Work functioning impairments due to common mental disorders: measurement and prevention in nurses and allied health professionals
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Summary
Common mental disorders (CMDs) can lead to impairments in work functioning. In addition to financial consequences, in certain occupations, impairments in work functioning can have serious consequences for other individuals. In the work of nurses and allied health professionals, impaired work functioning due to CMDs is related to higher risks for the workers’ and patients’ health and safety, e.g., by increasing the frequency of medication errors and needle stick injuries, and by decreasing patient well-being. Both the high prevalence of CMDs and the risk of serious adverse events caused by CMDs in the work of nurses and allied health professionals necessitate a call for research and presumably action on this topic.

If we are able to identify concrete aspects of work functioning impairments due to CMDs, future research on the prospects for both early detection of employees with CMDs and work functioning impairments and purposeful interventions will be possible. Therefore, the first aim of this thesis was to develop and evaluate a job-specific instrument to assess work functioning impairments due to common mental disorders in nurses and allied health professionals. A conceptual model was developed for the specification of work functioning aspects. In this model, work functioning is composed of two main elements, task and contextual work functioning, and it encompasses four dimensions: process, quality outcomes, quantity outcomes, and effort.

Furthermore, preventive actions are necessary to promote good mental health and work functioning in nurses and allied health professionals. Workers’ health surveillance (WHS) is a possible strategy for preventive action by occupational health services. Therefore, the second aim of this thesis was to develop and evaluate a mental module for WHS for nurses and allied health professionals. The WHS mental module aims to use an online screening to identify workers with mild to moderate severe symptoms of CMDs and/or early signs for impaired work functioning. It is hypothesized that workers who receive the WHS mental module will seek more help compared to the control group. Furthermore, it is expected that work functioning impairments and mental health complaints will improve more for this group of workers.

The literature review presented in Chapter 2 aimed to inventory aspects of the work functioning of nurses and allied health professionals that are affected by CMDs. A sensitive, systematic literature search was conducted using four electronic databases: PubMed, PsycINFO, Embase, and Cinahl. All studies published between 1998 and 2008 that examined a relationship between CMDs and work functioning in nurses or allied health professionals were included. The data from these investigations were categorized into themes, and the strength of the evidence for each theme was assessed. The search resulted in 2,792 studies, of which 16 met the inclusion criteria. Of these, 13 had a cross-sectional design, one was a vignette study, and two were narrative reviews. In all of the studies, the subjects were nurses. The retrieved aspects of sub-optimal work functioning due to common mental disorders were merged into 15 themes. Strong evidence was found for five themes: general errors,
medication errors, near misses, patient safety, and patient satisfaction. Moderate evidence was found that CMDs are associated with complex motor skills and with general performance, whereas evidence for an association between common mental disorders and needle stick injuries was inconclusive. Seven themes were only supported by narrative evidence: interpersonal behavior, energy, focus on goals and responsibility, work speed, avoiding work while on the job, coping with emotions, and motivation.

The development of the job-specific questionnaire for work functioning impairments due to CMDs was described in Chapter 3. As a first step, an item pool was developed. In addition to the results of the literature review, five focus groups were held with employees and experts to identify additional themes and concrete signs in the characteristic behaviors of impaired work functioning in nurses and allied health professionals with CMDs. Based on the results from the literature study and focus groups, 13 themes were formulated representing different aspects of work functioning impairments which are supposed to be assessable by self-report. For each theme, items were phrased representing examples of work behavior and tasks that might be impaired. In six verbal probe interviews, the items and the underlying themes were checked for its relevance and completeness and rephrased if necessary. This process resulted in an item pool of 14 themes and a total of 231 items.

In a second step, definite subscales and items were identified. In a cross-sectional assessment, 314 nurses and allied health professionals filled out the item pool. In explorative factor analysis (using Principal Component Analysis), the subscales’ structure was generated, and definite items were chosen. For a corroboration of the subscales, confirmative factor analysis was performed (using the Oblique Multiple Group Method). The study resulted in a questionnaire with seven subscales and a total of 50 items, called the Nurses Work Functioning Questionnaire (NWFQ). The seven subscales are the following: 1) Cognitive aspects of task execution and general incidents, 2) Impaired decision making, 3) Causing incidents at work (not suitable for allied health professionals), 4) Avoidance behavior, 5) Conflicts and irritations with colleagues, 6) Impaired contact with patients and their family, and 7) Lack of energy and motivation. The internal consistency was good for four subscales (Cronbach’s alphas ≥ 0.80) and acceptable for three subscales (Cronbach’s alphas ≥ 0.70).

