the average (mean) age when convicted was 38.1. When the data is grouped into age brackets, we see a concentration of HSKs in the 31-40 age group (50%, n=8) compared to the other groups 21-30 (19%, n=3), 41-50 (19%, n=3), and 51-60 (12%, n=2). This data is presented in Table 5.

*Insert table 5 about here*

Exploring the number of murders for which each HSK had been convicted, the greatest proportion had been convicted of between 5 and 9 murders (44%, n=7), with a smaller proportion convicted of between 2 and 4 murders (31%, n=5). There was again a small proportion convicted of between 10 and 14 murders (19%, n=3) but only one – Charles Cullen - convicted of more than 14 murders (6%, n=1). This data is presented in Table 6. In passing

it is worth noting that Cullen is an especially interesting HSK and deserves much greater academic scrutiny than he has hitherto been given, especially as he may have been America's most prolific serial killer.  Some have estimated that he may have killed up to 400 patients, (Graeber, 2013).

*Insert table 6 about here*

When we considered the length of time that the HSK was able to commit murder before being suspended or arrested, we saw some variation. The largest number of HSKs fell into the 'Less than 3 months' group (44%, n=7), with between 1 and 3 HSKs falling into the other categories: 3-5 months (6%, n=1), 6-11 months (13%, n=2), 12-17 months (19%, n=3), 18 – 23 months (6%, n=1), 24-29 months (13%, n=2). These findings are presented in Table 7.

*Insert Table 7 about here*

The location of the murders for which the HSKs were convicted was analysed in terms of those who killed in a single location – in other words in one hospital, and those whose murders spanned more than one location, by which is meant two or more hospitals. The majority of HSKs killed in a single location (75%, n=12) whilst a smaller proportion killed in more than one hospital (25%, n=4). This data is presented in Table 8. However, it is necessary to urge caution here as our data relates only to murders for which HSKs have been convicted.  It may be that HSKs had committed additional murders at a different hospital or hospitals aside from the one relating to their conviction. So too, their activities at different hospitals may have gone undetected, or prosecutors may not have been able to secure convictions.

*Insert table 8 about here*

The gender of murder victims also highlighted some additional differences. However, we were unable to establish conclusively the gender profile of the victims of the Belgian nurse Cecile Bombeek and Finnish nurse Aino Nykopp-Koski - therefore our findings for this variable relate to 14 of the 16 cases. The majority of HSKs murdered both male and female victims (69%,

n=11), whilst smaller numbers murdered exclusively male victims (13%, n=2). Only one HSK – Colin Norris - murdered exclusively female victims (6%, n=1) and this result is in itself of interest. The differences are presented in Table 9.

*Insert Table 9 about here*

Further exploring victim characteristics, we grouped victim ages into the categories of children (aged 0-15 years), young people (aged 16-24 years), adults (aged 25-64 years) and elderly (aged 65 and over) and discovered that just over half of HSKs murdered adults and elderly people (53%, n=8), a third murdered elderly people exclusively (33%, n=5) with only one killing children exclusively (7%, n=1) and only one killing young people, adults and elderly people (7%, n=1). See Table 10.

*Insert Table 10 about here*

The majority of HSKs used only one method to murder their victims (81%, n=13), whilst 19% (n=3) used more than one method. These findings are presented in Table 11.

*Insert Table 11 about here*

Investigating their methods of murder further, we discovered that poisoning was used by most HSKs. We compared the use of poisoning with other methods and discovered that in the majority of cases, poisoning was the only method used (88%, n=14). In only one case – that of English nurse Beverley Allitt, was poisoning combined with other methods, notably suffocation and air embolus (6%, n=1). In only one other case – that of the Italian Sonia Caleffi, was poisoning not used at all (6%, n=1). Caleffi's method was solely air embolus. These findings are presented in Table 12. We also noted the substances used in poisoning. Insulin was the most prevalent constituting 19% of all substances used by HSKs and was utilised by four HSKs. However, we also discovered a wide range of other medications and substances being used, including muscle relaxants, opiates, potassium, bleach and heparin. These are presented in Table 13.

