General discussion and conclusions
In Chapter 1, we introduced the case of Mrs. F., a 39-year old breast cancer survivor working as a shop assistant. The case illustrates the queries the IP may need to address in assessing a work disability claim at the 24-month sick leave term. As we previously left the IP’s office while Mrs. F. presented her medical history, the discussion now starts with a follow-up on her case description.

As the IP has studied all relevant documents, received to assess the vocational rehabilitation efforts (which proceeds the assessment of the work disability claim) prior to meeting Mrs. F., it is clear to the IP that she was treated with curative intent. During the interview, the IP gives Mrs. F. room to tell about her complaints and current circumstances, and makes sure that all relevant items that the guideline breast cancer lists, are addressed. Next, based on the medical history and physical examination, the IP discusses that a full RTW in the previous job held, at the moment, seems difficult. On the other hand, there seem no arguments to advice a complete and sustainable work disability, meaning that functional abilities have to be described in which part-time work seems a logical starting point. Since Mrs. F. elaborates on being fatigued most of the time, the IP explains to Mrs. F. that, based on all relevant factors, it is expected that these complaints eventually will subside and that her work ability will increase. Mrs. F. is a bit hesitant and discusses her worries and problems in daily functioning, for which reason the IP suggests that she completes a set of questions, that relate to future prospects on fatigue and work ability. They agree that she completes these questions at her convenience at home and that she will return them by mail. On receipt, the IP calculates the predicted values on fatigue and work ability, based on the answers given, and next, Mrs. F. is contacted to discuss the results. Being reassured by the IP on hearing the outcome of her future prospects, she is now more confident in meeting the labour expert and making further plans related to RTW. Mrs. F. agrees to the proposed re-assessment, that the IP thinks is indicated at a one-year term.

In the past, cancer survivors reported that IPs paid little attention to CRF and/or cognitive limitations and that IPs were unaware of the impact of CRF and cognitive limitations on daily functioning. This study was conducted as one of the SSA’s initiatives to give more attention to cancer survivorship. The main aim of this study was to identify predictive factors for CRF and work ability in cancer survivors on long-
term sick leave. Two objectives acted as a starting point to target this goal, i.e., the need to (1) enhance work participation of cancer survivors, and (2) support IPs in assessing work disability claims of cancer survivors. The present chapter starts with an overview of findings and answers to the research questions, briefly presenting the results of the separate studies. This is followed by a discussion in which the answers to the research questions act as point of departure and are linked to the two objectives mentioned above. Subsequently, some methodological considerations are put forward, after which the key messages and recommendations related to future research as well as practice and policy are listed.

A SUMMARY OF THE MAIN FINDINGS AND ANSWERS TO THE RESEARCH QUESTIONS

**Question 1: Which factors are known to predict RTW in cancer survivors on long-term sick leave?**

In Chapter 2, the results of a systematic review on predictors of RTW and employment in cancer survivors of working age are described. Heavy work and chemotherapy were negatively associated with RTW. Less invasive surgery was positively associated with RTW. Old age, low education and low income were negatively associated with employment. Breast cancer survivors had the greatest chance to RTW. Moderate evidence was found for extensive disease being negatively associated with both RTW and employment, and for female gender being negatively associated with RTW.

**Question 2: Which factors are associated with work disability in cancer survivors at 24-month sick leave?**

In Chapter 3, this question is addressed by a secondary data analysis, i.e., a prospective study on prognostic factors of work disability in sick-listed cancer survivors. A cohort of 131 sick-listed employed cancer survivors was followed for two years and data were collected at 10- and 24-month sick leave. Analysis showed that at 10-month sick leave, negative perception of health care providers on cancer
survivors’ work ability and little experienced influence on RTW, both as reported by respondents, were associated with increased risk for work disability at 24 months.

Next, in Chapter 4, the results of a cross-sectional study in cancer survivors (n=351) applying for a work disability grant at 24-month sick leave are described. Results showed that at 24-month sick leave an increased risk for work disability was associated with Dutch nationality, higher education, hormone therapy, metastatic disease, high level of sickness impact, and low work ability.

