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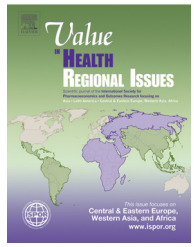

Work Productivity and Costs Related to Patients with Ankylosing Spondylitis, Rheumatoid Arthritis, and Psoriasis

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ABSTRACT

Objectives: To determine and compare the impact of rheumatoid arthritis (RA), ankylosing spondylitis (AS), and psoriasis on work productivity, to calculate the productivity costs (PC), and to map out factors that influence (functional status and disease activity) work productivity. **Methods:** The Work Productivity and Activity Impairment questionnaire was used to evaluate productivity losses of patients with RA (n = 77), AS (n = 230), and psoriasis (n = 93). Demographic data, patient-reported outcomes (PROs) (Health Assessment Questionnaire [HAQ] and Bath Ankylosing Spondylitis Disease Activity Index [BASDAI]), and clinical parameters (Disease Activity Score in 28 joints [DAS28], body surface area [BSA], and Psoriasis Area and Severity Index [PASI]) were collected. The correlations among PROs, clinical parameters, and overall productivity loss were examined, and multiple regression models were used to examine relationships among parameters and productivity loss. PC were calculated using the friction cost approach. **Results:** Mean patient age and disease duration were 47.1 and 15.7 years, respectively. The mean HAQ and DAS28 in patients with RA were 1.22 and 5.6, respectively. The mean BASDAI score in patients with AS was 4.43. The mean BSA and PASI score in patients with psoriasis were 21.1% and 12.9, respectively. The percentage of patients with psoriatic arthritis (in those with psoriasis) was 24.7%. We did not find significant differences in Work Productivity and Activity Impairment domains among various diagnoses. Patients with AS, RA, and psoriasis reported overall work productivity losses of 40.9%, 42.9%, and 42.8%, respectively. Daily activity impairments were approximately 50.0%. Overall work productivity loss strongly correlated with PROs, whereas correlations with clinical parameters were weak. The HAQ and BASDAI were identified as major predictors of productivity impairment. **Conclusions:** The greatest loss in productivity was in those with psoriatic arthritis; however, it was not significant. In contrast to clinical parameters (DAS28, BSA, and PASI score), PROs (HAQ and BASDAI score) significantly influence loss of productivity. The average annual lost PC per patient was estimated to be €2000.

Keywords: ankylosing spondylitis, productivity costs, psoriasis, psoriatic arthritis, rheumatoid arthritis, work productivity, WPAI.

Introduction

Rheumatoid arthritis (RA), ankylosing spondylitis (AS), and psoriasis are chronic diseases leading to progressive disability, with significant costs arising not only to the health care system. Hence, the performance of health economic studies from the health care system perspective leads to substantial underestimation of total disease burden [1,2].

Patients suffer from decreased quality of life related to health problems; in addition, there are work restrictions and lost work productivity resulting from these diseases, with lost productivity being related to diminished participation in the labor market [3]. Reduced work opportunities affect both the national economy and personal finances and contribute overall to reduced quality of life [4].

During the illness, patients can move among different health states; there can be periods of normal productivity, presenteeism, the state of being at work but working at reduced productivity, also referred to as "at-work productivity loss" or "at-work disability", interspersed with reduced productivity associated with increased temporary absenteeism, as well as periods of chronic or permanent absenteeism [5,6].

In cases of RA, 20% to 30% of the patients have been reported to have become totally disabled in the first 2 to 3 years after the disease was diagnosed [7].

Kobelt et al. [8] states that the overall percentage of patients who must leave their jobs is 20% to 50%, depending on the sample of patients and the country where the study was conducted.

The prevalence of these chronic conditions (i.e., RA, AS, and psoriasis) ranges from 0.1% to 1.0% of the population [9,10]. The

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first symptoms often appear early in life (especially with AS) and affect the entire productive life of the individual [11]. This is why these conditions generate not only health costs but also significant costs to patients, employers, and society as a whole [12].