Having obtained descriptive information about the perpetrators, their victims and the crimes, each of the authors then independently assigned scores to each case on the basis of the 22 variables identified by Ramsland in her checklist. When a variable seemed to apply it was assigned a score of 1, and those that did not were scored at 0. In theory the maximum that a HSK could score would be 22. Here it is important to acknowledge that these variables, which include both personality traits as well as behaviours, are often open to interpretation and have not previously been rigorously tested within academic writing about HSKs. For example, what is meant by *Has moved regularly from one hospital to another*? Does *regularly* mean every year, or at some other interval of time? How should we measure *craves attention*? So too there would appear to be overlaps between some of these variables as with, for example, *Has a history of mental instability or periodic depression* and *Appears to have a personality disorder*. We attempted to overcome some of these difficulties through discussing our results. This allowed us to further consider each case and reach a consensus about how to interpret these 22 variables and then amend our scores where this was necessary. For example, through discussion, we interpreted regularly as meaning a pattern of employment that was out of the ordinary, and which might have seen the nurse settling at a job for only a few months and then moving on. However, it is also clear that at some later stage this checklist should be further refined and scrutinised, especially as it has the potential to be of great assistance to hospitals and law enforcement. The scores for each HSK are displayed in Table 14.

The five items from Ramsland's checklist that occurred most often within our sample were: *Higher incidences of death on his/her shift* (94%, n=15); *History of mental instability / depression* (62.5%, n=10); *Makes colleagues anxious* (56%, n=9); *In possession of drugs etc. at home / in locker* (50%, n=8); and, finally, *Appears to have a personality disorder* (50%,

n=8), see Table 15. We draw some notes of caution about the first of these most common red flags within our discussion.  Three items on the checklist did not gain any scores at all.  These were: *Tries to prevent others checking on his/her patients*; *Hangs around during the investigations of deaths*; and *Lied about personal information*.

*Insert Table 15 about here*

Examining the differing scores obtained on Ramsland's checklist, a cumulative frequency distribution was created and the median, lower quartile and upper quartile were estimated from the ogive (see Figure 1).  The median score on the Ramsland checklist was 6 and the middle 50% of scores fell between the lower quartile of 4 and the upper quartile of 7.4. HSKs with scores above the upper quartile of 7.4 were Sonia Caleffi, Robert Rubane Diaz, Kristen Gilbert (all with a score of 8), Kimberley Saenz (score of 9) and Charles Cullen (score of 11). Only one HSK had a score below the lower quartile of 4 - Colin Norris, who scored only 2.

*Insert Figure 1 about here*

**Discussion**

Our aims in this paper were to further refine the meaning of the term HSK and explore the contribution that academic research may make in better understanding this phenomenon and reducing opportunities of HSKs to kill. We have suggested that HSKs be defined as male or female nurses who have been convicted of at least two murders, which they have carried out within a hospital setting. In relation to our second aim, we have identified several points of interest in enhancing understanding of HSKs and as such, are able to suggest opportunities for prevention / limitation of such killings, which we will discuss in this section. HSKs are, as previous literature suggests, a heterogeneous group (Field, 2007; Field, 2010; Ramsland, 2007). However, we have identified some common characteristics and we challenge existing knowledge in arguing that there is a more even split between male and female HSKs than previous literature suggests (Hickey, 2013). HSKs were most commonly aged 31-40 and were

convicted of between five and nine murders which occurred within a period of less than three months in one hospital. However we must emphasise here that we examined *convicted* HSKs, who may have been stopped before moving on to a different hospital. Similarly, those with higher numbers of convictions for murder generally had a longer killing period – implying that HSKs are unlikely to cease their activities.  In other words, the longer they are able to engage in murder, the more murders they will commit and will not stop until apprehended by the criminal justice system.

