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NIHR CLAHRC West Midlands News Blog

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Welcome to the latest issue of your CLAHRC West Midlands News Blog where we discuss the [lexicological ambiguity](#) of health service and delivery research. We also have a guest blog on the act of [balancing a personal and population approach](#). Finally, we take a look at recent papers on [vertical health care](#) programmes; [senior doctors and in-hospital care](#); an association between [childhood IQ and mortality](#); and association between fruit and vegetable [intake and cognitive function](#) later in life. We also report on a [recent masterclass](#) delivered by CLAHRC WM staff.

As usual, we also have details of the latest [news and events](#); this issue's [quiz question](#); and highlight some of our [latest publications](#).

We hope that you find these posts of interest, and we welcome any comments. You can find previous issues of our News Blog [here](#).

Health Service and Delivery Research – a Subject of Multiple Meanings

Never has there been a topic so subject to lexicological ambiguity as that of Service Delivery Research. Many of the terms it uses are subject to multiple meanings, making communication devilishly difficult; a '[Tower of Babel](#)' according to McKibbon, et al.[\[1\]](#) The result is that two people may disagree when they agree, or agree when they are fundamentally at odds. The subject is beset with '*polysemy*' (one word means different things) and, to an even greater extent, '*cognitive synonyms*' (different words mean the same thing).

Take the very words "Service Delivery Research". The study by McKibbon, et al. found 46 synonyms (or near synonyms) for the underlying construct, including applied health research, management research, T2 research, implementation research, quality improvement research, and patient safety research. Some people will make strong statements as to why one of these terms is not the same as another – they will tell you why implementation research is not the same as quality improvement, for example. But seldom will two protagonists agree and give the *same* explanation as to why they differ, and textual exegesis of the various definitions does not support separate meanings – they all tap into the same concept, some focussing on outcomes (quality, safety) and others on the means to achieve those outcomes (implementation, management).

Let us examine some widely used terms in more detail. Take first the term "implementation". The term can mean two quite separate things:

1. Implementation of the findings of clinical research (e.g. if a patient has a recent onset thrombotic stroke then administer a 'clot busting' medicine).
2. Implementation of the findings from HS&DR (e.g. do not use incentives when the service providers targeted by the incentive do not believe they have any control over the target.[\[2\]](#)[\[3\]](#)

Then there is my *bête noire*, "complex interventions". This term concatenates separate ideas, such as the complexity of the intervention vs. the complexity of the system (e.g. health system) with which the intervention interacts. Alternatively, it may concatenate the complexity of the intervention components vs. the number of components it includes.

It is common to distinguish between process and outcome, *à la* Donabedian.[\[4\]](#) But this conflates two very different things – clinical process (such as prescribing the correct medicine, eliciting the relevant symptoms, or displaying appropriate affect), and service level (upstream) process endpoints (such as favourable staff/patient ratios, or high staff morale). We have described elsewhere the methodological importance of this distinction.[\[5\]](#)

Intervention description is famously conflated with intervention uptake/ fidelity/ adaptation. The intervention description should be the implementation as described (like the recipe), while the way the interventions is assimilated in the organisation is a finding (like the process the chef actually follows).[6]

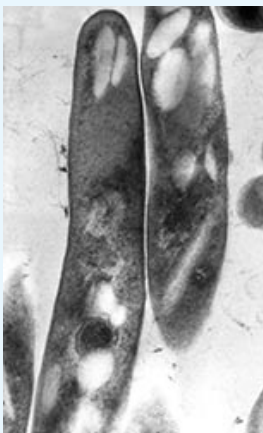
These are just a few examples of words with multiple meanings that cause health service researchers to fall over their feet. Some have tried to forge an agreement over these various terms, but widespread agreement is yet to be achieved. In the meantime, it is important to explain precisely what is meant when we talk about implementation, processes, complexity, and so on.

-- Richard Lilford, CLAHRC WM Director

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CLAHRC WM Quiz

Which of the following mycobacterium pathogens is stunted in that it has lost nearly half of its functional genome including many genes responsible for invasive properties and metabolic activities?