To evaluate the content validity, six experts evaluated the subscales and items on their relevance and representativeness. All of the aspects were evaluated as relevant or highly relevant, and the representativeness of the item pool was assessed as highly comprehensive. The finding of a variety of subscales supports the idea that a multidimensional approach is suitable for the study of impaired work functioning and emphasizes the added value of a job-specific approach.

The clinimetric quality of the newly developed NWFQ was further studied in Chapter 4 by evaluating the reproducibility and construct validity of the NWFQ. To achieve this aim, the
questionnaire was administered to 314 nurses and allied health professionals with a re-test in 112 of the subjects after two weeks.

To evaluate the reproducibility of the NWFQ, the reliability and the level of agreement of the questionnaire were assessed. The reliability – the ability of a test to distinguish between persons despite the measurement error – was evaluated by the intraclass correlation coefficient (ICC). The level of agreement represents the extent of the expected difference between repeated measures, due to measurement error, which is expressed by the standard error of measurement (SEM). All of the NWFQ subscales showed good reliability, with ICC values above 0.70, except for subscale 2), *Impaired decision making*, for which the ICC was too low (ICC = 0.16). The standard error of measurement ranged from 3 to 6 for six subscales, which is considered to be low for a scale ranging from 0 to 100. However, for subscale 2), the standard error of measurement was rather high (SEM = 17).

Three aspects of construct validity were studied: convergent validity, divergent validity, and discriminative validity. Medium (> 0.30) to high (> 0.60) correlations were hypothesized between the NWFQ scores and those of a general work functioning scale, the Endicott Work Productivity Scale (convergent validity), and low (< 0.30) correlations were expected between the NWFQ scores and those of a physical functioning subscale of the SF-36 (divergent validity). For discriminative validity, a statistically significant difference between the NWFQ results of groups of subjects with and without mental health complaints was hypothesized, which was analyzed by a Mann Whitney U test.

Our data offer strong support for good construct validity, with the exception of subscale 2), *Impaired decision making*. Regarding the convergent validity of these six subscales, all correlations were substantial and in line with the hypothesis. The fact that these correlations were medium and not high affirms that the NWFQ has significant overlap with a generic work functioning scale, yet is an instrument that possesses additional value because it measures job-specific aspects that may be neglected by a generic questionnaire. The hypothesis for good divergent validity was supported for all of the seven subscales. Additionally, all of the subscales showed good discriminative validity. Therefore, the relatedness of CMDs to impaired work functioning is evident.

In conclusion, the NWFQ demonstrated good clinimetric properties for six subscales. Subscale 2), *Impaired decision making*, did not show enough ability to discriminate between subjects, and its association with other work functioning measures was too weak. Therefore, we discourage the use of this subscale in its present form. In the Appendix of this thesis the NWFQ is presented.

**Chapter 5** focused on the evaluation of another measurement characteristic for the NWFQ, the interpretability of change. The aims of this study were, first, to identify the minimal important change values for improvement and the smallest detectable change values and second, to evaluate the interpretability of individual change scores. The analyses were
conducted both for the overall NWFQ score and separately for six subscales. The subscale *Impaired decision making* was excluded from this analysis. Knowledge of the smallest detectable change and the minimal important change helps interpret the change scores of the Nurses’ Work Functioning Questionnaire on an individual level. These values might guide researchers and practitioners in their conclusions regarding whether changes in individual workers are real and relevant.

Data collected in a randomized controlled trial at two distinct time points, baseline and three months of follow-up, were used to achieve the aforementioned aims. In this trial, 358 nurses and allied health professionals at one Dutch academic medical center participated at both measurement points. The minimal important change values were calculated using two anchor-based methods, the mean-change method and the ROC-curve method. Additionally to the MIC calculation based on absolute change scores, MIC values based on relative change scores were calculated, to correct for the baseline scores. The smallest detectable change values were calculated using the standard error of measurement. Requirements for good interpretability were two-fold: first, MIC values had to be higher than the SDC values and second, the area under the curve (AUC) values of the ROC-curve had to be 0.70 or higher. The interpretation was based on results from a subgroup of workers who demonstrated work functioning impairments at the first measurement point (high baseline scores on the NWFQ), as only in this subgroup was improvement realistic and assessable by the NWFQ.