It is possible that we can learn more about HSKs by focusing on the socio-demographic characteristics of their victims, than we can by solely focusing upon the HSKs themselves. Indeed, the importance of victim characteristics has been recognised by other scholarly contributions to serial murder in general (Wilson, 2007; Wilson, 2009).  Our findings suggest that serial murder by HSKs is no exception to this. We found that HSKs do not appear to target a particular gender, commonly targeting both male and female victims.  The most prominent victim type in terms of age group was a combination of adults and elderly people – attacked, as previous research has suggested, at the time when they are least able to protect themselves (Lubaszka & Shon, 2013; Smith, 2002; Soothill & Wilson, 2005).  The method by which these victims meet their deaths also generated interesting findings, with poisoning alone being the most prominent method of HSKs.  However, whether this is an accurate portrayal of the reality of healthcare serial murder is debatable. The use of poison is likely to leave a trace of the substance in the patient's body, which may be discovered if their death is investigated. However, other methods may be less easy to detect and so a HSK who wants to evade detection might draw upon them. This was evident in the case of Beverley Allitt – she killed one of her victims, Kayley Desmond, by injecting her with a syringe filled with air. This was not observed

when x-rays of the victim's chest were first examined and only came to light when radiologists were asked by police to review all available x-rays of victims (Clothier, 1994, p. 45).

We also note that the middle 50% of scores on the Ransland checklist fall between the lower quartile of 4 and upper quartile of 7.4, with a median of 6. It would appear that the most common red flags are: *Higher incidences of death on his/her shift; History of mental instability / depression; Makes colleagues anxious; In possession of drugs etc. at home / in locker; and Appears to have a personality disorder.* Here we accept that further work needs to be done to refine this checklist and better test if some red flags need to be removed and, perhaps, others added. After all, it should be acknowledged that the highest number scored was 11.

We should note that previous research has urged caution in relation to the most prevalent red flag that we uncovered - *Higher incidences of death on his/her shift*. This red flag has also been widely used as evidence in the prosecution of cases of murder in a hospital context (Lucy & Aitken, 2002). In other words, where the number of deaths over a specified time period exceed those expected when compared to usual death rates for that institution, or ward, attendance data are commonly analysed by legal teams to determine guilt or innocence. Attendance data relates to the presence or absence of particular members of staff during or around the time of unusual death rates - staff rotas will be examined to determine who was *in attendance* during the time periods concerned. However, there is an uneasy fit between scientific and legal principles around evidence in this context. Although this type of evidence may appear sound and convincing from a scientific and epidemiological point of view, it has deficiencies when employed as evidence in court. In particular it does not fit into the established *similar facts* principle of evidence, and this underlines the depth of the epistemological disjuncture between what can be said in science, and what is held to be true in

law. In an empirical science, for example, it is sufficient to demonstrate that there is an association between action and event, whereas in law one must demonstrate that there is an association between specific actions and specific events (Lucy & Aitken, 2002).

So as to illustrate this caution, it is important to acknowledge that the use of attendance data was central to the conviction of the Dutch nurse Lucia de Berk, who had been found guilty in 2003 of killing seven patients and attempting to murder three others.  However, de Berk was thereafter acquitted in 2010 (Agence France Presse, 2010). Academic research used by her appeal had drawn attention to the problematic nature of attendance evidence in the years before her acquittal (Meester *et al.*, 2006).  We would argue in relation that *Higher incidences of death on his/her shift* alone is simply one indicator among many, and should be treated with caution. A higher than average number of deaths over a given period may have various explanations - of which an active serial killer is only one – therefore only when found in combination with other red flags and non-circumstantial evidence should it be considered significant. We would also emphasise that moving away from too heavy a reliance upon this single indicator is important for law enforcement in investigating and developing prosecution cases against suspected HSKs for two reasons. Firstly, more compelling cases will be built on a range of red flag data and information. Secondly, placing a higher threshold on evidence will lessen the possibility of miscarriages of justice such as that of Lucia deBerk.

In addition, we would suggest that the red flag *History of mental instability / depression* should also be treated with care, particularly following the risk of stigmatization of nurses who have experienced mental ill health. This concern was a very real one for English nurses in the years following the Clothier Report into the Beverley Allitt case, following recommendations for the

tightening up of mental health criteria for those entering the profession (Brandon, 1999; Clothier, 1994; Muncey, 1998).