1. Tuberculosis (*Mycobacterium tuberculosis*).
2. Buruli (*Mycobacterium ulcerans*).
3. Leprosy (*Mycobacterium leprae*).

Email [CLAHRC WM](#) your answer.

Answer to our previous quiz: **Horses** are commonly used in the production of snake antivenom. After obtaining the venom it is mixed with an adjuvant and injected into the horse. This produces a neutralising antibody response, which is then collected and purified. Horses are most common as they thrive in many environments worldwide, have a large body mass, and aren't scared by the injection process. Other animals, such as sheep or goats are also occasionally used.

Congratulations to Paul Bird, Alan Poots, Hosni Khairy, and Jerry Marsden who were first to answer correctly.

Guest Blog

A Casualty of Evidence-Based Medicine – Or Just One of Those Things. Balancing a Personal and Population Approach

My mother-in-law, Celia, died last Christmas. She died in a nursing care home after a short illness – a UTI that precipitated prescription of two courses of antibiotics followed by an overwhelming *C. diff* infection from which she did not recover. She had suffered from mild COPD after years of cigarette smoking, although she had given up more than 35 years previously, and she also had hypertension (high blood pressure) treated with a variety of different medications (more of which later). She was an organised and sensible Jewish woman who would not let you leave her flat without a food parcel of one kind or another, and who had arranged private health insurance to have her knees and cataracts replaced in good time. Officially, medically she had multimorbidity; unofficially her life was a full and active one, which she enjoyed. She moved house sensibly and in good time, to a much smaller warden-supervised flat with a stair lift, ready to enjoy her declining years in comfort and with support. She had a wide circle of friends, loved going out to matinées at the theatre, and was a passionate bridge player and doting grandma. So far so typical, but I wonder if indirectly she died of iatrogenesis – doctor induced disease – and I have been worrying about exactly how to understand and interpret the pattern of events that afflicted her for some time.

A couple of weeks ago a case-control study was published in JAMA (I can already hear you say '*case control in JAMA!*' yes – *and it's a good paper*).^[1] It helps to raise the problem of what may have happened to my son's grandma and has implications for evidence use in health care. The important issue is that my mother-in-law also suffered from recurrent syncope, or fainting and falls. It became inconvenient – actually more than inconvenient. She would faint after getting up from a meal, after going upstairs, after rising in the morning – in fact at any time when she stood up. She fell a lot, maybe ten times that I knew about and perhaps there were more. She badly bruised her face once, falling onto her stair lift and on three occasions she broke her bones as a result of falling. She broke her ankle requiring surgical intervention and her arm, and her little finger. Her GP ordered a 24-hour ECG and referred her to a cardiologist where she had a heap of expensive investigations. Ever the over-enthusiastic medically-qualified, meddling epidemiologist, I went with her to see her cardiologist. We had a long discussion about my presumptive diagnosis: postural hypotension – low blood pressure on standing up – and her blood pressure readings confirmed my suspicion. Postural hypotension can be caused by rare abnormalities, but one of the commonest causes is antihypertensive medication – medication for high blood pressure. The cardiologist and the GP were interested in my view, but were unhappy to change her medication. As far as they were concerned, she definitely came into the category of high blood pressure, which should be treated.

The JAMA paper describes the mortality and morbidity experience of 19,143 treated patients matched to untreated controls in the UK using CPRD data. Patients entered the study on an 'index date', defined as 12 months after the date of the third consecutive blood pressure reading in specific a range (140-159/90-99mmHg). It

says: “During a median follow-up period of 5.8 years (interquartile range, 2.6-9.0 years), no evidence of an association was found between antihypertensive treatment and mortality (hazard ratio [HR], 1.02; 95% CI, 0.88-1.17) or between antihypertensive treatment and CVD (HR, 1.09; 95% CI, 0.95-1.25). Treatment was associated with an increased risk of adverse events, including hypotension (HR, 1.69; 95% CI, 1.30-2.20; number needed to harm at 10 years [NNH10], 41), and syncope (HR, 1.28; 95% CI, 1.10-1.50; NNH10, 35).”