With the increasing loss of productivity (due to physical impairment), significant costs associated with lost productivity are generated. From the societal and patient perspective, these costs are referred to as "productivity costs" (PC) and "productivity loss," respectively. These costs represent 40% to 80% of the total societal cost attributed to these diseases (RA, AS, psoriasis) [13]. Another important part of the costs is social pensions and various allowances based on the degree of dependence [14], which is indirect costs that the government bear and do not represent the productivity costs from the societal perspective [15].

In general, there is no discussion that the burden of rheumatic diseases and psoriasis on the society is substantial. There are several methods of measurement and valuation of the productivity impairment and productivity costs. Based on different approaches of quantification of productivity losses, the overall calculated impact/economic burden can differ significantly [16,17]. It should also be noted that there are differences in guidelines across countries on how to implement productivity losses and costs into decision making [17].

Several instruments/questionnaires are used for the measurement of productivity and disability in rheumatic diseases and psoriasis. These instruments have proved their reliability, validity, and responsiveness in various diseases. The most frequently used instruments are Rheumatoid Arthritis Specific Work Productivity Survey, Workplace Activity Limitations Scale, Work Instability Scale for Rheumatoid Arthritis, Work Limitations Questionnaire, and Work Productivity and Activity Impairment (WPAI) questionnaire [5,18]. The development of the "ideal" tool for the valuation of productivity losses, however, is still a subject of research [19–21].

Two main approaches are used for calculating the costs associated with reduced or lost productivity. The first approach is the human capital approach, which includes the value of any potentially lost productivity. Productivity loss is then calculated or monetized as all of the expected or potential loss of profit because of an illness, disability, or a prematurely deceased patient. An essential precondition for the application of this human capital approach method is the "absolute loss of productivity" and the impossibility of its replacement; therefore, a fully utilized labor force is assumed (i.e., zero unemployment) [8,22].

The second approach used for calculating productivity costs is the friction cost approach (FCA). This approach assumes that those with reduced or lost productivity will be replaced by other workers. In this scenario, productivity loss is calculated as the maximum period of time needed to restore full productivity of the position concerned. This period of time is called the "friction period"; after expiration of the friction period, the cost to society is assumed to be zero. The friction period should also include the new employee's training period [8,23].

Methods

The study was carried out using cross-sectional data collection among randomly selected patients from a patient organization (AS), specialized centers for the treatment of skin diseases (four centers for psoriasis), and specialized centers for the treatment of rheumatic diseases (three centers for RA). Data collection was performed through self-reporting questionnaires returned by regular mail for patients with AS (65% recoverability) and by direct physician-administered questionnaires for patients with RA and psoriasis.

Structure and scope of the data were represented by the WPAI questionnaire in patients with relevant diagnoses [24], a Health Assessment Questionnaire (HAQ) [25], and the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) [26]. In addition, the Disease Activity Score in 28 joints (DAS28) in patients with RA, body surface area (BSA), and Psoriasis Area and Severity Index (PASI) in patients with psoriasis were collected.

Demographic data (age, sex, work status, educational level) and the year of diagnosis were also collected. Patients were eligible for the study if they were in their productive years. Hence, old-age pensioners (retirement pension patients), students, and women on maternity leave were excluded from the study.

The WPAI:Specific Health Problem questionnaire is a variation of a specific questionnaire developed to measure the impact of specific diseases on work productivity. The questionnaire has demonstrated validity, reliability, and sufficient predictive value to measure the impact of the disease with regard to absenteeism, presenteeism, and overall productivity impairment in such a way that it could be monetized [27–29]. In general, the WPAI questionnaire is a quantitative tool used for measuring reduced productivity at work and during leisure activities (i.e., typical activities that a person performs on a regular basis, such as household activities, shopping, childcare, and exercising). Four scores, expressed as percentage deterioration, are obtained from the WPAI questionnaire. Higher percentage scores are worse in terms of absenteeism, presenteeism, overall productivity, and leisure activity impairment relative to lower scores.