Question 3: Which factors predict CRF and work ability in cancer survivors at long-term follow-up, after the assessment of work disability?

In Chapter 5, the results of the main study, a prospective cohort study on predictors for CRF and work ability in cancer survivors at long-term follow-up, i.e., after assessment of work disability, are presented. Analysis showed that higher level of fatigue in cancer survivors was predicted by being divorced or widowed, a higher level of sickness impact, having depressive symptoms, and working in healthcare. A lower level of fatigue was predicted by having received chemotherapy and lower fatigue at baseline. A higher score on work ability was predicted by having received chemotherapy, better global health and better work ability at baseline. Being principal wage earner, uncertainty related to being free of disease, a higher level of sickness impact, and higher level of wage loss predicted a lower score on work ability.

Question 4: Which factors do IPs consider in assessing CRF and abilities in cancer survivors at 24-month sick leave?

In Chapter 7, the results of a focus group study on factors IPs consider in assessing CRF and work disability of cancer survivors are presented. This qualitative study relates to the experiences of IPs in assessing CRF and functional abilities of cancer survivors, their use of guidelines and their needs related to the use of a prediction rule that targets to support work disability assessments. The IPs reported to feel responsible for correct assessment of cancer survivors’ work disability, in which they predominantly investigated medical factors. Next, non-medical factors related to the person, work and/or social environment were considered. Adherence to existing guidelines, i.e., the guidelines on colorectal cancer and breast cancer, that aim to support IPs in the assessment, proved to be diverse. In discussing the need
and design of a prediction rule, its influence on communication with other stakeholders, e.g., the cancer survivor or his/her OP, was addressed as an important issue. Related to daily use IPs thought a prediction rule should be valid, reliable and easy to use.

Besides the studies mentioned above, that aim to answer the research questions, the mediating role of coping between health complaints and work status in cancer survivors was studied as well. The results of this cross-sectional study are described in Chapter 6. Only for active coping such a mediating role was found.

DISCUSSION OF THE RESULTS

In this thesis, CRF and work ability in cancer survivors form a central theme, connecting the separate studies. Taking the work disability assessment at 24-month sick leave as a starting point, the studies described in the previous chapters specifically relate to the cancer survivor and the IP, who are both engaged in the work disability assessment, as applicant and assessor.

In order to meet the first objective of this thesis, i.e., to enhance work participation of cancer survivors, there is a need to know which factors relate to RTW and employment in cancer survivors. These factors may provide a framework that, during sick leave, can be considered in a vocational rehabilitation trajectory that, if unsuccessful in case full RTW is not reached, usually proceeds the work disability assessment. The topics RTW and employment were addressed in Chapter 2. The association of chemotherapy in hindering RTW, as found in literature, seems to oppose the result found in our main study (Chapter 5). However, as discussed in Chapter 5, a selection bias could play a role here in that among applicants who did not receive chemotherapy, only those with a more unfavourable prognosis related to RTW (i.e., with high fatigue levels) might be represented in the cohort. That is, in cancer survivors not treated with chemotherapy, the majority of those with low levels of fatigue have already returned to work, and therefore are not in need to apply for a work disability benefit. Among the survivors who did receive chemotherapy this selection might be less obvious. That is, chemotherapy treatment

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usually has a prolonged course that might hinder early RTW. Furthermore, we should consider that in our systematic review, the studies targeting the association between chemotherapy and RTW addressed breast cancer survivors only, whereas our study relates to a cohort with mixed diagnoses. Also, in these studies, RTW was measured at different time points, i.e., at 10 months and 24 months, while our main study relates to a cohort with work ability being predicted one year after the work disability assessment, i.e., 36 months after the first day of sick leave.

In a previous longitudinal Dutch study of breast cancer survivors, persistent fatigue was associated with the duration of former treatment, but not associated with type of surgery, type of adjuvant therapy and time since finishing treatment (1). In that study, high anxiety, high impairment in role functioning and low sense of control over fatigue symptoms at baseline were predictors of persistent fatigue. To conclude, different designs and study populations may form an explanation for the aforementioned results that, related to the associations found between chemotherapy and both CRF and work ability, seem contradictory and are possibly partly caused by selection bias.