Translated into plain English, this implies that the high blood pressure medication did not make a difference to the outcomes that it was meant to prevent (cardiovascular disease or death). However, it did make a difference to the likelihood of getting adverse events including hypotension (low blood pressure) and syncope (fainting). The paper concludes: “*This prespecified analysis found no evidence to support guideline recommendations that encourage initiation of treatment in patients with low-risk mild hypertension. There was evidence of an increased risk of adverse events, which suggests that physicians should exercise caution when following guidelines that generalize findings from trials conducted in high-risk individuals to those at lower risk.*”

Of course, there are plenty of possible criticisms that can never be completely ironed out of a retrospective case control study relying on routine data, even by the eagle-eyed scrutineers at CLAHRC WM and the JAMA editorial office. Were there underlying pre-existing characteristics that differentiated case and controls at inception into the study, which might affect their subsequent mortality or morbidity experience? Perhaps those who were the untreated controls were already ‘survivors’ in some way that could not be adjusted for. Was the follow-up period long enough for the participants to experience the relevant outcomes of interest? A median of 5.8 years is not long when considering the development of major cardiovascular illness. Was attention to methods of dealing with missing data adequate? For example, the study says: “*Where there was no record of blood pressure lowering, statin or antiplatelet treatment, it was assumed that patients were not prescribed treatment.*” Nevertheless, some patients might have been receiving prescriptions that, for whatever reason, were not properly recorded. The article is interesting, and food for thought. We must always bear in mind, however, that observational designs are subject to the play of those well-known, apparently causative variables, ‘confoundings.’^[2]

What does all this mean for my mother-in-law? I did not have access to her full medical record and do not know the exact pattern of her blood pressure readings over the years. I am sure that current guideless would clearly have stated that she should be prescribed antihypertensive medication. The risk of her getting a cardiovascular event must have been high, but the falls devastated her life completely. Her individual GP and consultant took a reasonable, defensible and completely sensible decision to continue with her medication and her falls continued. Finally, a family decision was taken that she couldn’t stay in her own home – she had to be watched 24 hours a day. Her unpredictable and devastating falls were very much a factor in the decision.

Celia hated losing her autonomy and she never really agreed with the decision. From the day that the decision was taken she went downhill. She stopped eating when she went in to the nursing home and wouldn't even take the family's chicken soup, (the Jewish antibiotic) however lovingly prepared. It was not surprising that after a few weeks, and within days of her 89th birthday, she finally succumbed to infection and died.

How can we rationalise all this? Any prescription for any medication should be a balance of risks and benefits, and we need to assess these at both the population level, for guidelines, and at the individual level, for individuals. It's very hard to calculate precisely how the risk of possible future cardiovascular disease (heart attack or stroke) stacked up for my mother-in-law, against the real and present danger of her falls. But I can easily see what apparently went wrong in her medical care, with the benefit of hindsight. I think that the conclusion has to be that in health care we should never lose sight of the individual. Was my mother-in-law an appropriately treated elderly woman experiencing the best of evidence-based medicine? Or was she the victim of iatrogenesis, a casualty of evidence-based medicine whose personal experiences and circumstances were not fully taken into account in the application of guidelines? Certainly, in retrospect it seems to me that I may have failed her – I wish I'd supported her more to have her health care planned around her life, rather than to have her shortened life planned around her health care.

-- Aileen Clarke, Professor at Warwick Medical School.

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Director's Choice - From the Journals

Vertical Health Care Programmes or Health System Strengthening: A False Dichotomy

Health care development is sometimes classified as vertical or horizontal. Vertical programmes target specific diseases or disease clusters. For example tuberculosis, HIV and malaria, are targeted by the Global Fund. Horizontal programmes, by contrast, seek to strengthen the system within which health care is embedded. Such programmes are concerned with human resources, financing, education, and supply chains, among many other functions.

There has been a strong push to move from vertical to horizontal programmes from many corners, including from this News Blog. Supporters of such a change in

emphasis cannot but acknowledge the massive successes that vertical programmes have notched up, especially in the fields of infant health, maternal health, and infectious diseases.