These words of caution would seem to suggest that focusing solely on one or two red flags is not likely to be an effective preventative or predictive mechanism and indeed, may have adverse consequences for the nursing profession. However, this opens up the potential to use this type of analysis to test whether some of those nurses suspected of being an HSK are worthy of greater – or less – police interest, based on whether or not a cluster of between four and seven red flags are present (based on our estimates of the interquartile range), or absent in the combinations described. Indeed it might also be used to begin investigating whether some of those nurses who have been convicted of murder within a hospital setting might in fact have been the victim of a miscarriage of justice.

We would suggest that this is a subject worthy of greater academic scrutiny more generally than it has previously received and that some HSKs deserve particular attention. We have, for example, drawn attention to Charles Cullen and also noted the very low scores of Colin Norris. So too, whilst the incidence of healthcare serial murder remains relatively rare, it is also the case that this phenomenon does occur in a number of countries but that respective hospitals and law enforcement agencies do not seem to be particularly well equipped to identify that a HSK is active and the steps that they should thereafter take to bring that HSK to justice.

In seeking to develop our knowledge about this type of offender within this type of institutional setting, it is clear that the label "healthcare serial killer" has previously been applied in too loose a manner. This is to be regretted, especially as such application when it is unwarranted and cannot be supported by the facts of the case under discussion, makes understanding this

phenomenon more problematic and therefore less useful to hospital administrators and law enforcement. Some might suggest that our sample is too narrowly defined. However, while this does make statistical analysis more challenging, the rigour with which we have constructed this sample does allow for genuine comparisons to be made and for inferences to be drawn.


**Conclusion**

Our research confirms the heterogeneity of HSKs but also highlights some common criminological and socio-demographic characteristics in cases of healthcare serial murder. Whilst our sample is small, we argue that the social and individual impact of HSKs are such as to merit a reassessment of healthcare and law enforcement approaches to prevention and detection. We emphasise the importance of ensuring that the appropriate background checks when employing nurses are rigorously followed and that references from previous employers are requested and carefully vetted. We also suggest that attendance data should be treated with caution as evidence in the investigation and prosecution of suspected HSKs. A spike in the numbers of deaths on the shifts of a suspected HSK may well be an indicator of wrongdoing. However, this should only be used in combination with other types of evidence, which may include some of the common red flags we discovered in our sample. Therefore we argue that the checklist developed by Ramsland (2007) is a potentially relevant tool in preventative / limiting interventions, but it is clear that some of the items do not appear to be relevant in our sample and the validity of others requires further scrutiny. Future research should focus upon this as well exploring interrelationships and measurement implications of the items on the checklist if it is to be developed into an effective psychometric scale. Finally, given the most common method by which HSKs kill – poisoning, the importance of monitoring access to drugs

within hospitals cannot be overestimated. These conclusions might be viewed as overstating our case, but we have chosen to risk that criticism so as to draw attention to these findings.

**References**

Agence France Presse (2010). *Dutch court overturns nurse's conviction for patient murder*. Agence France Presse, 14 April. Retrieved November 3 2013 from Nexis database.

Brandon, D. (1999). Melting Straightjackets. *Journal of Psychiatric and Mental Health Nursing*, *6*, 321-326.

Canter, D. & Wentwink, N. (2004). An Empirical Test of Holmes and Holmes's Serial Murder Typology. *Criminal Justice and Behavior*, *31*(4), 489–515.

Clothier, C. (1994). *The Allitt Inquiry*. London: HMSO.

Davies, N. (1993). *Murder on Ward Four: The Story of Bev Allitt, and the Most Terrifying Crime since the Moors Murders*. London: Chatto and Windus.

Dietz, M.L. (1996). Killing Sequentially: Expanding the Parameters of the Conceptualization of Serial and Mass Murder, In T. O'Reilly Fleming (Ed.), *Serial and Mass Murder* (pp. 109-22). Toronto: Canadian Scholar's Press.

Egger, S. A., (1984). A Working Definition of Serial Murder and the Reduction of Linkage Blindness. *Journal of Police Science and Administration*, *12*(3), 348-357.