In case RTW in cancer survivors during sick leave fails, at the end of the sick leave term, the need to apply for a work disability grant is inevitable. In this respect, to provide the IP with an evidence-based and supportive framework, we need to know which factors relate to work disability at 24-month sick leave. This topic, that relates to our second objective, i.e., supporting the IP in assessing the work disability claim, was addressed in Chapter 3 and 4. Related to the results presented in Chapter 3, it is interesting to see that nowadays, as also reported three decades ago, health care professionals’ negative views on RTW expectations were associated with a higher risk for work disability. However, it should be noted that attribution of cancer survivors’ own expectations towards the reported health care professionals’ views may also play a role here. The results described in Chapter 4 show that poor health condition and/or a self-reported low work ability are contributing to the risk for work disability. This indicates that somehow (core) factors, that in the past were identified as associated with work disability (2), nowadays are still relevant. These have not lost their importance, even though over the years health care improved and legislation changed.
Considering the results presented in Chapter 3, surely in the Netherlands, clinical medicine is sometimes blamed for having too little interest in working life of patients (3), which might partly relate to the way responsibilities in care and cure are being operationalized. That is, different stakeholders (GP, clinician, OP and IP) each have their own perspective and treatment goals, which defines their relationship with the sick-listed worker. As treatment goals do not always converge, vocational rehabilitation of a cancer survivor on sick leave is sometimes obstructed (4). However, next to paying more attention to working life aspects of cancer survivors in clinical care, it seems there is room for improvement in caring for them in occupational medicine and insurance medicine as well. More specifically in providing continuity in care and communication (5;6). That is, in assessing work disability claims of cancer survivors, we need to address the role of the IP in this process as well. This aspect is considered in discussing the results presented in Chapter 7.

Finally, at 24-month sick leave, on assessment of the work disability claim, it may be helpful to know the future prospects of cancer survivors related to fatigue and work ability beyond 24-month sick leave, considering the potential long-term effects of treatment and/or the disease. This topic is addressed in Chapter 5, and two models, which predict CRF and work ability one year after the work disability assessment, are presented. These models may provide a foothold to plan and/or initiate a vocational rehabilitation trajectory in cancer survivors, and as such aim at the second objective of this thesis. Related to CRF, several factors were associated with a higher level of fatigue. The results concur with results of previous studies and indicate that perhaps complaints can be reduced, by considering medication and/or offering support and counseling, combined with tailored physical exercise (7;8). As it is, these aspects should be discussed during the work disability assessment if applicable, as they are potentially open to a positive change and to a cancer survivor’s benefit.

Next to studying factors associated with RTW, employment, work disability and work ability (see Chapter 2, 3, 4, and 5, respectively) it seems desirable to explore the association between behavioral aspects and RTW in cancer survivors as well, considering that “functioning and disability are results of the interaction
between the health conditions of the person and their environment” (9). In assessing a cancer survivor’s work disability, the IP also has to judge behavioral aspects. Therefore, in Chapter 6, the focus is on cancer survivor’s characteristics in that coping behavior is examined, and its relation with RTW. In this study, which used the ICF model as global starting point, we found a small mediating role of active coping, but a mediating role of passive coping was not found. However, passive coping was associated with more self-reported depressive symptoms. This finding is relevant as depressive symptoms are frequently reported by cancer survivors (10-12). However, in the assessment of work disability, specifically mood and anxiety disorders are not always recognized by IPs (13). This underlines the need to promote guideline adherence in IPs, specifically as guidelines on depression and anxiety disorders in insurance medicine are available and have been implemented previously. Moreover, a recent study (14) found indications that, related to describing functional abilities, adherence to the guideline depression resulted in a higher inter-rater reliability. In this respect, guideline adherence seems to promote uniformity, although it should be noted that the result of this study was not statistically significant.