However, the limitations of a purely disease-based approach have become increasingly evident. Logically, it is not even possible to instigate a vertical approach in a complete system vacuum. For example, it would be difficult, if not impossible, to instigate a programme to improve HIV care, if the supply chain could not make drugs available and if the health system could not support basic diagnostic services. That said, vertical surfaces should not be able to siphon off more than their fair share of the health services infrastructure.

A recent Lancet paper on health services in Ethiopia made a further important point, [1] that vertical systems can make a very good platform to extend and deepen generic health systems. In fact, that is precisely what has happened in that country, with full support from the Global Fund and GAVI, the Vaccine Alliance. They refer to this combination of vertical and generic development as a “diagonal” investment approach. We would prefer to describe the relationship as one of symbiosis in which vertical and horizontal programmes are designed to reinforce each other.

The Ethiopian initiative involved strengthening the system at multiple levels, from health service financing, human resources policies, education, investment in primary care, and community outreach activities, along with support for community action and self-help (including the “IKEA model” previously described in this news blog).[2] Certainly, Ethiopia, along with other countries such as Bangladesh, Thailand and Rwanda, stand out for having achieved remarkable improvements over many dimensions of health. In Ethiopia the reduction in mortality for children under the age of five years was 67% from the 1990 baseline, while there was a 71% decline in the maternal mortality ratio and deaths from malaria, tuberculosis and HIV were halved. This took place against a financial backdrop of declining international aid but increasing domestic expenditure. The combination of vertical programmes and health system strengthening seems to have ensured that the money was not wasted.

-- Richard Lilford, CLAHRC WM Director

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Senior Doctors and In-hospital Care

Readers of this News Blog may be aware that we are involved in the HiSLAC (high-intensity, specialist-led acute care) project that examines the impact of increasing consultant presence on acute in-hospital care at weekends.[1-4] Professor Julian Bion, the Principal Investigator for the project, recently drew our attention to two studies from the US that have shown some interesting results in relation to the

potential impact of senior doctors on the quality of care. One of the studies was a cross-over randomised controlled trial (RCT) conducted in general medical wards in which increased supervision by attending physicians (senior doctors) was compared with standard supervision [5]; the other was a retrospective cohort study in which the association between physician's age and patient outcomes was explored.[6]

In the RCT, the attending physicians joined residents and interns (doctors who are still in training) on their ward rounds to see previously admitted (i.e. not newly admitted) patients in the increased supervision group, while the attending physicians were available but did not join the ward rounds in the standard supervision group. Medical error rates did not differ significantly between increased vs standard supervision (91 [95% CI 77 to 104] vs 108 [95% CI 86 to 134] events per 1000 patient-days), but interns (the most junior doctors) spoke significantly less, and both residents and interns felt that they were *less* efficient and less autonomous in the ward rounds with increased supervision.[5]

The retrospective cohort study was undertaken using a 20% random sample of Medicare (an US federal health insurance program primarily for elderly people) beneficiaries admitted to hospital with a medical condition and treated by hospitalists (senior doctors specialised in the general care of patients in hospitals). The association between the hospitalists' age and 30-day mortality, 30-day re-admission and cost of care was explored with statistical adjustment covering patient characteristics, physician characteristics and hospital fixed effects (which essentially allows comparisons be made within hospitals). Adjusted 30-day mortality was found to increase with doctors' age: 10.8%, 11.1%, 11.3% and 12.1% for ages <40, 40-49, 50-59 and ≥60 respectively. The association appears robust under various sensitivity and subgroup analyses, with an exception that no such association was found among doctors with a high volume of patients. Re-admission rates were similar between doctors' age groups and costs of care were slightly higher among older doctors.[6]

What should we make out of these findings? For the RCT, the observed effect (reduction in medical errors) was in the expected direction but the study was under-powered (the sample size was powered to detect a 40% relative reduction in error rates vs. 15% actually observed). However, the junior doctors clearly felt qualified to 'fly solo'. For the observational study, while the association between doctors' age and care quality and outcomes may require further scrutiny, it is highly speculative. Since an experimental study is not on the cards, cause and effect reasoning must await triangulation of multiple observations across the chain from cause to effect.[7] Such a study is currently under way with respect to the cause of the "weekend effect".[8]

-- Yen-Fu Chen, Principal Research Fellow.