The HAQ is used to monitor functional abilities of patients with RA. It is intended to reflect the impact of the disease on daily life. It contains 20 questions regarding ability to perform activities in eight areas (dressing and grooming, rising, eating, walking, hygiene, reach, grip, and activities). The final score ranges from 0 to 3, where 0 indicates no functional impairment and 3 indicates the worst impairment. For some analysis, we divided patients with RA according to their HAQ score into five categories [30]. The BASDAI questionnaire focuses on the subjective assessment of disease activity (or disease status) in patients with AS. It uses six questions. Using a visual analogue scale, patients record their degree of fatigue, spinal pain, joint pain/swelling, areas of localized tenderness, and severity and duration of morning stiffness. The total score can range from 0 to 10, with higher values indicating greater disease activity or limitations. A score higher than 4 indicates very active disease [31].

DAS28 was used for evaluation activity in patients with RA and psoriatic arthritis. DAS28 is derived by assessing the number of swollen and tender joints, sedimentation, and global assessment of the patient [32,33].

The PASI score and BSA were used to evaluate the severity of skin changes (size of the affected BSA) of patients with psoriasis. The PASI score ranges from 0 to 72; a score of 72 means that the patient is having erythroderma. The BSA ranges from 0% to 100%, where the percentage describes the total area of the affected skin [34].

The costs associated with lost work productivity were calculated using the FCA [23,35,36]. Loss of productivity was then calculated to include the time necessary to replace and train the new employee, after which it is assumed that the original productivity is restored. This time period (friction period) was set to 130 working days according to the present conditions for the Czech Republic [37,38]. The average gross wage in the Czech Republic (€42.85/d, year 2010) was used for the valuation of lost productivity [39]. The cost of lost productivity, using the FCA method, is calculated as follows:

PC_{FCA} = Total loss of work productivity (based on the WPAI score) × Average gross salary for the friction period × coefficient of elasticity. [35,40]

The coefficient of elasticity included in the calculation takes into account certain corrective mechanisms (e.g., replacement of an absent worker by a colleague) at the patient's workplace, so the loss of productivity is partially compensated. The level of this coefficient was 0.8.

In the absence of scores for total loss of productivity (patients with disabilities), the score was replaced with values of 0.42, 0.60, and 0.85 for degree of disability I, II and III, respectively. Values are based on the current definition of the three degrees of disability in the amendment to the Pension Insurance Act No. 306/2008 Coll. § 39 applicable from January 1, 2010.

Statistical Methods

Sociodemographic data, clinical characteristics, individual WPAI scores, and productivity costs are presented using descriptive statistics. Because data were not normally distributed, we have used the nonparametric Wilcoxon two-sample test for the comparisons of two groups of patients and the nonparametric Kruskal-Wallis test when more than two groups of patients were compared.

Subsequently, multiple comparisons of pairs was used to identify paired groups of patients with statistically significant differences in values. Dependence of two categorical variables was tested using the chi-square tests in a pivot table. The relationship between a dependent variable and a set of predictors was identified by using a linear multiple regression model. The power of the interdependence between the two variables was determined using the Spearman's correlation coefficient. Statistical analysis was performed in program R, version 2.15.1 (R Foundation for Statistical Computing, Vienna, Austria).

Results

Patient Characteristics

From a cohort of 400 patients, 77 patients (64.9% women) suffered from RA, 230 patients (41.7% women) suffered from AS, and 93 patients (31.1% women) suffered from psoriasis, with 23 patients having psoriatic arthritis simultaneously. The mean patient age was 47.1 ± 9.5 years (range 22–62). The duration of disease was, on average, 15.7 years; patients with RA had substantially shorter disease durations than did patients with AS and psoriasis (psoriatic arthritis). The lowest number of actively working (full-time or part-time job) patients was those with AS (only 67%). It should be noted, however, that the AS patient group was also the oldest among all diagnostic groups, with a mean age of 49 years. Those with psoriasis had the highest percentage of active workers (95.7%).

Disease activity in patients with RA was rather high, with a mean DAS28 of 5.6 with functional impairment, described by the HAQ score, averaging 1.22 in patients with RA. We also found high disease activity among patients with AS, with a mean BASDAI score of 4.43 out of 10. Disease activity in patients with AS, also measured using the HAQ score, had a mean value of 1.0. It is necessary to mention that this tool was not specific to AS and provided rather less information about the state of patients with AS. With respect to BSA (21.1%) and PASI (12.9) levels in patients with psoriasis, it should also be noted that patients with psoriasis also had active and severe forms of the disease, which is by definition an overlap of 10% in BSA and 10 in PASI, respectively. For further patient characteristics, see Table 1.