As already mentioned, the IPs’ characteristics were studied in Chapter 7, considering that, related to work disability claims of cancer survivors, it is not only important to know which factors need to be assessed (Chapter 2, 3, 4, 5 and 6), but also if these factors are assessed, and how. In order to access this “black box”, i.e., questioning the IPs’ motives, attitudes and beliefs, the way by which IPs usually assess CRF and work disability in cancer survivors was addressed in a qualitative way. We found that in the work disability assessment of cancer survivors, IPs investigate several factors related to the person, disease, work and environment (displayed in Chapter 7, Table 7.2). These factors largely concur with the factors found in both literature (Chapter 2) and quantitative studies of this thesis (Chapter 3, 4, 5, and 6). It therefore seems that the IPs share common knowledge, and are aware of the factors that need to be questioned. However, this does not necessarily mean that these factors are always discussed with cancer survivors during the work disability assessment. Current results also suggest that adherence to existing guidelines is relevant, as these present the domains of role functioning, e.g., social functioning,
work functioning (and their related factors), that need to be addressed by IPs. As such, guidelines offer an evidence-based body of knowledge along which work disability can be assessed.

**GENERIC AND DISEASE-SPECIFIC FACTORS ASSOCIATED WITH WORK DISABILITY**

In Chapter 7, we specifically targeted at the role of IPs in assessing cancer survivor’s work disability. In the past, similar studies that aimed to disclose factors IPs consider in assessing work disability of sick-listed workers were published, although not specifically addressing cancer survivors (15;16). One of these studies showed that, according to the ICF model, IPs addressed a wide range of items of which “environmental factors” (assistance, workplace factors) and “personal factors” (coping, motivation) were under reported compared to factors related to “function and structures” (mood, attention) and/or “participation” (family life, social life) (15). Also, related to the prognosis of work ability, this study showed that particularly disease-related factors (course, severity) were considered. Furthermore, in assessing musculoskeletal disorders, the “function and structure” domain of the ICF was mentioned as the most important, whereas in psychiatric disorders “participation” was most frequently addressed (15). Does this mean that IPs have several strategies in assessing work disability, depending on diagnosis? And if so, does this imply that in assessing work disability, in each strategy the importance of specific (prognostic) factors varies? As our focus group study did not quantify the factors that IPs most frequently use in assessing cancer survivors’ work disability, these questions cannot be answered. However, related to using certain strategies, our study indicated that IPs do use a certain strategy in that predominantly disease-related factors are questioned in assessing functional abilities, and, next, non-medical factors are addressed in order to support their decision. Still, the same may apply to other sick-listed workers with chronic diseases, such as congestive heart disease or COPD, as well. That is, next to CRF in cancer survivors, IPs have to assess functional abilities related to fatigue in other conditions as well.
and may encounter similar problems in finding the arguments to support their decision. In other words, are there specific factors that the IP needs to consider in assessing work disability in cancer survivors, or can the IP use a generic core set of factors, applicable to all sick-listed workers (on long-term sick leave)?

A systematic review, based on five cohort studies and not specifying diagnosis, identified 16 factors, e.g., poor general health, low income, own prediction of non-RTW, associated with long-term sick leave (17). However, only weak evidence was found for older age and previous sick leave being associated with long-term sick leave. Moreover, insufficient evidence was found for work-related factors being associated with long-term sick leave. As we also found weak and inconclusive evidence for both age and previous sick leave associated with RTW, respectively (Chapter 2), we could say that these findings concur, irrespective of diagnosis. However, as described in our review on prognostic factors for RTW and employment in cancer survivors, we found strong evidence for the association between both job- and disease-related characteristics with RTW. This indicates that perhaps specific disease-related prognostic factors and generic factors co-exist, the latter shared by all workers on long-term sick leave, e.g., negative self-perceived RTW expectations, older age, and low education. To illustrate, in a large Dutch cohort of unemployed and temporary agency workers with psychological problems, positive RTW expectations proved to be a prognostic factor for work participation at the long term (18).

Also, in a previous Delphi study, in which IPs were questioned on the most relevant factors usually discussed in work disability assessments, without specified diagnosis, six factors liable to hinder RTW and three factors promoting RTW were identified. All but one of these factors, i.e., secondary gain of illness, were also addressed in our focus group study as factors considered in work disability assessment of cancer survivors. Again, this seems to indicate that in assessing work disability claims, IPs use a core set of factors irrespective of diagnosis. Next, the IP may add disease-related factors to the questions used in the interview, in order to assess the work disability claim.