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Childhood IQ and Mortality

Many studies have shown an association between childhood intelligence and mortality. However, most studies have been conducted with male participants, and potential mechanisms for the putative association are poorly understood. A recent paper looked at a large sample of Swedish people in an attempt to clarify these issues.[\[1\]](#)

The authors looked at IQ data from 19,919 Swedes who were 13 years old at the time (9,817 women), along with socioeconomic data from their childhood and middle age over the following 53 years. The analysis found an association between lower IQ and increased all-cause mortality. A one standard deviation decrease in IQ was associated with increased risk of all-cause mortality in both men (hazard ratio 1.31, 95% CI 1.23-1.39) and women (HR 1.16, 95% CI 1.08-1.25). Most causes of death were associated with lower IQ in men, while in women a lower IQ was associated with an increased risk of death from cancer and cardiovascular disease. When the authors adjusted for childhood socioeconomic factors the associations were slightly attenuated; but were further attenuated when adjusting for adulthood factors – considerably in men (overall mortality HR=1.17, 95% CI 1.08-1.26), and almost completely in women (HR 1.02, 95% CI 0.93-1.12). These results suggest that it is the social and socioeconomic circumstances in adulthood that contribute to the association between IQ and mortality, particularly in women, though the authors state that more research is needed to clarify the pathways linking childhood IQ and mortality across genders.

-- Peter Chilton, Research Fellow

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[Reference](#)

Can Diet Help Maintain Brain Health?

A recent study in the journal of Neurology looked at the long-term effects high fruit and vegetable intake had on a person's cognitive function.[\[1\]](#) The authors were able to research and follow-up 27,842 US men over a 26 year period. These men were middle-aged (mean age of 51 years) and were or had been health professionals.

Every four years, from 1986 to 2002, they completed questionnaires looking at their eating habits, and then completed subjective cognitive function questionnaires in 2008 and 2012. Logistic regression of the data found significant individual associations between higher intakes of vegetables (around six servings a day compared to two), fruits (around three servings a day compared to half) and fruit juice (once a day compared to less than once a month) and lower odds of moderate or poor subjective cognitive function. These associations remained significant after adjusting for non-dietary factors and total energy intake, though adjusting for dietary factors weakened the association with fruit intake. Daily consumption of orange juice (compared to less than one serving per month) was associated with much lower odds of poor subjective cognitive function, with an adjusted odds ratio of 0.53 (95%

CI 0.43-0.67). Meanwhile the adjusted odds ratios for vegetables were 0.83 (0.5% CI 0.76-0.92) for moderate, and 0.66 (0.55-0.80) for poor subjective cognitive function. The authors also found that high intake of fruit and vegetables at the start of the study period was associated with a lower risk of poor subjective cognitive function at the end of the study. Although the study does not prove a causal link, the fact that the association lasted the length of the study support the idea that vegetable and fruit consumption may help avert memory loss.

-- Peter Chilton, Research Fellow

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Event Reports

Inspiring the Next Generation Masterclass

*Inspiring the next generation of Applied Health Researchers – CLAHRC WM
Researchers deliver masterclass on making sense of health-related stories in the
media*

Celia Brown and Sam Watson from CLAHRC WM's Research Methods theme, together with Patient and Public Involvement Lead, Magdalena Skrybant, delivered a masterclass at the University of Birmingham on 14th November. The interactive session was pitched at 16-18 year-olds with the aim of giving students the skills and knowledge to help them make sense of health-related stories in the media.

The two-hour masterclass used examples from health-related stories presented in the media and demonstrated that sometimes you need to look beyond the attention-grabbing headlines. Key take-home messages for students were that:

- Headlines might not tell the full story.
- Statistics can be presented in different ways and may be misleading.
- Correlation does not necessarily mean causation.

Students had opportunities to put their new skills to the test by working through some examples and using clicker pads to see how many people in the audience got the answers right.