Loss of Productivity

No statistically significant differences were observed in absenteeism ($P < 0.108$), presenteeism ($P < 0.109$), overall work impairment ($P < 0.657$), or activity impairment among all diagnosis. Patients

Table 1 – Patients' characteristics (demographic, clinical, and PRO parameters).

Parameter	RA					AS					Ps (PsA)				
	n		%			n		%			n		%		
	Mean	SD	Median	Min	Max	Mean	SD	Median	Min	Max	Mean	SD	Median	Min	Max
Number of patients	77		100.0			230		100.0			93 (23)			100.0 (100.0)	
Work-active (full-/part-time job) patients	58		75.3			154		67.0			89 (19)			95.7 (82.6)	
Women	50		64.9			96		41.7			28 (9)			30.1 (39.1)	
Age (years)	45.3	9.6	47.0	24.0	61.0	49.3	8.7	50.0	22.0	61.0	43.3 (45.5)	10.0 (8.1)	44.0 (48.0)	23.0 (31.0)	62.0 (59.0)
Disease duration (years)	7.4	6.8	5.0	1.2	40.0	18.0	9.6	17.0	0.0	44.0	17.0 (16.2)	11.7 (9.8)	15.0 (21.5)	0.4 (0.4)	50.0 (42.0)
$HAQ^{RA,AS}$, BSA (%)$^{Ps(PsA)}$	1.2	0.7	1.0	0.1	2.9	1.0	0.6	1.0	0.0	2.6	21.1 (25.3)	19.2 (22.1)	15.0 (18.0)	2.0 (5.0)	90.0 (75.0)
$DAS\ 28^{RA}$, $BASDAI^{AS}$, $PASI^{Ps(PsA)}$	5.6	0.7	5.7	3.4	6.8	4.4	2.1	4.4	0.0	9.2	12.9 (14.0)	11.9 (7.9)	15.8 (11.8)	0.4 (3.0)	43.4 (35.4)

AS, ankylosing spondylitis; BSA, body surface area; BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; DAS28, Disease Activity Score in 28 joints; HAQ, Health Assessment Questionnaire; PASI, Psoriasis Area and Severity Index; PRO, patient-reported outcome; Ps, psoriasis; PsA, psoriatic arthritis; RA, rheumatoid arthritis.

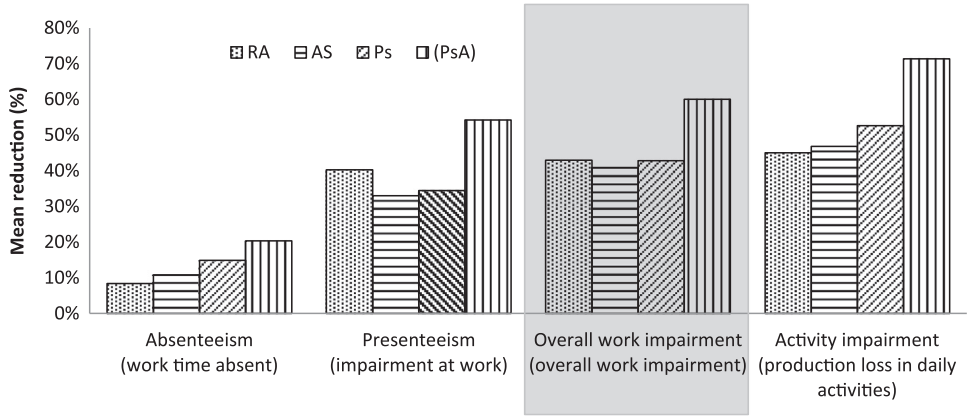

Fig. 1 – Work productivity and activity impairment (WPAI) domains.

with psoriasis and psoriatic arthritis were absent from work most often compared with patients with the other diagnoses; absenteeism was 14.9% and 20.3%, respectively. In other words, patients with psoriasis were absent from work on average 6 hours per week and patients with psoriatic arthritis missed one entire workday per week (i.e., 8 hours). Patients with RA and AS missed approximately 4 hours per week; absenteeism was 8.4% and 10.8%, respectively.