As it is, assessing functional abilities and work disability in cancer survivors at 24-month sick leave can be a challenging task, in which many aspects have to be
addressed. This includes possible future prospects related to abilities, and if applicable RTW. In order to facilitate the IP in addressing these aspects, a prediction rule was developed based on the data gathered in the main study (Chapter 5) that may help the IP to decide on planning a re-assessment.

THE DEVELOPMENT (AND USE) OF A PREDICTION RULE IN INSURANCE MEDICINE

A short history on prediction rules

The third research question concerns prognostic factors of CRF and work ability in cancer survivors on long-term follow-up. This question was addressed in Chapter 5, and based on the results a prediction rule was developed for both outcomes (see appendix). Contrary to insurance medicine, the development, introduction and use of prediction rules in (clinical) medicine has a history of over 50 years now. In order to develop a register of clinical prediction rules relevant to primary care, in a review, Keogh et al. (2014) found 434 prediction rules, reported between 1965 and 2009 (19). These rules were predominantly studied in primary care or in the setting of emergency departments, and mostly connected with cardiovascular or respiratory disease, and musculoskeletal conditions. Also, the number of studies on prediction rules applicable in hospital care, throughout all clinical disciplines, has increased exponentially over these years.

As such, it seems that, nowadays in medicine, prediction rules, e.g., to assess the risk of pulmonary embolism or an acute coronary syndrome, form a indissoluble part of the (diagnostic) tools a GP or clinician may use (20). In contrast, development of prediction rules applicable in occupational medicine or insurance medicine, seems to lag behind. That is, in occupational medicine over the last decades only a limited number of studies on prediction rules, specifically related to job loss, sick leave and RTW, were published. These studies particularly addressed musculoskeletal conditions, i.e., low back and/or shoulder problems (21-25), occupational allergic diseases (26), common mental disorders (27;28), or self-rated health (29;30). In insurance medicine, studies on prediction rules are almost non-
existent, although recently a prediction rule on the risk of a work disability benefit in construction workers on sick leave, using the WAI score as a predictor, was developed (31).

**Why use prediction rules?**

To explain the increasing attention for prediction rules in medicine over the past decades, we should consider their added value. That is, in medicine, normally a physician sets a diagnosis based on patient’s history, physical examination, and other tests. Using experience and knowledge, a physician goes through a decision making process in which gathered findings are connected and interpreted to set an accurate diagnosis and prognosis. Actually, this procedure seems to fit any physician, either working in primary care, hospital care, occupational or insurance medicine. A prediction rule quantifies the assets that the various aspects of the patient regarding medical history, physical examination, and other tests make towards the diagnosis, prognosis, and/or expected effects of treatment. Basically a prediction rule, based on research, aims to increase the accuracy of physicians’ diagnostic and prognostic assessment (32;33). Likewise, the quality of the IP’s assessment may be enhanced by using a prediction rule.

**The need to develop prediction rules in insurance medicine**

Considering the numerous studies on prediction rules that relate to general practice and clinical medicine, it is tempting to try and see if they can be used in occupational medicine or insurance medicine as well. Unfortunately, in occupational medicine and insurance medicine, the outcomes of interest usually are quite different from those applied in hospital or primary care. This stresses the need to develop prediction rules specifically targeting outcomes of interest related to occupational medicine and/or insurance medicine. That is, the OP or IP may use the outcome of such a prediction rule as an argument in an advice, e.g., on RTW or sustainability of functional abilities. As such, a prediction rule that targets work ability beyond 24-month sick leave, for a part may also relate to the work disability assessment at 24-month sick leave. In this respect, we should consider the last of the four tasks the IP has on assessing a work disability claim, i.e., the IP has to (1)...
assess the social medical case history, (2) evaluate the followed treatment and therapy, (3) assess functional abilities, and (4) assess sustainability of functional abilities. It seems clear that, in a narrow sense, considering the nature of the work disability assessment at 24-month sick leave, a prediction rule on work ability modelled like we did, does not address the work disability claim at 24-month sick leave as such. Based on the used methodology, it is clear that a prediction rule that targets work ability beyond 24-month sick leave, does not relate to the work disability claim directly. Next to this methodological aspect, our prediction rule neither addresses the first three of the aforementioned tasks. However, in a broader sense, our model not only serves as a tool to predict future work ability, but also, indirectly, may relate to the work disability assessment at 24-month sick leave as such. That is, in case of uncertainty related to sustainability of functional abilities, in combination with a full loss of former wages earned (80-100%), the outcome of the prediction rule may support the decision to either grant or deny a complete and durable work disability benefit (IVA) at 24-month sick leave.