Ferguson, C., White, D.E., Cherry, S., Lorenz, M. & Bhimain, Z. (2003). Defining and Classifying Serial Murder in the Context of Perpetrator Motivation. *Journal of Criminal Justice, 31*, 287–92.

Field, J. (2007). *Caring to death: a discursive analysis of nurses who murder patients.* PhD Thesis. Adelaide: University of Adelaide.

Field, J. & Pearson, A. (2010). Caring to death: the murder of patients by nurses. *International Journal of Nursing Practice*, *16*(3), 301-309.

Graeber, C. (2013). *The Good Nurse: A True Story of Medicine, Madness and Murder*. London: Atlantic Books.

Hickey, E. W. (2010). *Serial Murderers and their Victims* (5th ed.). Belmont: Wadsworth.

Holmes, R.M. & De Burger, J.E. (1988). *Serial Murder*. Newbury Park, CA: Sage.

Holmes, S. T., Hickey, E. & Holmes, R. M. (1991). Female Serial Murderesses: Constructing Differentiating Typologies. *Journal of Contemporary Criminal Justice*, *7*(4), 245-256.

Holmes, R. M., & Holmes, S.T. (1998). *Serial Murder*. Thousand Oaks: Sage.

Kelleher, M. & Kelleher, C. L. (1998). *Murder Most Rare: the Female Serial Killer,* Westport: Praeger.

Lubaszka, C.K. & Shon, P.C. (2013). Reconceptualizing the Notion of Victim Selection, Risk, and Offender Behaviour in Healthcare Serial Murders. *Journal of Criminal Psychology*, *3*(1), 65-78

Lubaszka, C.K., Shon, P.C., & Hinch, R., (2014). Healthcare Serial Killers as Confidence Men, *Journal of Investigative Psychology and Offender Profiling, 11*(1), 1-28.

Lucy, D. & Aitken, C. (2002). A review of role of rosta data and evidence of attendance in cases of suspected excess deaths in a medial context. *Law, Probability and Risk*, *1,* 141-160.

Meester, R., Collins, M., Gill, R. & vanLambalgen, M. (2006). On the (ab)use of statistics in the legal case against the nurse Lucia de B. *Law, Probability and Risk*, *5*, 233- 250.

Muncey, T. (1998). Selection and retention of nurses. *Journal of Advanced Nursing*, *27*(2), 406-413.

Peters, C. (2005). *Harold Shipman: Mind Set on Murder*. London: Carlton Books.

Ramsland, K. (2007). *Inside the Minds of Healthcare Serial Killers: Why They Kill.* Westport, CT: Praeger Publishers.

Schechter, E. & Shechter, H. (2010). Killing with kindness: nature, nurture and the female serial killer. In S. Waller (Ed.), *Serial Killers: Philosophy for everyone* (pp. 117-28). Oxford: Wiley Blackwell.

Smith, D. (2002). Not by Error, but by Design – Harold Shipman and the Regulatory Crisis for Healthcare. *Public Policy and Administration*, *17*(4), 55-74

Soothill, K. (2001). The Harold Shipman Case: A Sociological Perspective. *Journal of Forensic Psychiatry and Psychology, 12*(2), 260–2.

Soothill, K. L. & Wilson, D. (2005). Theorising the puzzle that is Harold Shipman. *Journal of Forensic Psychiatry and Psychology*, *16*(4), 685-698.

Wilson, D. (2007). *Serial Killers: Hunting Britons and their Victims 1960-2006.* Winchester: Waterside.

Wilson, D. (2009). *A History of British Serial Killing, 1888–2008*. London: Sphere.

Yorker, B.C., Kizer, K. W., Lampe, P., Forrest, A.R.W., Lannan, J.M. & Russell, D. A. (2006). Serial Murder by Healthcare Professionals. *Journal of Forensic Sciences*, *51*(6), 1362-1370.