All groups of patients in our study had impaired work performance. Presenteeism was 40.3% in the group of patients with RA, whereas it was lower, 33.0% and 34.4%, for patients with AS and psoriasis, respectively. The highest presenteeism was in those with psoriatic arthritis, with a mean value of 54.2%. In other words, patients with RA worked with reduced performance due to illness for approximately 2 d/wk. Patients with AS and psoriasis worked with reduced performance for shorter time periods than did those with RA, for example, 1.7 d/wk. Performance impairment was greatest among patients with psoriatic arthritis, who spent 2.5 d/wk working at reduced levels.

After combining absenteeism and presenteeism into one number, the total loss of productivity was expressed. Patients with AS, RA, and psoriasis (psoriatic arthritis) reported overall work productivity losses of 40.9%, 42.9%, and 42.8% (60.0%), respectively. According to these figures, we can conclude that patients with rheumatic disease lost more than 2 d/wk of productivity because of illness. Their activity impairment was approximately 50.0%; however, for patients with psoriatic arthritis, it was more than 70%. See Fig. 1 for the results of all WPAI domains in all diagnoses concerned.

Functional status (HAQ) was a statistically significant predictor of overall loss of productivity. Deterioration of functional status, as described by the HAQ score in patients with RA and AS, yielded higher overall loss of productivity. Patients with AS and RA and reduced functional status (HAQ score >2.1) had 75.5% and 52.3% greater productivity losses compared with patients with a relatively preserved function status (HAQ score <0.6). Another major predictor of productivity loss was disease activity. For patients with AS and RA, the more active the disease, the greater the loss of productivity. Patients who have highly active disease lost at least one fourth of their work time because of work impairment. Different trends were observed among patients with psoriasis (psoriatic arthritis), in whom greater overall work productivity impairment was observed in those with better PASI scores and BSA than in worse compensated patients, which can be explained in the following way. In general, patients with psoriasis had longstanding disease, in which progression of disease without any intervention is common; therefore, controlling the disease requires time-consuming treatment and care (phototherapy, etc.), which significantly interferes with productivity. However, this can also be just the specificity of the cohort surveyed because there are several studies describing the PASI score as the relevant predictor of direct and productivity costs in patients with psoriasis (psoriatic arthritis) [41–43]. See Table 2 for the results of subgroup analysis according to functional and disease activity relative to overall productivity impairment.

Productivity Costs

Total mean annual productivity costs per patient with RA, AS, and psoriasis (psoriatic arthritis) were €1913, €1809, and €1908 (€2673), respectively (Table 3). When we translate these figures into population levels, we can, for example, calculate the productivity costs of all patients with AS (in the productive age 18–65 years) in the Czech Republic (8300 patients [4]) to be approximately €14.8 million per year. This number represents the maximum possible PC (or loss of productivity) because not all patients with AS would be in such a highly active disease state as was the case in our patient cohorts.

Regression Analysis and Correlation

By application of a multiple linear regression model, we identified the main predictors of overall productivity loss for each diagnostic group. The functional status of the patient is a statistically significant factor ($P < 0.001$) that affects productivity loss in patients with RA. We calculated that if the functional status of patients with RA gets worse, that is, the HAQ score increases by 0.22 (minimum clinically important difference), the productivity loss would increase by 5.3%. However, other variables used in the model affected the loss of productivity in patients with RA just numerically without statistical significance. Instruments such as the HAQ and the BASDAI can be considered significant predictors of productivity loss in patients with AS. In cases with increased disease activity, that is, the BASDAI score increases by one unit, loss of productivity would increase by 6.2% in patients with AS. No statistically significant predictors were found using multiple linear regression models for patients with psoriasis (psoriatic arthritis). Overall, work productivity impairment was strongly correlated with patient-reported outcomes (HAQ and BASDAI), whereas correlations with clinical parameters were rather weak. See Table 4 for correlation analysis results.