This is the second year CLAHRC WM has been invited to deliver a masterclass at the University of Birmingham and the feedback was very positive, with 88% students said that they had 'learnt something new', and 94% students said that they are 'equally or more likely to pursue the subject further'. Comments included:

- “I really enjoyed this class. I found it interactive, enjoyable and fun!”
- “The speakers were clear and entertaining.”

We look forward to presenting further masterclasses on methods of applied health research and inspiring budding applied health researchers of the future.

-- Magdalena Skrybant

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News & Events

Job Opportunities

Two qualitative research posts are currently available at Keele University for a NIHR-funded 5 year programme of research:

The Research Institute for Primary Care and Health Sciences are seeking a [Research Associate in Qualitative Health Research](#) and a [Research Associate in Applied Qualitative Health Research](#). Both posts are full-time, fixed-term contract, at £32,548 p.a. The deadline for applications is **6 December 2018**.

Prof Sara Kenyon Inaugural Lecture

Prof Sara Kenyon, Professor of Evidence-based Maternity Care at the University of Birmingham, will be presenting her inaugural lecture on Wednesday 5 December 2018 at 16:30. Her talk, '**Great Expectations: The Unexpected Journey of a Midwife**' will reflect on her pathway and experiences, as well as current opportunities for nurses and midwives to progress into academia. For more information, and to register, [please click here](#).

Warwick Business School MBA Online Taster Lecture

Warwick Business School are holding an online taster lecture for their MBA course on Wednesday 5 December, 12:00-12:45. Dr Nicola Burgess will present on Healthcare Operations Management and Innovation, part of the Business and Sustainability elective module. For more information and to register, [please click here](#).

CLAHRC WM Director in Uganda

CLAHRC WM Director Prof Richard Lilford recently visited Uganda to take part in the 15th International Conference on Urban Health where he held two panel sessions on household surveys in slums, and distinguishing slums from non-slum urban areas.

Whilst there he also met with the Prime Minister of Uganda, [Dr Ruhakana Rugunda](#), who was formerly a physician.



Digital Festival 2019

The NIHR are holding a Digital Festival 2019, located in Birmingham on 26 March 2019. The event will celebrate digital innovation across the NIHR and the people who make it happen. The call for showcasers, showreelers and award entries is now open. For more information, and to submit abstracts, [please click here](#).

QHRN Conference 2019

The Qualitative Health Research Network are holding their 4th conference in London on 22 March 2019. The event is entitled '*Crafting the Future of Qualitative Health Research in a Changing World*'. For more information, and to register, [please click here](#).

NIHR Funding Opportunities

The latest funding opportunities from the NIHR are now available:

Efficacy and Mechanism Evaluation Programme

18/169 [Mechanisms of action of health interventions](#)

18/170 [Researcher-led](#)

18/171 [Dental health - disorders of the teeth and gums](#)

18/172 [Benign gynaecological disorders](#)

Public Health Research Programme

18/184 [Researcher-led](#)

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Recent Publications

Hekkert K, van der Brug F, Keeble E, Borghans I, Cihangir S, Bardsley M, Clarke A, Westert GP, Kool RB. [Re-admission patterns in England and the Netherlands: a comparison based on administrative data of all hospitals](#). *Eur J Public Health*. 2018.

Jones HM, Al-Khudairy L, Melendez-Torres GJ, Oyebode O. [Viewpoints of adolescents with overweight and obesity attending lifestyle obesity treatment interventions: a qualitative systematic review](#). *Obes Rev*. 2018.

Partington R, Helliwell T, Muller S, Sultan AA, Mallen C. [Comorbidities in polymyalgia rheumatica: a systematic review](#). *Arthritis Res Ther*. 2018; **20**(1): 258.

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Šumilo D, Nicholls L, Ryan R, Marshall T. [Incidence of indications for tonsillectomy and frequency of evidence-based surgery: a 12-year retrospective cohort study of primary care electronic records](#). *Br J Gen Pract*. 2018.

Taylor C, Nhlema B, Wroe E, Aron M, Makungwa H, Dunbar EL. [Determining whether Community Health Workers are 'Deployment Ready' Using Standard Setting](#). *Ann Glob Health*. 2018; **84**(4): 630-9.

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