**Tables**

Table 1: Red Flags

| | |
|---|---|
| 1. | Moves from one hospital to another |
| 2. | Secretive/difficult personal relationships |
| 3. | History of mental instability/depression |
| 4. | Predicts when someone will die |
| 5. | Makes odd comments/claims to be "jinxed" |
| 6. | Likes to talk about death/odd behaviours when someone dies |
| 7. | Higher incidences of death on his/her shift |
| 8. | Seems inordinately enthused about his/her skills |
| 9. | Makes inconsistent statements when challenged about deaths |
| 10. | Prefers nightshifts – fewer colleagues about |
| 11. | Associated with incidents at other hospitals |
| 12. | Been involved with other criminal activities |
| 13. | Makes colleagues anxious/suspicious |
| 14. | Craves attention |
| 15. | Tries to prevent others checking on his/her patients |
| 16. | Hangs around during investigations of deaths |
| 17. | In possession of drugs etc. at home/in locker |
| 18. | Lied about personal information |
| 19. | In possession of books about poison/serial murder |
| 20. | Has had disciplinary problems |
| 21. | Appears to have a personality disorder |
| 22. | Has a substance abuse problem |

Table 2: Healthcare Serial Killers

| Name | Gender | Age at conviction | Year of last known murder | Country | Victim Gender | Victim Type(s) | No. of convictions for murder | Hospital Department |
|------|--------|-------------------|---------------------------|---------|---------------|----------------|-------------------------------|---------------------|
| Aino Nykopp-Koski | Female | 60 | 2009 | Finland | NOT KNOWN | Elderly | 5 | NOT KNOWN |
| Kimberly Saenz | Female | 39 | 2008 | USA | Male & Female | Elderly | 5 | Dialysis Unit |
| Irene Becker | Female | 55 | 2006 | Germany | Male & Female | Elderly | 5 | Cardiology Ward |
| Petr Zalenka | Male | 31 | 2006 | Czech Republic | Male & Female | Multiple | 7 | Anaesthesiology/Resuscitation ward |
| Stephan Letter | Male | 28 | 2004 | Germany | Male & Female | Multiple | 12 | Internal Diseases Ward |
| Benjamin Geen | Male | 25 | 2004 | UK | Male | Elderly | 2 | Accident and Emergency |
| Sonia Caleffi | Female | 35 | 2004 | Italy | Male & Female | Elderly | 5 | Intensive Care Unit |
| Charles Cullen | Male | 46 | 2003 | USA | Male & Female | Multiple | 29 | Multiple - Coronary Care Unit, Intensive Care Unit |
| Colin Norris | Male | 32 | 2002 | UK | Female | Elderly | 4 | Orthopaedic Wards |
| Vickie Dawn Jackson | Female | 40 | 2001 | USA | Male & Female | Elderly | 10 | N/A - Small hospital |
| Christine Malevre | Female | 33 | 1998 | France | Male & Female | Multiple | 6 | Palliative Care Unit |
| Kristen Gilbert | Female | 33 | 1996 | USA | Male | Multiple | 4 | Intensive Care Unit |

| Orville Lynn Majors | Male | 38 | 1995 | USA | Male & Female | Elderly | 6 | Intensive Care Unit |
|---|---|---|---|---|---|---|---|---|
| Beverley Allitt | Female | 24 | 1991 | UK | Male & Female | Children | 4 | Children's Ward |
| Robert Rubane Diaz | Male | 46 | 1981 | USA | Male & Female | Elderly | 12 | Intensive Care Unit |
| Cecile Bombeek | Female | 44 | 1977 | Belgium | NOT KNOWN | Elderly | 3 | Geriatric Ward |

Table 3: Country in which HSKs committed murders

| Gender | N | % |
|---|---|---|
| USA | 6 | 38 |
| UK | 3 | 19 |
| Germany | 2 | 13 |
| Belgium | 1 | 6 |
| Czech Republic | 1 | 6 |
| Finland | 1 | 6 |
| France | 1 | 6 |
| Italy | 1 | 6 |
| Total | 16 | 100 |

Table 4: Gender of HSKs

| Gender | N | % |
|--------|-----|-----|
| Male | 7 | 44 |
| Female | 9 | 56 |
| Total | 16 | 100 |