Conclusions

This study described the impact of RA, AS, psoriasis, and psoriatic arthritis on the work productivity of patients with active diseases. The study also compared the impact of these diseases relative to

Table 2 – The loss of productivity by functional and clinical parameters.

WPAI, RA			**HAQ**			
	<0;0.6>	**(0.6;1.1>**	**(1.1;1.6>**	**(1.6;2.1>**	**(2.1;3.0>**	**p-value**
	30.1%	34.6%	55.2%	50.7%	82.7%	0.001*
			DAS28			
	<0;2.6>	**(2.6;3.2>**	**(3.2;5.1>**	**(5.1;10>**		**p-value**
	NA	NA	41.6%	43.2%		0.202
WPAI, AS			**HAQ**			
	<0;0.6>	**(0.6;1.1>**	**(1.1;1.6>**	**(1.6;2.1>**	**(2.1;3.0>**	**p-value**
	24.5%	40.0%	55.7%	73.3%	100,00%	< 0.001†
			BASDAI			
	<0;4>	**(4;10>**				**p-value**
	26.5%	57.6%				<0.001
WPAI, Ps (PsA)			**PASI**			
	<0;5>	**(5;10>**	**(10;72>**			**p-value**
	63.4% (70.2%)	37.0% (62.4%)	43.4% (57.7%)			0.120 (0.841)
			BSA (%)			
	<0;5>	**(5;10>**	**(10;72/100>**			**p-value**
	68.1% (97.9%)	29.7% (49.5%)	43.6% (56.5%)			0.006‡ (0.155)

AS, ankylosing spondylitis; BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; BSA, body surface area; DAS28, Disease Activity Score in 28 joints; HAQ, Health Assessment Questionnaire; PsA, psoriatic arthritis; PASI, Psoriasis Area and Severity Index; Ps, psoriasis; RA, rheumatoid arthritis; WPAI, Work Productivity and Activity Impairment.

* HAQ, RA: <0;0.6> vs. (2.1;3.0>.(0.6;1.1> vs. (2.1;3.0>.

† HAQ, AS: <0;0.6> vs. (0.6;1.1>.<0;0.6> vs. (1.1;1.6>.<0;0.6> vs. (1.6;2.1>.<0;0.6> vs. (2.1;3.0>.(0.6;1.1> vs. (1.1;1.6>.(0.6;1.1> vs. (1.6;2.1>.

‡ BSA, PS: <0%;5%> vs. (5%;10%>.

each other. Furthermore, the productivity costs, and in particular the productivity loss to society in the Czech Republic, were calculated. The effect of factors such as patient functional status and disease activity on work productivity was observed. A statistically significant effect, relative to loss of productivity, was described by using multiple linear regression models and the power of mutual dependence was described by correlations. The data about productivity losses are in general considered as rather low transferable among various countries and governmental settings [44]. Hence, we find this study relevant and potentially interesting because in the Central and Eastern Europe region, there are very limited figures describing productivity losses and their derived costs.

Limitations of this comparison are related to the heterogeneity of patients with different diagnoses with respect to the duration of disease. All comparisons of patients with different diagnoses, however, are always questionable with regard to the heterogeneity of the diagnoses themselves. Another limitation of the study could be the absence of a control group. For example, the article by Braakman-Jansen et al. [45] described the work impairment due to RA in patients with RA; however, a work impairment was also described within the control group without the disease [45]. Moreover, some compensation mechanisms for lost productivity have been described, which means that the lost productivity of an individual does not have to necessarily mean the same loss to society because individual productivity loss can be compensated by other individuals. Hence, the directly measured productivity impairment of individuals (and its derived costs) should be interpreted with caution [46].

We found that the loss of productivity is similar for all the three diagnoses but the highest loss of productivity and related costs were recorded in patients with psoriatic arthritis. This phenomenon can be explained by the presence of two diagnoses within a single patient (psoriasis as well as psoriatic arthritis). However, it could also be a characteristic of the group surveyed. Because the number of patients with psoriatic arthritis was low, the final conclusion for psoriatic arthritis burden should be stated with caution. Moreover, other studies describing the burden of rheumatic diseases had not reported a significant difference in productivity loss (costs) among the diagnoses of AR, AS, and psoriatic arthritis [13,47].