Prediction rules and evidence-based medicine

In the past, the Dutch health council reported that there was a need to strengthen the scientific base of insurance medicine (34;35). For a part, the council’s recommendation has been met, e.g., by the development and implementation of guidelines, by the several research projects that are ongoing, and by the numerous scientific publications (36). As a next step, the development of prediction rules in insurance medicine seems logical. It can be considered as a part of evidence-based medicine that needs to be promoted to meet the standards of good (clinical) practice, which relates to all physicians, irrespective of their function and discipline.

Benefits of prediction rules in insurance medicine

Based on the results of the cohort study (Chapter 5), the development and use of a prediction rule targeting work ability in cancer survivors beyond long-term sick leave may be to the benefit of the cancer survivor, the IP and society as a whole. That is, from the cancer survivor’s perspective, with the use of a prediction rule, uniformity in assessments can be enhanced, and this may add to the quality of
assessments in general. Moreover, the use of a prediction rule targeting work ability beyond long-term sick leave may help to identify those at risk for sustainable work disability. Consequently, in case of poor prognosis related to work ability, immediate access to and granting of a full and sustainable work disability benefit can be considered. This may reduce financial worries or worries related to possible future re-assessments, and as a result, support the cancer survivor’s quality of life. Simultaneously, in cancer survivors, the prediction of future improvement of work ability may open the opportunity to offer a vocational rehabilitation trajectory. Next to the cancer survivor’s benefit, the introduction of a prediction rule in insurance medicine may be to the advantage of the IP. It may support the IP in deciding on sustainability of functional abilities and therefore the need to plan a future re-assessment. The introduction of a prediction rule in insurance medicine may also be to the benefit of society at large, in that lawfulness is applied in assessing work disability benefit claims. Moreover, it may help to reduce the number of unnecessary re-assessments, which leaves room for other professional activities, either by the IP or the labour expert. Therefore, it could eventually help to cut societal costs as a result of optimizing services.

**Vocational rehabilitation and cancer survivorship**

The prediction rule targeting work ability in cancer survivors may not only support the decision on sustainability of functional abilities, it may also help to decide to start a vocational rehabilitation trajectory, even beyond 24-month sick leave. The importance to enhance vocational rehabilitation in cancer survivors has already been reported in several studies (37-39) and was also addressed in Chapter 2 and 3 of this thesis. The results presented in Chapter 3 showed that experienced influence on a RTW trajectory was positively associated with work disability at 24-month sick leave. Even though this study described prognostic factors measured at 10-month sick leave, experienced influence on a RTW trajectory at later stage, i.e., at 24-month sick leave, may possibly also be positively associated with RTW outcomes beyond 24 months. Supporting this assumption are the findings described in Chapter 6, regarding the mediating role of coping measured at 24-month sick leave, that point in the direction of a positive association between
active coping and RTW. That is, taking control and responsibility, meaning having influence in an RTW trajectory by active coping, seems positively associated with RTW, even at 24-month sick leave.