Table 5: Ages of HSKs when convicted

| Age Group | N | % |
|-----------|-----|-----|
| 21-30 | 3 | 19 |
| 31-40 | 8 | 50 |
| 41-50 | 3 | 19 |
| 51-60 | 2 | 13 |
| Total | 16 | 101 |

*Note: Total ≠100 due to rounding.*

Table 6: Number of convictions for murder

| Number of convictions for murder | N | % |
|---|---|---|
| 2-4 | 5 | 31 |
| 5-9 | 7 | 44 |
| 10-14 | 3 | 19 |
| 15+ | 1 | 6 |
| Total | 16 | 100 |

Table 7: Length of murder activity

| Length of murder activity in months | N | % |
|---|---|---|
| Less than 3 | 7 | 44 |
| 3-5 | 1 | 6 |
| 6-11 | 2 | 13 |
| 12-17 | 3 | 19 |
| 18-23 | 1 | 6 |
| 24-29 | 2 | 13 |
| Total | 16 | 101 |

*Note: Total ≠100 due to rounding.*

Table 8: Location of HSKs

| Location | N | % |
|---|---|---|
| Single Location | 12 | 75 |
| Multiple Locations | 4 | 25 |
| Total | 16 | 100 |

Table 9: Victim Gender

| Victim Gender | N | % |
|---|---|---|
| Male victims | 2 | 14 |
| Female victims | 1 | 7 |
| Both male and female victims | 11 | 79 |
| Total | 14 | 100 |

*Note: Victim gender profile not available for Aino Nykopp-Koski and Cecile Bombeek, therefore total is 14 as opposed to 16 for this variable.*

Table 10: Victim Type

| Victim Type | N | % |
|---|---|---|
| Children | 1 | 7 |
| Elderly people | 5 | 33 |
| Adults and Elderly People | 8 | 53 |
| Young people, adults and elderly | 1 | 7 |
| Total | 15 | 100 |

*Note: Victim type not available for Petr Zalenka, therefore total is 15 as opposed to 16 for this variable.*

Table 11: Single or multiple methods

| Single Method or Multiple Method | N | % |
|---|---|---|
| Single method | 13 | 81 |
| Multiple methods | 3 | 19 |
| Total | 16 | 100 |

Table 12: Combination of methods

| Methods | N | % |
|---|---|---|
| Poisoning only | 14 | 88 |
| Poisoning and another method | 1 | 6 |
| Other method only | 1 | 6 |
| Total | 16 | 100 |

Table 13: Substances used in poisoning

| Substance | N | % |
|---|---|---|
| Insulin | 4 | 19 |
| Muscle relaxant | 3 | 14 |
| Sedative | 2 | 10 |
| Opiate | 2 | 10 |
| Epinephrine | 2 | 10 |
| Potassium | 2 | 10 |
| Anaesthetic | 2 | 10 |
| Blood pressure medication | 1 | 5 |
| Bleach | 1 | 5 |
| Digoxin | 1 | 5 |
| Heparin | 1 | 5 |

*Note: n $\neq$ 16, % $\neq$ 100 as in some cases, more than one type of substance was used*

Table 14: HSK and Red Flag Score

| HSK | Total Score |
|---|---|
| Charles Cullen | 11 |
| Kimberley Saenz | 9 |
| Kristen Gilbert | 8 |
| Robert Rubane Diaz | 8 |
| Sonia Caleffi | 8 |
| Beverley Allitt | 7 |
| Cecile Bombeek | 7 |
| Vickie Dawn Jackson | 7 |
| Aino Nykopp-Koski | 6 |
| Orville Lynn Majors | 6 |
| Benjamin Geen | 5 |
| Petr Zalenka | 5 |
| Christine Malevre | 4 |
| Irene Becker | 4 |
| Stephan Letter | 4 |
| Colin Norris | 2 |