HAQ scores and the BASDAI in contrast to the DAS28, BSA, and PASI score were significantly more predictive of the overall productivity loss, and therefore the costs related to it. The results of our study are consistent with previously reported findings [8,29,48]. A limitations of our analysis may be the fact that the operability of the AS population was not evaluated using the BASFI questionnaire.

The average annual cost per patient was calculated to be approximately €2000. The study also reveals the importance of collecting patient-reported outcomes and not dealing strictly with clinical parameters that appear to be less significant in relation to the quality of life of patients and their productivity. Currently, the health care system and treatment financing in the Czech Republic only considers the direct costs of health care. All costs or losses in connection with the disease, however, should be addressed comprehensively, not just through the myopic eye of health care costs.

Table 3 – Productivity costs.

FCA (€)	Mean ± SD	Median	Min	Max
RA	1912.7 ± 1077.0	1782.4	0.0	4456.0
AS	1808.6 ± 1261.8	1782.4	0.0	4456.0
Ps (PsA)	1908.1 ± 1377.5 (2672.9 ± 1243.7)	1782.4 (2958.8)	0.0 (222.8)	4456.0 (4456.0)

AS, ankylosing spondylitis; FCA, friction cost approach; Ps, psoriasis; PsA, psoriatic arthritis; RA, rheumatoid arthritis.

Table 4 – Spearman's correlation coefficient between overall work productivity loss or productivity cost (FCA).

Correlation between overall WPAI/PC_{FCA} and parameter	RA		AS		Ps (PsA)	
	r^S	*P*	r^S	*P*	r^S	*P*
$HAQ^{RA,AS}$, BSA (%)$^{Ps(PsA)}$	0.504	<0.001	0.618	<0.001	0.052 (−0.317)	0.630 (0.185)
DAS 28^{RA}, $BASDAI^{AS}$, $PASI^{Ps(PsA)}$	−0.099	0.465	0.665	<0.001	0.013 (−0.212)	0.906 (0.385)

Note. RA: r^s (0–0.19 weak correlation, 0.20–0.38 moderate correlation, 0.39–1 strong correlation); AS: r^s (0–0.11 weak correlation, 0.12–0.22 moderate correlation, 0.23–1 strong correlation); Ps: r^s (0–0.17 weak correlation, 0.18–0.34 moderate correlation, 0.35–1 strong correlation); PsA: r^s (0–0.34 weak correlation, 0.35–0.69 moderate correlation, 0.70–1 strong correlation).
AS, ankylosing spondylitis; BSA, body surface area; BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; DAS 28, Disease Activity Score in 28 joints; FCA, friction cost approach; HAQ, Health Assessment Questionnaire; PASI, Psoriasis Area and Severity Index; PRO, patient-reported outcome; Ps, psoriasis; PsA, psoriatic arthritis; RA, rheumatoid arthritis; r^s, Spearman correlation coefficient.

Interventions that can substantially improve the patient-reported outcomes and functionality of patients could also then preserve the productivity of patients with a particular health problem. Therefore, these interventions save indirect/productivity costs, which is the issue of biologic disease-modifying antirheumatic drugs that have proved their ability of productivity preservation in various rheumatic diseases and psoriasis [49,50]. Because of the relatively high acquisition cost of biologic disease-modifying antirheumatic drugs, even the inclusion of the productivity cost in the relevant costs (from the societal perspective) may not have led to the cost-effectiveness of biologic disease-modifying antirheumatic drugs intervention [3,51].

If a particular health care system (i.e., the Czech Republic) opts to use other costs (the loss of productivity) and other outcomes (employability) in the reimbursement decision-making process, it is important to start by adequately describing the burden of each particular health care problem with respect to productivity under Czech conditions, because productivity loss calculations are country-specific, and with limited transferability [44]. This approach would be able to clearly describe the appropriate and comprehensive effect of treatment and intervention. The first step toward this goal should be active data collection on quality of life, functional disability, and effect on productivity.

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