The minimal important change values ranged from 4.4 to 29 for the mean-change method and from 9.5 to 41.5 for the ROC-curve method. The smallest detectable change values ranged from 7 to 17. These were considered to be small compared with the scale range (0 to 100), except for two values. Regarding the interpretability, 10 of the 14 calculated minimal important change values exceeded the smallest detectable change values in the subsample with high baseline scores and three AUC values were of ≥ 0.70. Thus, the requirements for a good interpretability of change were met in three of the seven tested scales: *Causing incidents at work*, *Impaired contact with patients and their family*, and *Lack of energy and motivation*.

The calculations in this study were based on a small number of subjects because only a few workers in this study reported that they perceived an important improvement in their work functioning between the two time points examined. The replication of the minimal important change value calculations in a population in which the occurrence of important improvements in work functioning is expected to be higher is therefore recommended. Another concern to address is that of an applicable anchor question. In this study, the formulation of an accurate anchor question for perceived change in work functioning appeared to be complex. Therefore, further research is regarded as necessary to identify a more suitable formulation for anchor questions on perceived change in work functioning. Provisionally, the calculated minimal important change values can cautiously be used.
The second aim of this thesis was to develop and evaluate a workers’ health surveillance (WHS) mental module, which is expected to be an effective preventive strategy to monitor and promote good (mental) health and work functioning. Chapter 6 describes the protocol for a study in which the effectiveness of two strategies for a WHS mental module were evaluated. One strategy included the care of an occupational physician (WHS OP-care). The second strategy included the choice of self-help e-mental health interventions for the workers (WHS EMH-care). The study evaluating the WHS mental module was designed as a cluster randomized controlled trial consisting of three arms (two intervention groups and one control group), with randomization at the ward level. The study population consisted of 86 departments in one Dutch academic medical center and includes a total of 1731 nurses and allied health professionals. The effectiveness of the WHS OP-care strategy compared with a control group was a subject of this thesis.

The first step of the WHS OP-care mental module included an online screening for work functioning impairments and six types of mental health complaints: distress, the need for recovery, risky drinking behavior, depression, anxiety, and post-traumatic stress disorder. Workers who participate in the screening immediately received feedback regarding their personal results online. In the second step, workers in the WHS OP-care group who are screened as positive received an invitation for a consultation with their occupational physician. In the control group, workers received no screening results or intervention. It was expected that, in the group of workers who received the WHS mental module, the WHS OP-care group, more workers would seek help than the control group. A reduction in work functioning impairments and mental health complaints was also expected in the WHS OP-care group compared with a control group. These effects were measured three and six months after the baseline.

In Chapter 7, the effects of the WHS OP-care strategy for a workers’ health surveillance mental module, which includes screening plus feedback and an invitation for a consultation with the occupational physician, if applicable, are presented and compared with the results of a control group. In total, 1,152 workers from 57 wards were invited to participate in the WHS OP-care group or the control group. Of these workers, 191 nurses and allied health professionals took part in the WHS OP-care group at baseline. In the control group, 188 workers completed the baseline questionnaire. A total of 151 workers (79%) in the WHS OP-care group were classified as having work functioning impairments and/or mental health complaints, compared with 161 (86%) in the control group. A statistically significant interaction effect was found for study-group*time on help-seeking behavior \( (p = 0.02) \), which indicates that the time course of help-seeking behavior differed in a statistically significant way between the two study groups. After the baseline, help-seeking behavior decreased in the control group, and stabilized between three and six months after the initial screening. In the WHS OP-care group, the percentage of participants engaging in help-seeking behavior was
approximately stable between baseline and three months of follow-up and was therefore higher than that of the control group. The difference in this percentage between the groups was 13%, which was marginally significant (p = 0.09). At the six-month follow-up, the help-seeking behavior frequency decreased more steeply in the WHS OP-care group than it did in the control group until reaching a level lower than that observed in the control group (8% lower), however, without a statistically significant discrepancy in the percentages between the control and WHS OP-care group (p = 0.14).

Workers who received the WHS mental module demonstrated less work functioning impairments in the follow-up measurements at three and six months after the baseline (p = 0.04). At three months of follow-up, 45% of the workers who received the intervention showed at least minimal important improvements in work functioning; this was 30% in the control group (p = 0.03). At the six-month follow-up, 41% of workers in the WHS OP-care group exhibited improvements representing a change that was minimal or larger; the magnitude of this change in the control group was 28%. This difference was marginal significant (p = 0.05).