Table 15: Prevalence of items on 'Red Flag' checklist

| Item | N | % of cases in which this item was present |
|---|---|---|
| 1. Moves from one hospital to another | 6 | 38 |
| 2. Secretive/difficult personal relationships | 7 | 43 |
| 3. History of mental instability/depression | 10 | 63 |
| 4. Predicts when someone will die | 4 | 25 |
| 5. Makes odd comments/claims to be "jinxed" | 3 | 19 |
| 6. Likes to talk about death/odd behaviours when someone dies | 1 | 6 |
| 7. Higher incidences of death on his/her shift | 15 | 94 |
| 8. Seems inordinately enthused about his/her skills | 6 | 38 |
| 9. Makes inconsistent statements when challenged about deaths | 3 | 19 |
| 10. Prefers nightshifts – fewer colleagues about | 6 | 38 |
| 11. Associated with incidents at other hospitals | 6 | 38 |
| 12. Been involved with other criminal activities | 7 | 43 |
| 13. Makes colleagues anxious/suspicious | 9 | 56 |
| 14. Craves attention | 7 | 43 |
| 15. Tries to prevent others checking on his/her patients | 0 | - |
| 16. Hangs around during investigations of deaths | 0 | - |
| 17. In possession of drugs at home/in locker | 8 | |
| 18. Lied about personal information | 0 | - |
| 19. In possession of books about poison/serial murder | 1 | |
| 20. Has had disciplinary problems | 4 | |

| | |
|---|---|
| 21. Appears to have a personality disorder | 8 |
| 22. Has a substance abuse problem | 3 |

*Note: % ≠100 as all cases had at least one checklist item*

**Appendix**

List of suggested initial sources for each HSK

| HSK | Source |
| --- | --- |
| Beverley Allitt | Clothier, C. (1994). *The Allitt Inquiry*. London: HMSO. |
| Irene Becker | Friedrichsen, G. (2007, July 2). Nur ein "absurder Irrtum"?. *Der Spiegel*, p. 46. Retrieved from NexisUK. |
| Cecile Bombeek | Jensen, V. (Ed.) (2012) *Women Criminals: An Encyclopedia of People and Issues*. California: ABC-CLIO, pp. 321-322. |
| Sonia Caleffi | Fazzo, L. (2006, July 11). Vent' anni all' infermiera killer. *la Repubblica,* p. 35. Retrieved from NexisUK. |
| Charles Cullen | Graeber, C. (2013). *The Good Nurse: A True Story of Medicine, Madness and Murder*. London: Atlantic Books. |
| Benjamin Geen | R v. Geen (2009)*,* EWCA Crim 2609. Retrived from LexisUK. |
| Kristen Gilbert | Goldberg, C (2000, November 23). Former Nurse on Trial in Patients' Deaths. *New York Times,* p. 24. Retrieved from NexisUK. |
| Vickie Dawn Jackson | Hollandsworth, S. (2007, July). Angel of Death. *Texas Monthly,* p. 88. Retrieved from NexisUK. |
| Robert Rubane Diaz | People v. Diaz, 11 Cal. Rptr. 2d 353, 834 P.2d 1171 (Cal. 1992). |
| Kimberley Saenz | McKinley, J. C. (2009, April 3). Nurse Is Charged in the Death of 5 Patients. *New York Times,* p. 19. Retrieved from NexisUK. |
| Stephan Letter | Pohl, M. (2006, February 7). German nurse confesses to killing patients at murder trial, says actions unjustifiable. *Associated Press International.* Retrieved from Nexis UK. |
| Orville Lynn Majors | Dedman, B. (1999, November 16). Ex-Nurse Sentenced to 360 Years in Killings. *New York Times,* p. 21. Retrieved from NexisUK. |
| Christine Malevre | Jeffries, S. (2000, September 17). Trail of death taints 'saintly' nurse: A champion of euthanasia once praised by the Health Minister is in court |

accused of being a serial killer. *The Observer*, p. 22. Retrieved from NexisUK.

Colin Norris     R v. Norris (2009) EWCA Crim 2697. Retrieved from LexisUK.

Aino
Nykopp-
Koski            (2010, December 22). Finnish nurse gets life for murdering five patients. *Agence France Presse.* Retrieved from NexisUK.

Petr Zalenka     Alda, K. (2006, December 13). Public outcry over hospital killings. *The Prague Post.* Retrieved from NexisUK.