To conclude, as stated previously and found in literature, having control is important for cancer survivors, and RTW even beyond 24-month sick leave may enhance this. Also, optimizing the start of a vocational rehabilitation trajectory may reduce costs, e.g., in case re-employment is enhanced, considering the 1.4 times increased risk (RR 1.4; 95% CI 1.2-1.6) for unemployment in cancer survivors (all diagnoses) (40). In addition, a prolonged and negative effect on work participation in cancer survivors was reported in a recent study in Dutch breast cancer survivors (41). In this study, an increased risk for disability benefits up to 10 years after diagnosis was found (HR 2.0; 95% CI 1.6-2.5), with higher risks for younger patients. This result again stresses the need to support cancer survivors in RTW. However, we should bear in mind that, until now in the Netherlands, no evidence on cost-effectiveness related to vocational rehabilitation in cancer survivors at long-term sick leave exists. That is, in a Dutch hospital based multi-center RCT that aimed to enhance RTW in female cancer survivors, treated with curative intent and mean sick leave of 193 days, no differences related to quality of life, work ability, work functioning or costs, between the intervention group and usual care group, were found (42). Still, it is expected that in cancer survivors vocational rehabilitation and supportive psychosocial interventions, may be cost effective (43).

Disadvantages of a prediction rule

Introduction of a prediction rule targeting work ability in cancer survivors comes with disadvantages as well. As IPs stated in the focus group study (Chapter 7), a prediction rule should be reliable, valid and easy to use. Therefore, acceptance and adherence to a prediction rule, considering the experiences related to the previously implemented guidelines, seems to warrant a pilot or implementation strategy. Next, we should also consider that related to the outcome, apart from true positives, a prediction rule will also identify false positives and false negatives, the latter actually being missed true positives. Regarding the false positive cases this may imply unjustified re-assessments, or offering a vocational rehabilitation
trajectory in which selected participants are unable to meet demands, and may reach over their limits, which can negatively influence health and well-being. Opposite to this, for false negatives it would mean withholding cancer survivors potential possibilities to participate in work or delay RTW. For this reason, internal and external validation of a prediction rule, using a second dataset, is customary. Subsequently, once implemented a prediction rule should be checked for its practical relevance and impact as well (44).

To conclude, the use of a prediction rule targeting work ability in cancer survivors by no way means leaving out the IP’s critical appraisal of facts and findings during assessment, it can be supportive and should be used as such.

METHODOLOGICAL CONSIDERATIONS

In each of the previous chapters, methodological strengths and limitations were addressed. Some additional methodological and practical considerations are discussed next. The first objective of this thesis was operationalized by performing a systematic review targeting prognostic factors, associated with RTW and employment (or similar outcomes), that stakeholders should consider in supporting cancer survivors who are willing to RTW. However, we should remind that this thesis specifically aims at circumstances as present in the Netherlands. In this respect, we may question if a literature search, even though a quality assessment on the level of evidence was done, based on studies performed in several countries all over the globe, each having a health care system and social security legislation of its own, is capable to answer topics raised. That is, Dutch social security legislation and probably labour market conditions are quite different compared to those abroad, especially in countries outside Europe. Therefore, generalization of results and their meaning towards daily practice of insurance medicine in the Netherlands should be considered cautiously. On the other hand, the results of the review may be of value in case a factor proves to be relevant in several countries, irrespective of the societal differences related to labour market conditions and/or legislation.
In addressing the second objective of this thesis we should consider that, related to our main study (Chapter 5), we were unable to perform a non-response analysis and only used data of employed workers, as the inclusion of unemployed workers (i.e., those without a fixed contract) was less successful. Especially the latter was disappointing, as we know that unemployed workers have a vulnerable position on the labour market (45;46). Also, related to the prediction models, we should consider that in our cohort, compared to historical data, the fraction of respondents with a sustainable complete and temporary complete work disability was low, i.e., 16% and 25% respectively. As it is, in the Netherlands from 2006 up to 2013, the fraction of cancer survivors granted a sustainable and complete work disability benefit at 24-month sick leave, increased from 31% up to 38%. For those granted a temporary complete benefit there was a decrease from 35% down to 27%. However, overall through these years, the fraction of those with a wage loss less than 80% remained stable at about 35%. Therefore, the data imply that particularly respondents with more favourable outcomes responded and participated in the cohort study. This, along with the uneven gender distribution of one male for every two female respondents, impedes generalizability. Regarding Chapter 7, that describes the focus group study, targeting IPs’ perspectives related to the work disability assessment of cancer survivors, 29 IPs from only two SSA offices were recruited, which may seem a limitation towards representativeness. However, as the results of this study, in which data saturation was reached, concur with results of a previous study, in which 102 IPs (recruited nationwide) were questioned on the most relevant factors usually discussed in work disability assessments (16), this aspect seems unimportant.