No statistically significant effects were found on mental health complaints, except for an interaction effect of study-group*time for risky drinking behavior (p < 0.01). The difference between the two study groups regarding risky drinking behavior was statistically significant at neither the three-month follow-up (p = 0.08) nor at the six-month follow-up (p = 0.36), but the time course for drinking behavior differed. At three months of follow-up, the WHS OP-care group showed a slight rise in drinking behavior compared with the control group; however, at six months of follow-up, risky drinking behavior in the WHS OP-care group decreased to below the levels observed in the control group.

In conclusion, the WHS mental module is regarded as an effective strategy to stimulate seeking help from the occupational physician and in improving work functioning in workers with mild to moderate severe work functioning and/or mental health complaints. It would be interesting to further investigate the possible effects of the WHS mental module on the recognition of mental health complaints.

Chapter 8 presents the process evaluation of the randomized controlled trial in which the effectiveness of the WHS mental module is studied. This chapter aimed to study the participants’ response to and compliance with the intervention and the occupational physicians’ adherence to the consultation protocol, as well as to describe the perspectives of the participants and occupational physicians on the WHS mental module.

The process evaluation of the WHS mental module revealed that the response rate to the intervention offered in this study was 32%. Fifty-one (34%) of the 151 workers who were screened as positive, visited the occupational physician for a preventive consultation. Due to system errors, only 125 of the 151 workers were invited for a consultation, thus 41% of the invited workers followed up upon the invitation. Of these workers 80% followed the occupational physician’s advice if such advice was given. The occupational physicians
reported that 70% of the participants who went to the consultation felt that the personal results (partially) reflected their perceived work functioning, whereas 60% felt similarly for the mental health screening results. Moreover, almost all (97%) of the workers who visited the occupational physician for the preventive consultation felt that they could be open and honest with their occupational physicians. The preventive consultation was perceived as being effective by nine out of 15 participants. Most of the participants would appreciate being offered a WHS mental module in the future.

The adherence of the occupational physicians to the consultation protocol was high, as in most cases, all of the seven steps were followed. The occupational physicians were satisfied with the consultation protocol and training. They felt that the preventive consultations had been meaningful and that implementing a WHS mental module in the future would also be meaningful. Suggestions were given for improvements of the studied strategy for a WHS mental module, e.g., regarding the in-house communication strategy and the role of e-mental health interventions. The occupational physicians expressed some reluctance and helplessness regarding providing advice and initiating further care in cases when the worker did not recognize the results of the mental health screening.

In conclusion, the WHS OP-care strategy was well-received by the nurses and allied health professionals who participated in the study. Strategies to improve the response of workers and the protocol adherence of the occupational physicians should be further investigated.

In Chapter 9, the main research findings were summarized and discussed, and recommendations for further research and practice are presented. It is concluded that the aim of developing a job-specific work functioning questionnaire for nurses and allied health professionals with CMDs has been successfully achieved by the creation of the Nurses' Work Functioning Questionnaire (NWFQ). With its seven subscales, six of which demonstrated good clinimetric properties, the NWFQ demonstrates both breadth and depth of measurement and permits self-administration. The individual subscale scores provide insight into the precise aspects of impaired work functioning, allowing for the tailoring of interventions to individual needs.

For future research, further improvements of the subscale Impaired decision making are recommended. In addition, future research should focus on the further validation of cut-off values to identify workers with work functioning impairments.

In conclusion, the WHS mental module is a successful strategy in stimulating seeking help from the occupational physician. Regarding the aims of WHS formulated by the Netherlands Society of Occupational Medicine, it was concluded that the WHS mental module studied here does monitor and improve work functioning. However, the goals of monitoring and improving mental health were not sufficiently met by the studied WHS mental module. Improvements in the screening strategy are recommended, such as by attuning the cut-off values of the
feedback strategy. Additionally, in the future, occupational physicians should be better trained for preventive care.

Practical implications were given in this study, including the recommendation that policy makers in hospitals should be aware of the risks posed by CMDs and related work functioning impairments in healthcare workers. Additionally, employers should take responsibility for the health of their workers and for the well-being and safety of the hospitals’ patients by making use of workers’ health surveillance mental module. Occupational health services should undertake actions to further develop, evaluate, and stimulate mental health modules as part of workers’ health surveillance, not only within healthcare service but also in other sectors.