**KEY MESSAGES**

- Prognostic factors of RTW, employment, CRF and work ability in cancer survivors can be identified (Chapter 2 and 5). In this respect, job demands, health condition, RTW expectations and support from other stakeholders seem factors closely connected with work participation of cancer survivors. Knowledge of
these factors is a necessary condition to correctly judge sustainability of functional abilities in the assessment of work disability claims of cancer survivors.

- In cancer survivors, a prediction rule based on identified factors may support IPs in the decision of who should be reassessed for future work ability (Chapter 5 and 7).

- During the first year of sick leave, timely and adequate vocational rehabilitation of cancer survivors can positively influence the outcome of the work disability assessment (Chapter 3). This calls for swift identification of facilitators and barriers of RTW that subsequently should be addressed to enhance vocational rehabilitation if possible.

- The role of the IP in assessing work disability claims, e.g., in questioning all potential factors that relate to work participation, is important (Chapter 7). The IP should be aware of his/her role, attitude and preferences, and consequently, the use of guidelines and/or prediction rules may help to enhance uniformity and add to the quality of the assessments as indicated by previous research.

- The cancer survivors’ coping style seems associated with the outcome of work disability assessments and work participation of cancer survivors (Chapter 3 and 6).

**RECOMMENDATIONS**

**Recommendations for future research**

- Considering the results described in Chapter 3, further research on the association of early stage RTW interventions with work disability at 24-month sick leave in cancer survivors is called for. In this respect, specifically in cancer survivors, the role of RTW expectations and coping behavior seem interesting topics that future research may address.

- Given the long-term effects of the disease and/or treatment in cancer survivors that may last up to several years, further research on long-term effects beyond the term that we examined, i.e., three years after first day of sick leave, is needed.
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New prospective studies should be designed to identify those who are working at 24-month sick leave, and those who are not, and examine their characteristics and experiences in RTW over time.

Results of such research could then perhaps be used to initiate intervention studies that may help to identify the best practice to support RTW in cancer survivors at, or beyond, 24-month sick leave.

As such, this in turn may also lead to further research in that we may examine RTW outcomes and costs in those receiving the usual care, as provided by the SSA, compared to those offered a tailored vocational rehabilitation.

New prospective studies may also give the opportunity to develop new prediction rules, and supply data to validate existing ones.

In research that targets work participation of cancer survivors, researchers should make an effort to converge the design of studies, and should consider using uniform outcome measures, e.g., WAI score in studies on work participation and/or work ability. This may help to compare the results of separate studies and add more strength to the level of evidence found.

To enhance uniformity in assessing work disability claims, future research should also address the IPs’ compliance with already identified factors, known to be associated with work disability.

Future research should particularly address unemployed sick-listed workers, i.e., cancer survivors without a fixed contract, as these seem more vulnerable related to prolonged unemployment and/or work disability, compared to employed cancer survivors on sick leave.

Recommendations for practice and policy

IPs should be aware of the meaning of the prognostic factors that were identified and address these in assessing work disability benefit applications of cancer survivors. Future expectations, meaning of work, perceived work ability and perceived support should always be assessed.

Our results may be used in updating existing guidelines, e.g., on breast cancer and colorectal cancer, presenting a overview of relevant factors that IPs may use.
The development and validation of prediction rules in insurance medicine needs more attention.

The use of a prediction rule as a triage tool to plan future reassessments in insurance medicine should be advocated.

Prior to their implementation, newly developed prediction rules should be piloted. This may help to assess the practical validity of a prediction rule, the need for further adaptation, and reduce the risk for non-compliance once implemented.

IPs should be encouraged to participate in small scale pilot projects and be facilitated by their management to do so.

In using a prediction rule, e.g., for work ability in cancer survivors, the consequence would be to develop a policy related to offering a vocational training for those in need for further (tailored) support.

More attention for (quality of) working life of patients in clinical medicine is needed considering the results described in Chapter 2 and 7, in which both cancer survivors and IPs report on the role of a health care provider and its association with RTW.
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